(No Model.) 2 Sheets—Sheet 1.

J. M. WESTERLIN.

CONDENSER.

No. 519,654. Patented May 8, 1894.

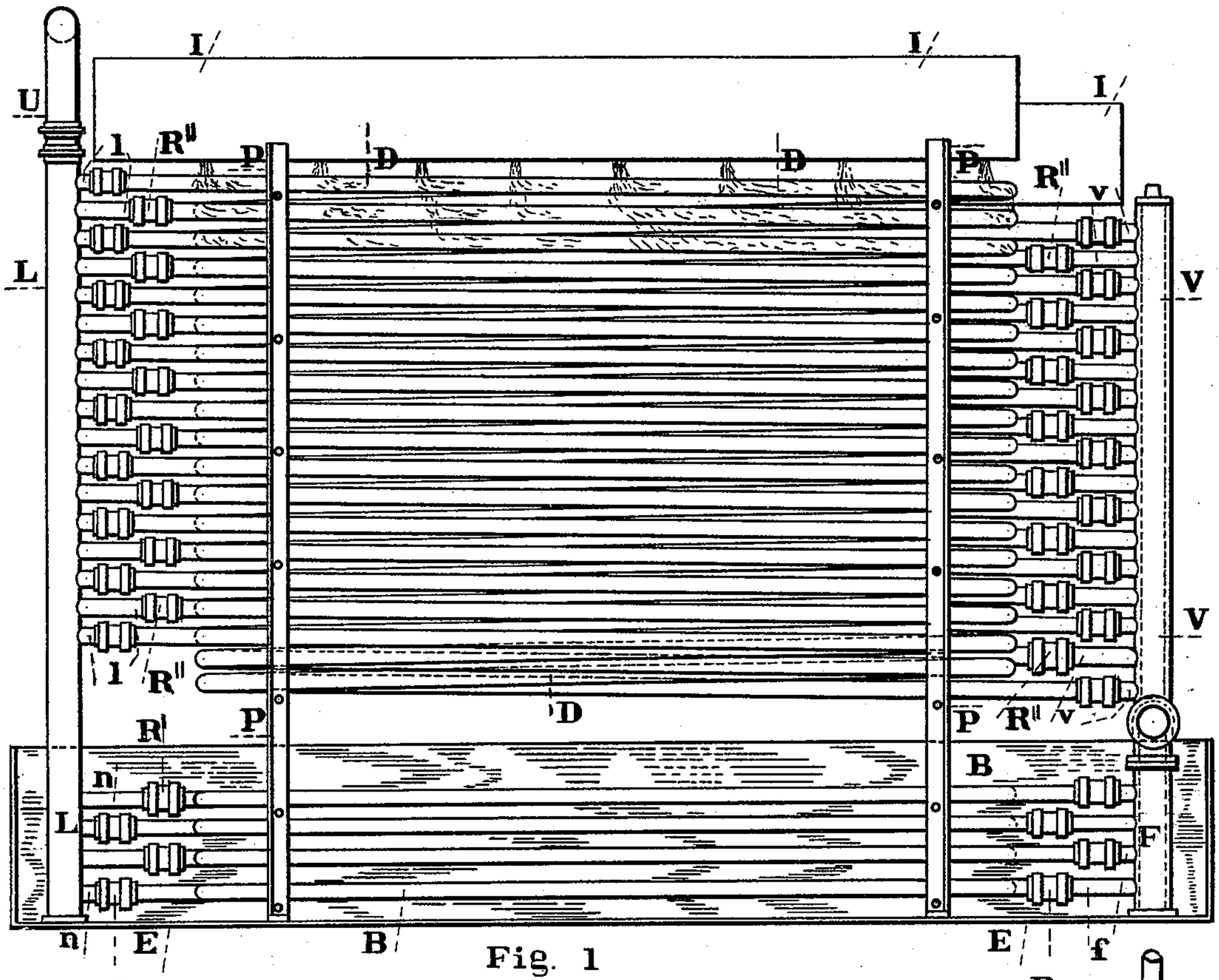

Fig. 1

Fig. 2

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(No Model.) 2 Sheets—Sheet 2.

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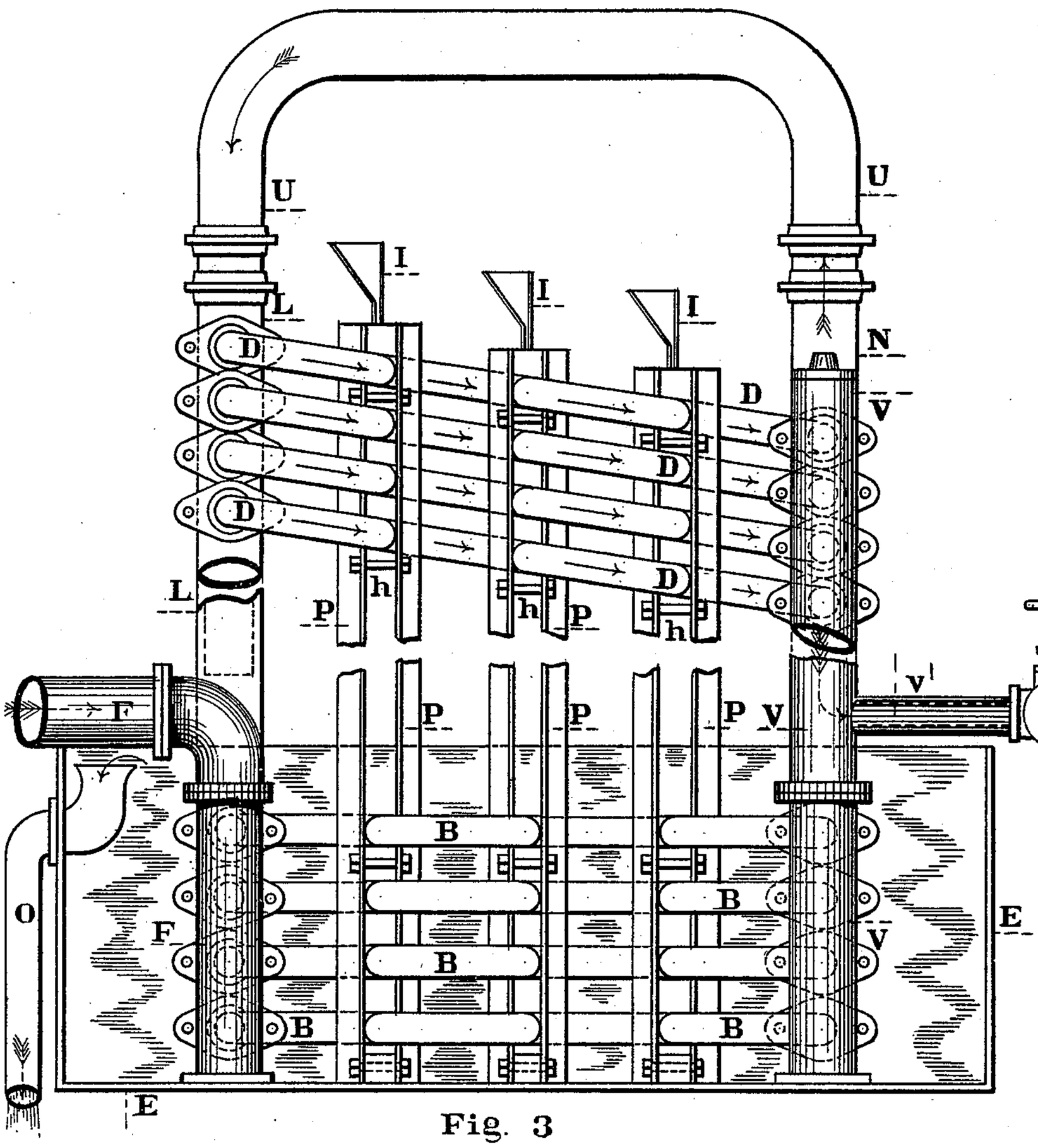

Fig. 3

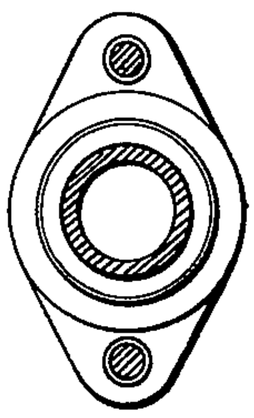

Fig. 5

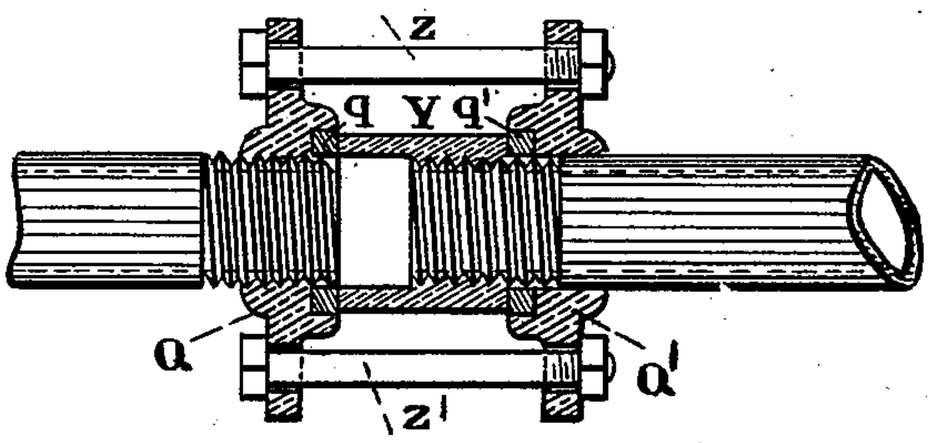

Fig. 4

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UNITED STATES PATENT OFFICE.

JOHN M. WESTERLIN, OF CHICAGO, ILLINOIS.

CONDENSER.

SPECIFICATION forming part of Letters Patent No. 519,654, dated May 8, 1894.

Application filed January 5, 1894. Serial No. 495,847. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. WESTERLIN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Condensers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to condensers of a class known as surface condensers, in which a vapor or gas is passed through a series of pipe coils, and is condensed by coming in contact with the inner and cold surface of metal of the pipes, and which are outwardly exposed to the cooling influence of the atmosphere and also of a stream of cold water distributed in the form of sprayed water over the pipes from convenient receptacles; said condenser being particularly adapted for use in the process of artificial refrigeration employing anhydrous ammonia or other analogous gases as refrigerants; and the improvements consist in certain details of construction, as will hereinafter be fully set forth.

In the accompanying drawings, which illustrate my improvements in condensers, Figure 1, is a side elevation. Fig. 2 is a plan view. Fig. 3 is an enlarged end elevation of part of the condenser, a few layers only of the upper series of pipe coils being shown, as said pipe coils are merely duplicates of each other. Fig. 4, is a sectional view of a pipe coupling used to connect the pipe coils to the vertical pipes of the condenser. Fig. 5, is an end elevation of either of the flanges composing the pipe coupling.

The condenser consists in an upper and lower series of pipe coils, and other pipes connected therewith, that the vapor or gas to be condensed in its passage through the condenser, is at first admitted to the lower series of pipe coils B, and from these conveyed to an upper series of pipe coils D. The lower series of pipe coils designated by letter B, is represented in Fig. 2 by the pipe coil shown entirely in full lines. The upper series of pipe coils designated by letter D, in the several figures is represented partly by full and partly by dotted lines, in the plan view or Fig. 2, the ends and also the bends of said pipe coils being shown by dotted lines. The lower series of pipe coils B, is situated in a tank E, preferably made of sheet metal and adapted to hold water, that the said lower series of pipe coils can be entirely submerged. To the bottom of tank E, are located vertical pipes F, V, L, N, that connect with the upper and lower series of pipe coils B, D. The tie-posts P, are also secured to the tank bottom, and are connected with each other by bolts *h*, that each individual pipe coil is thereby clamped and supported by the tie-posts and the said pipe coils also firmly bound all together, that the entire weight of the pipe coils is supported by the tie-posts P. The vertical pipe or header F, rests upon the tank bottom, and connects with the several pipe coils B located in the tank E, by an equal number of branch pipes *f*, that take into the union pipe couplings R. The vertical pipe or header N, rests upon the tank bottom, and connects with the several pipe coils located in the tank E, by an equal number of branch pipes *n*, that take into the union pipe couplings R′. The vertical pipe or header N, is connected at its upper end by a union pipe U, to the vertical pipe or manifold L. The vertical pipe or manifold L, is connected with the vertical pipe or manifold V, by a series of pipe coils D, inclined toward the manifold V, that any condensed vapor or gas would naturally flow toward the manifold V. The manifolds L, and V, have each as many branch pipes *l*, and *v*, as there are pipe coils in the upper series of pipes. The upper series of pipe coils D, are connected at their ends to the branch pipes *l*, and *v*, of the manifolds L, and V, by union pipe couplings R″, similar as used with the lower series of pipe coils B. The manifold L, acts as the inlet pipe to the upper series of pipe coils, and the manifold V, serves as the outlet pipe to the upper series of pipe coils. The manifold V, has a branch pipe *v*′, to connect with such other necessary pipe as may be used in the refrigerating system to convey the liquid through, to the refrigerating coils of the refrigerating system. The tank in which the lower series of pipe coils is located, is furnished with an overflow pipe O, to convey

away the waste or overflow water of the tank. The troughs I, situated immediately above the upper series of pipe coils are constructed from sheet metal, and are used to distribute water over the upper series of pipe coils as an agent in keeping said pipe coils cold.

The pipe coupling shown in detail in Figs. 3 and 4, is composed of a short union pipe Y, formed with an internal thread for a limited distance at one end; two flanges Q, and Q′, provided with gaskets q, q', that take into recesses formed in the said flanges, the flange Q, having an internal thread to fit the thread of pipe it takes on to, and the flange Q′ is bored out to pass over the pipe it connects with, and the two bolts z, and z', complete the several parts of the pipe coupling for the pipe coils of the condenser.

Having described the several parts of my condenser, the manner of its use in a refrigerating system with machinery using anhydrous ammonia or other similar gas or fluid as a refrigerant is as follows: Anhydrous ammonia gas when compressed produces heat, and in its change from a gaseous to a liquid state must be deprived of its heat as rapidly as possible that it acquired by being compressed, that the highest amount of useful effect as a refrigerating agent is secured in its use in a refrigerating or cooling system: and to accomplish the foregoing purpose in the most effective manner, and with a modicum use of water, my condenser is arranged with a lower and upper series of pipe coils, through which the anhydrous ammonia used in the system is allowed to pass. The lower series of coils is submerged in water that already had done service as a cooling and condensing agent by having already been distributed by the distributing troughs I, in the form of sprayed or thin sheets of water over the upper series of pipe coils. The upper series of pipe coils is exposed to the cooling influence of the atmosphere as well as the water that is sprayed over them, and as the water is distributed over the upper series of pipe coils, it naturally falls down, and comes in contact more or less with all of the layers constituting the upper series of pipe coils, and the water as it falls from the lowest layer of said pipe coils drops into a tank E, containing the pipe coils B of the lower series. The anhydrous ammonia gas used in a refrigerating system to which my condenser applies develops heat by being compressed in a compressor pump, and as it is required that the ammonia gas should be changed to a liquid state, to again become a refrigerant, it has to be deprived of its heat produced by compression of the ammonia gas in a compressor pump. The ammonia gas as it leaves the cylinder of compressor pump is conveyed by suitable pipes to the inlet pipes F′ of my condenser, and from said pipe the ammonia gas enters the header F, and from which it is distributed into several pipe coils B, situated in the tank E and surrounded with water, and by which the ammonia gas is deprived of a portion of its heat in its passage through the said coils but not sufficient to liquefy it, and from the said pipe coils B, the ammonia gas enters the header N, and from there is conveyed by a union U, to the vertical pipe or manifold L, and from the manifold L, the ammonia gas enters the upper series of pipe coils D, and the ammonia gas coming in contact with the cold inner metal surface of said pipe coils is deprived of sufficient heat by contact with the inner metal surface of the upper series of pipe coils that the ammonia gas becomes a liquid, and runs naturally in the direction of the fall of the said pipe coils, and subsequently drops into the vertical pipe or manifold V, from where it is conveyed by pipe connection with the branch v', of the manifold V, to the refrigerating or cooling pipe coils used in connection with the system to which the condenser applies.

In erecting condensers of the above type, weight is occasionally a very important matter on account of the situation of the condenser and in such cases I prefer to dispense with the water tank E, and merely expose the lower series of pipe coils B, to the constant dripping of the water that is distributed over the upper series of pipe coils D, from the troughs I.

The pipes F, V, L, N, in such cases rest upon the floor of the condenser house, and as the water drips from the upper series of pipe coils it falls upon the lower series of pipe coils B, and is a means of depriving the ammonia gas in the lower series of pipes B, of a certain amount of its heat as it passes through the said pipe coils B, on its way to the upper series of pipe coils D.

This arrangement also gives very satisfactory results in practice, and the lower series of pipe coils should be placed as close to the floor of condenser house as possible that the full benefit of the water as it drips or falls down from the upper series of pipe coils as a condensing agent would be attained.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a surface condenser a series of pipe coils B, having manifolds or headers F, N, at ends of coils, and provided with union pipes or couplings R, R′, by which said pipes are connected to said headers, in combination with an upper series of pipe coils D having manifolds or headers L, V, and provided with union pipes or couplings R″, by which the pipe coils of the upper series are connected to the headers L, V, a union pipe U, joining the outlet header N, of the lower series of pipe coils B, with the inlet header L, of the upper series of pipe coils D, that the ammonia gas as it leaves the lower series of pipe coils is conveyed by the union pipe U to the inlet header L, of the upper series of pipe coils, substantially as shown and described.

2. In a surface condenser a water tank E, containing a series of pipe coils B, having

manifolds or headers F, N, connected to the ends of said pipe coils by pipe couplings, in combination with a series of pipe coils D, having manifolds or headers L, V, connected to the ends of said pipe coils by pipe couplings, a union pipe U, joining the headers N, L, distributing troughs I, situated above the upper series of pipe coils, and tie posts P, clamping and supporting the pipe coils, substantially as shown and described.

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