(No Model.)

2 Sheets—Sheet 1.

J. C. KLINE.

ICE MAKING MACHINE.

No. 274,500. Patented Mar. 27, 1883.

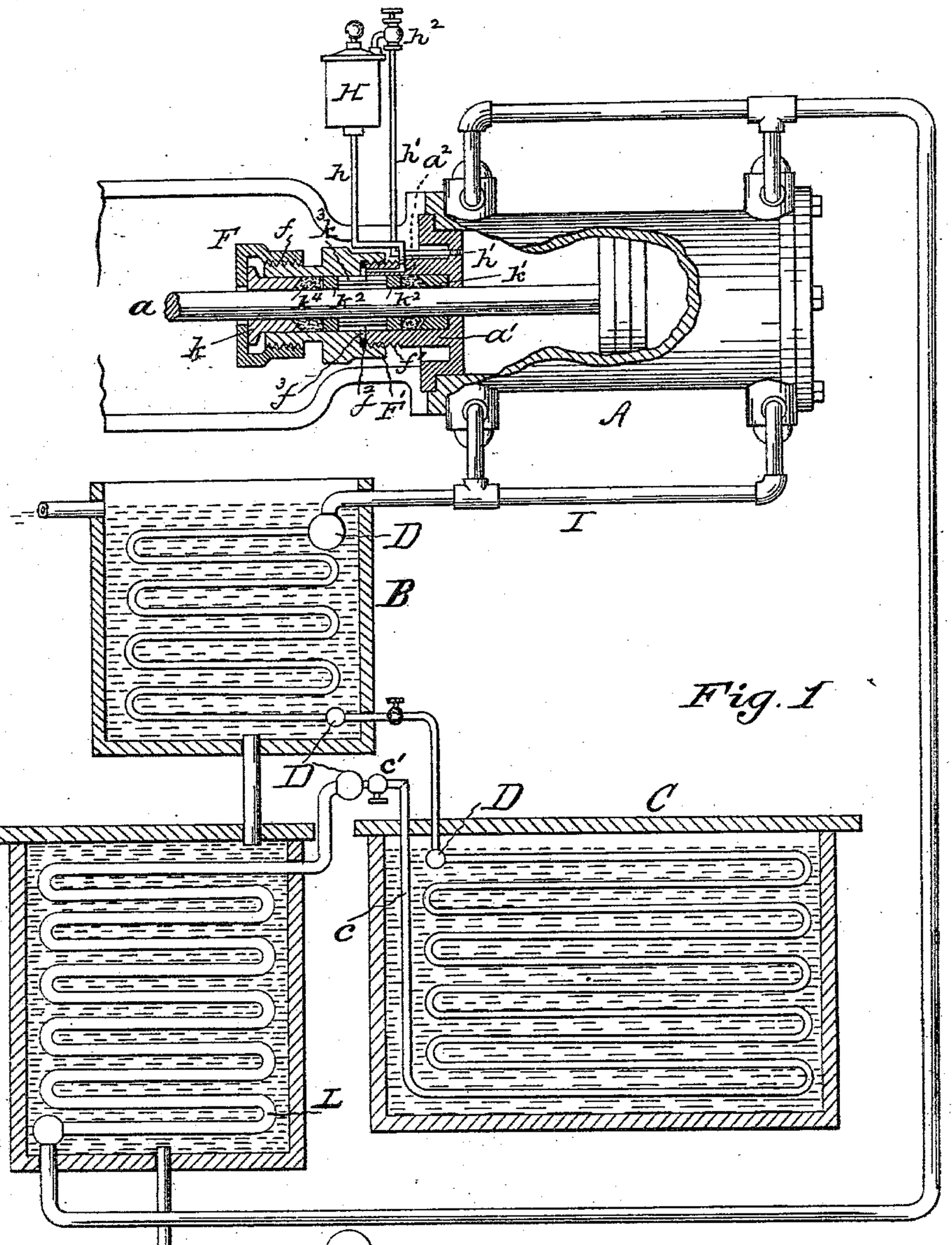

Fig. 1

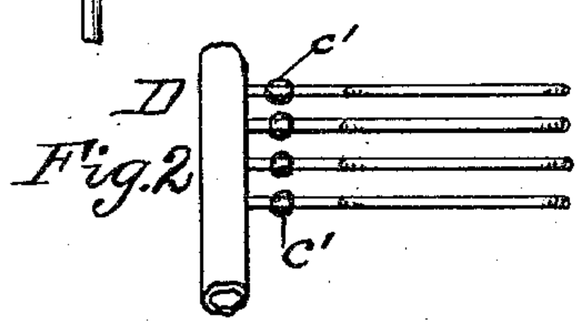

Fig. 2

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(No Model.) 2 Sheets—Sheet 2.

J. C. KLINE.

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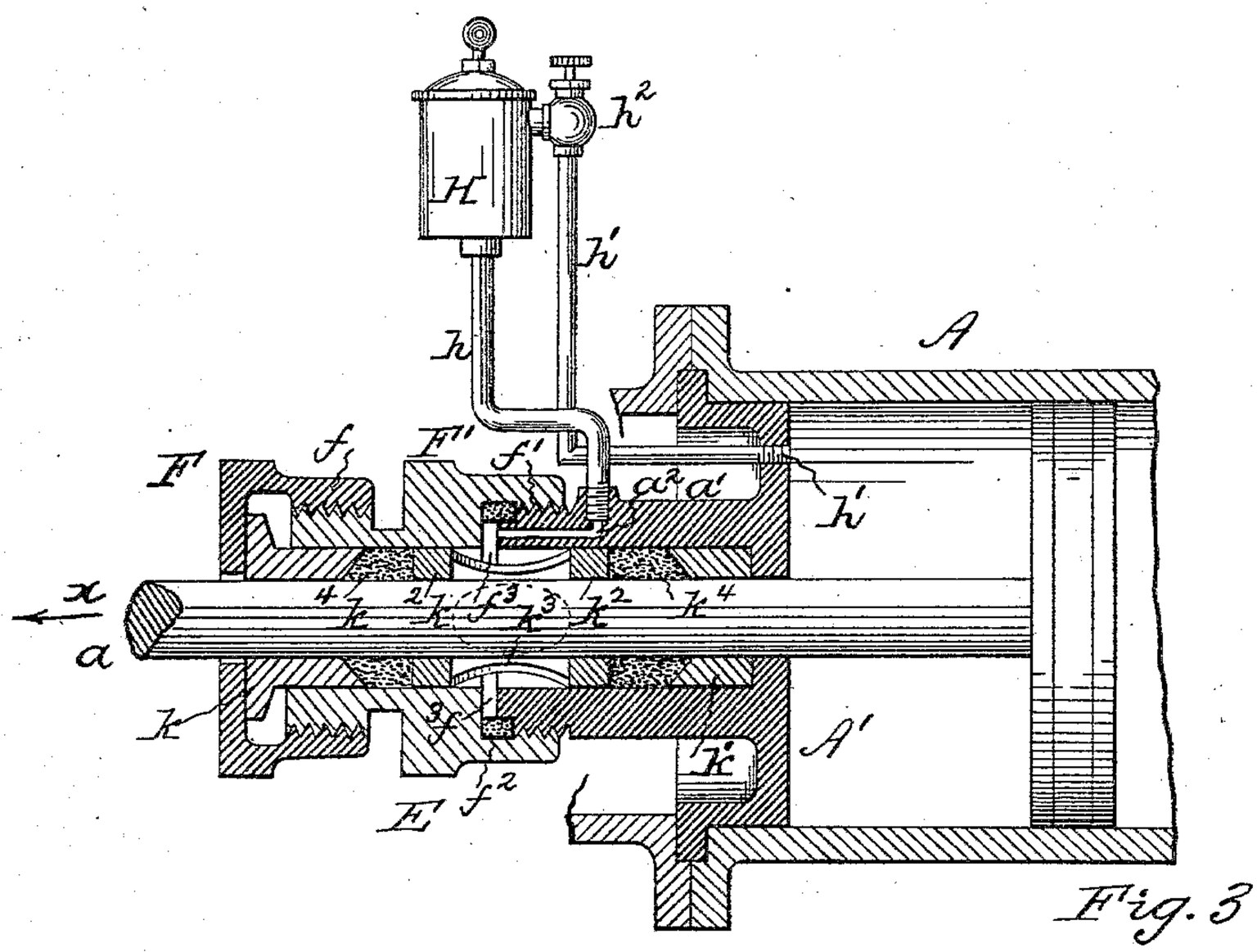

Fig. 3

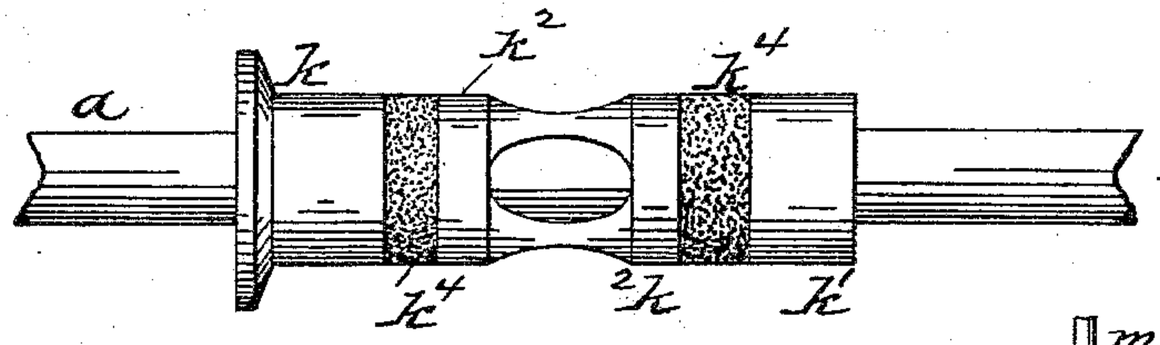

Fig. 4

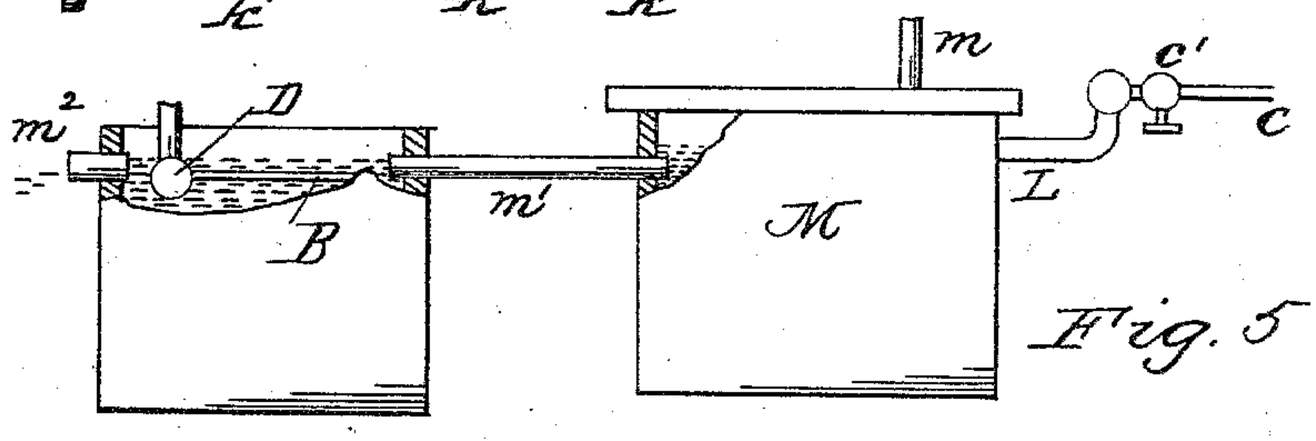

Fig. 5

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UNITED STATES PATENT OFFICE.

JOSEPH C. KLINE, OF PHILADELPHIA, PENNSYLVANIA.

ICE-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 274,500, dated March 27, 1883.

Application filed December 15, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH C. KLINE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Ice-Making Machines, of which the following is a specification, reference being had therein to the accompanying drawings, wherein—

Figure 1 is a sectional view of a theoretical arrangement of the parts of an ice or refrigerating machine for illustrating my improvements. Fig. 2 is a detail plan. Fig. 3 is a detail section of the stuffing-box for the pump piston-rod. Fig. 4 is a plan of the packing therefor, and Fig. 5 is a sectional elevation of a modification.

My invention has relation to that class of refrigerating or ice-making machines wherein the compression and liquefaction of the vapors of a volatile liquid and the subsequent evaporation of such liquid are utilized for producing the refrigerant results; and it has for its object to prevent the forcing of the lubricant from the stuffing-box of the piston-rod into the compressing pump-cylinder; to avoid the admission of air to said cylinder or the leakage of vapor therefrom; to obviate the freezing of the pump or undue back-pressure by the return cold vapor from the refrigerating-tank; to more quickly and economically effect the condensation of the compressed vapor, and to provide for the compression of the vapor with less expenditure of power.

My improvements accordingly consist—

First, of the provision of a pump, the piston-rod stuffing-box of which is connected to a reservoir containing glycerine or other suitable lubricant, having a pipe-connection with the interior of the pump-cylinder, whereby the oil in the stuffing-box is always directly subject to the pressure in the pump-cylinder, thereby providing a packing for the stuffing-box which effectually prevents the ingress of air to said cylinder or the leakage of vapor therefrom, and the forcing of such lubricant from the stuffing-box into the cylinder is avoided.

Second, of the combination, with the condenser, of a reservoir having a coil or a series of coils connecting with the refrigerating-tank and a flow of water or other suitable liquid passing through said reservoir, and from thence through the condenser, so that as the cold vapor from the refrigerating-tank passes through the coils in the reservoir it cools the water therein, which, when it enters the condenser, is utilized to effect a condensation or liquefaction of the compressed vapor. The said cold vapor is thereby rendered less cold, so that when it returns to the pump it does not freeze the latter or produce undue back-pressure. Consequently the pump is operated to insure better results with a decrease of power.

Third, of the novel combination, arrangement, and construction of parts, as hereinafter specifically described and claimed.

Referring to the accompanying drawings, A represents the pump; B, the condenser, and C the refrigerating-tank, which may be constructed and arranged in the usual or other suitable manner. The coils in the condenser and tank, as well as those to be hereinafter described, may consist of a single coil or a series of coils connected to manifolds D, as more plainly shown in Fig. 2.

E represents the stuffing-box for the piston-rod *a*, which is composed of the glands F F′, screwed together at *f* and *f′* to a tubular flange, *a′*, projecting from the cylinder-head A′. A rubber, lead, or other suitable ring, f^2, is interposed between the ends of the gland F′ and the flange *a′*, for preventing said ends being screwed up to each other, thereby providing for an annular space, f^3, which forms a communication between the interior of the stuffing-box and a passage-way or channel, a^2, in the flange *a′*.

Surrounding the piston-rod *a* at each end of the stuffing-box are two rings, *k k′*; and k^2 k^2 are other rings connected by rods k^3, which are located centrally within the stuffing-box, on each side of the space f^3. Between the rings *k k′* and k^2 a flexible or other packing, k^4, is interposed, as shown. If desired, the rings k^2 k^2 may consist of a sleeve with openings therein, as plainly illustrated in Fig. 4.

To the external outlet of channel, a^2, is secured a pipe, *h*, which connects with a vessel or reservoir, H, containing glycerine or other lubricant for the piston-rod. From reservoir H proceeds a pipe, *h′*, provided with valve h^2, leading to the interior of the pump-cylinder

by way of head A′, as shown. The lubricant from reservoir H finds its way through pipe *h*, channel a^2, and space f^3 to the interior of the stuffing-box, inclosed by the rings k^2 k^2, and by reason of pipe *h′*, connecting with the head A′, a communication is made between said stuffing-box and the interior of the pump-cylinder, so that the lubricant in said box is at all times directly subject to the varying pressure in said cylinder. Said lubricant, therefore, also forms a packing for the stuffing-box, which effectually prevents the admission of air to the cylinder and the emission of the vapor therefrom. As the pressure in the cylinder varies the pressure upon the lubricant varies correspondingly. Consequently, said lubricant being always between two equal pressures, it is not forced into the pump-cylinder, as has heretofore occurred when it was subjected to the pressure in the condenser, as the pressure in the latter is greater than that in the pump when the piston begins its stroke.

The provision of the ring *k′* permits of the withdrawal of the packing k^4 when worn out without resorting to the manual operation of picking or pulling it out of the stuffing-box. For instance, when said packing is used up and it is desired to replace it with fresh packing, the gland F is unscrewed and the piston-rod *a* slid in the direction of arrow *x*, Fig. 3. The frictional contact between said rod and said rings and packing causes the last-named parts to move with said rod, and when they emerge from the box the packing is knocked off the piston-rod, fresh packing supplied, and the rod is reversely moved to reinsert the rings and packing in the stuffing-box.

The compressed vapor from the pump passes through pipe I to condenser B, thence to the refrigerating-tank C. From the latter the cold vapor is conducted through pipe *c*, having cock *c′*, to a coil, L, in reservoir M, cools the water flowing thereinto, and is raised in temperature, so that when it arrives at or returns to the pump it is not cold enough to freeze the same or cause undue back-pressure. The cooled water in reservoir M is forced or conducted to the condenser B, and is utilized for causing a liquefaction of the compressed vapor in its coils. Hence such vapor is more quickly and economically condensed than has heretofore been the case. The water in reservoir M may be forced to the condenser by a pump, N, or said vessels may be located in respect to each other as shown in Fig. 5, so that the water from reservoir M will naturally flow into the condenser, *m* representing the inlet of the water-pipe, *m′* the connection, and m^2 the outlet-pipe for said parts. It will thus be seen that a stream of running water is passing through the reservoir M and condenser B.

The cocks *c′* are provided for regulating the flow of vapor passing through the coils in the refrigerating-tank, and they and portions of the pipes *c′* are located outside of the tank, in order that the pipes *c′* may be inspected to ascertain if the vapor is passing through the whole series of pipes. If the flow of vapor is through all the pipes, they will be what is technically called "white"—*i. e.*, covered with frost produced by the freezing thereon of the moisture in the atmosphere; but if one or more pipes have no frost thereon, or are "black," then it is apparent that the vapor is not passing therethrough, whereupon the attendant opens its respective valve *c′* to a greater extent and the vapor soon flows through said pipes, when the valves are again adjusted to their original position. The vapor from the tank C being warmed before passing to the pump, the latter can be worked to better advantage with less power than heretofore has been the case.

What I claim is—

1. The combination, in a compressing-pump, of a cylinder, a piston-rod, a stuffing-box therefor, a reservoir for the lubricant, and a communication from said cylinder through said reservoir to the stuffing-box, substantially as shown and described.

2. The combination, in a compressing-pump, of a cylinder, piston-rod, stuffing-box, reservoir for a lubricant, and means for holding the lubricant in the stuffing-box under the pressure generated in said cylinder, substantially as shown and described.

3. In combination with pump A, the head A′, having flange *a′* and channel a^2, the glands F F′, ring f^2, pipes *h h′*, and reservoir H, substantially as shown and described.

4. The combination, with packing k^4, of the rings *k k′*, located at each end of the stuffing-box E, and piston-rod *a*, substantially as shown and described.

5. In an ice-making machine, the combination of a pump having a stuffing-box the lubricant of which is under the direct pressure generated in said pump, a condenser, a refrigerating-tank, a reservoir of water, a coil therein, connected at one end to the pipe from the refrigerating-tank and at the other to a pipe leading to the pump, and means for conveying or forcing said water from said reservoir to the condenser, substantially as shown and described.

6. The combination of tank C, reservoir M, coil L, condenser B, vapor-pipe I, and water-pipe connections *m*, *m′*, and m^2, substantially as shown and described.

7. In compressing-pumps, the method of preventing leakage of lubricant from the stuffing-box to the pump-cylinder, which consists of subjecting said lubricant to the pressure of the pump, so as to cause it to be under the influence of two opposing equal pressures, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JOSEPH C. KLINE.

Witnesses:
S. J. VAN STAVOREN,
CHAS. F. VAN HORN.