(No Model.)

J. SCHUHLE.

REFRIGERATING MACHINE.

No. 337,874. Patented Mar. 16, 1886.

Fig. 1.

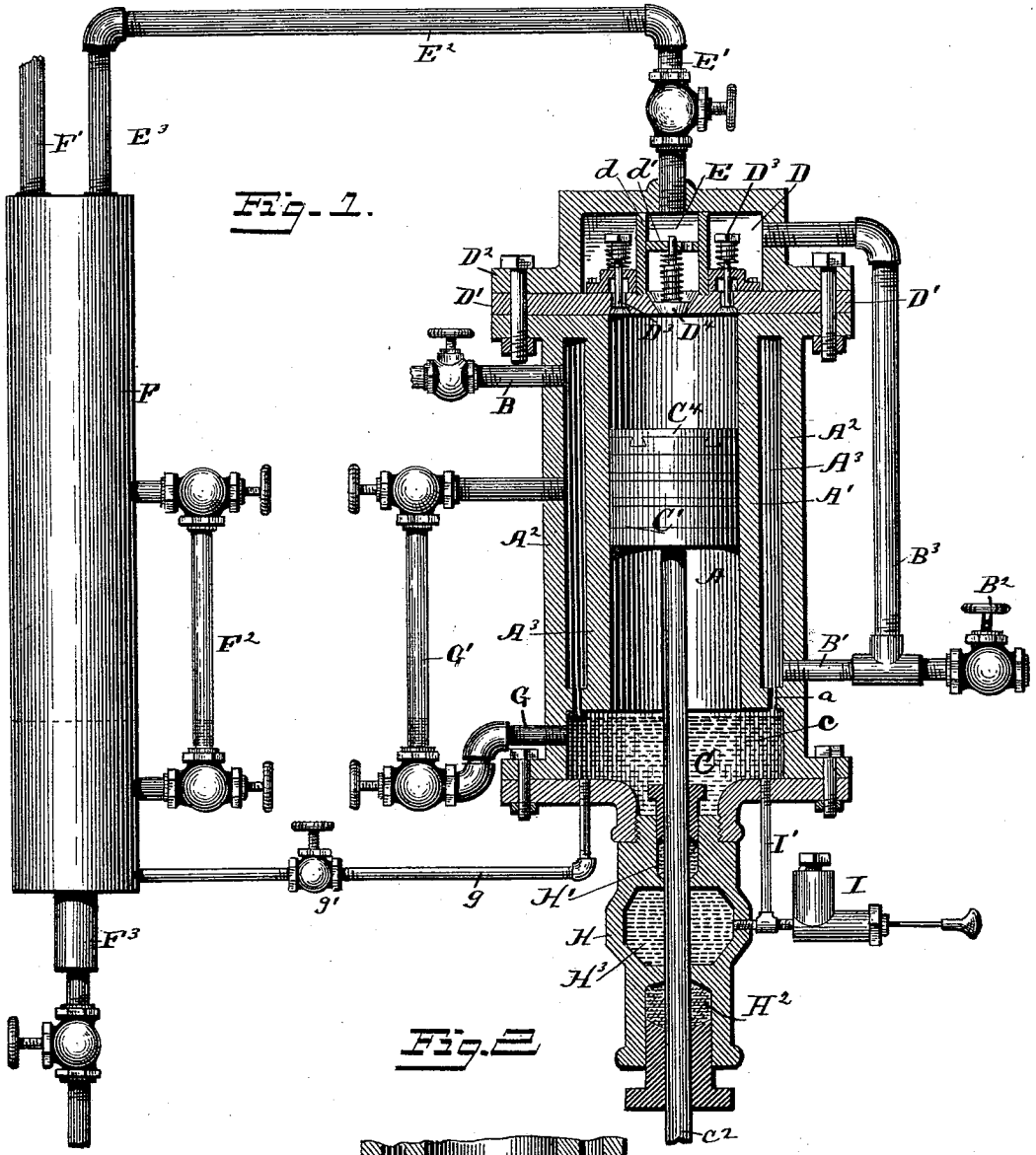
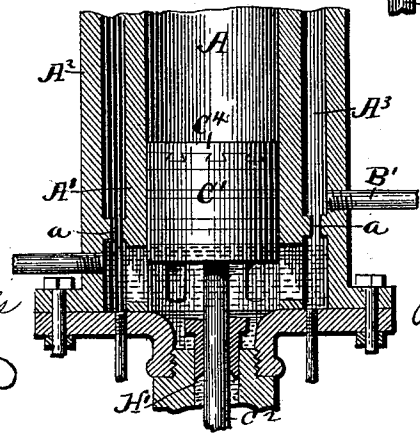


Fig. 2.



Witnesses:

Louis C. Hills

W. B. Masson

Inventor:

Jacob Schuhle

by E. E. Masson

atty.

N. PETERS. Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

JACOB SCHUHLE, OF SAN ANTONIO, TEXAS.

REFRIGERATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 337,874, dated March 16, 1886.

Application filed March 2, 1885. Serial No. 157,636. (No model.)

To all whom it may concern:

Be it known that I, JACOB SCHUHLE, a citizen of the United States, residing at San Antonio, in the county of Bexar and State of Texas, have invented certain new and useful Improvements in Refrigerating-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to that class of refrigerating or ice-making machinery wherein a liquefiable gas, preferably that of ammonia, is introduced into a compression-pump and is compressed to a state of liquefaction, the pressure being subsequently removed, the liquefied refrigerating agent expands with rapidity through tubes, tanks, or other chambers, and, the frigorific effects produced by the volatile liquid again assuming its gaseous state, is utilized for absorption of heat; and the invention consists in certain improvements in the construction of the gas-compressor and its adjuncts, as hereinafter described, and specifically set forth in the claims.

Figure 1 represents the compressor in vertical section and the oil-intercepter in elevation. Fig. 2 is a vertical section of a modification of the lower portion of compressor-cylinder.

Like letters represent like parts in both the figures.

In the drawings, A represents the chamber of an ammonia-gas-compressing cylinder, the walls A′ of which are inclosed in a jacket, A^2, and between these walls and the jacket is an annular space, A^3, into which liquid ammonia is introduced through the pipe B, entering the upper portion of the jacket A^2, to keep the body of the pump at any desired degree of temperature. The walls A and A^2 are cast in one piece, connected at the top and bottom of the cylinder. The ring of metal forming the connection at the bottom is provided with perforations *a*, through which the mineral oil *c* used in the apparatus passes when forced upward or displaced by the piston C′ in its downward course, and through which it returns to the oil-chamber C. The liquid ammonia introduced at B, while cooling the pump, becomes volatilized and passes out through the pipe B′, issuing from the jacket A′ a little above the perforations *a*. This pipe B′ is connected to the freezing-coil, and is provided with a check-valve, B^2, to keep the gaseous ammonia of the chamber A^3 from entering the pipe leading from the freezing-coil, and from increasing the pressure in the freezing-coil. The pipe B′ has also an upwardly-extending pipe, B^3, which connects it with the valve-chamber D, located on top of the pump-cylinder A. The ammonia-vapors issuing from the pipe B′ become mixed with the gas coming from the freezing-coil, and following the pipe B^3 enter into the valve-chamber D. This chamber D is composed of a valve-supporting plate, D′, preferably made of steel, and cap-piece D^2, both being attached to the frame of the cylinder and jacket by bolts passing through their flanges. The plate D′ is provided with a series of supply-valves, D^3, arranged in a circle around a large discharging-valve, D^4. The cap-piece D^2 is provided with inner walls, *d*, which encircle the discharging-valve D^4 and isolate it from the supply-valves. The stem of each valve is guided, as usual, by passing through spider-plates, and said valves are retained against their seats in the plate D′ by springs coiled around their stems. After having entered through the supply-valves D^3 into the cylinder A, above its piston C′, the gases compressed by the action of said piston are forced upward through the discharge-valve D^4 into the chamber E, and thence through the pipes E′, E^2, and E^3 into the oil-intercepting cylinder F, and from said cylinder through the outlet-pipe F′ to the condensing-coil. The chamber C is kept full of crude or mineral oil to lubricate the piston, and also to prevent the gas from escaping through the stuffing-box of the piston-rod C^2. Said chamber is connected with the oil-intercepter F by means of the pipe *g*, provided with a valve, *g*′, to regulate the return of the oil to the chamber C. Issuing from said chamber is a pipe, G, having a glass gage, G′, to indicate the amount of the oil therein. The intercepter is provided with a similar gage, F^2, to indicate when the oil accumulated therein should be forced back to the pump-chamber. The upper end of the piston C′ is provided with a plate, C^4, of lead, about a quarter of an inch thick, having dovetailed tenons to enter dovetailed grooves in the top of said piston and be retained thereby. The purpose of this lead is

to avoid knocking or injuring the plate D′, in case the piston C′ comes too close to said plate when reaching the end of its upward stroke, and by this arrangement all the gas will be expelled from the upper end of the cylinder. The piston on its downstroke will dip a quarter to one half of an inch in the oil within the chamber C, and thus keep the said piston constantly oiled. The openings *a* in the top of said chamber C are to enable any surplus oil to escape into the space A^3, to avoid knocking out the lower piston-head. A portion of the oil forced through the openings *a* will be carried to the valve-chamber through the supply-valves and into the cylinder, and thus keep it well oiled from the top. The stuffing-box H of pump is a separate piece, being screwed into the lower cylinder-head, and is constructed in a manner to have packings H′ H^2 located above and below a small oil-chamber, H^3. By this arrangement no gases or liquids can be lost from the cylinder above. An oil-pump, I, is attached to the side of the small oil-chamber H^3 of the stuffing-box H to supply said chamber with oil. It also supplies the oil-chamber C with oil, when required, through the pipe I′. In the bottom of the cylinder F there is a discharging-pipe, F^3, for the outflow of dirty oil, &c.

In Fig. 2 the lower portion of the pump-cylinder walls A′ is extended the length of the walls of the jacket A^2, and is provided with a series of openings, a^2, for the oil and liquids to pass through into the lower end of the space A^3.

Having now fully described my invention, I claim—

1. In an ice-machine, a pump-cylinder, A, an oil-chamber, C, in the lower end thereof, a jacket, A^2, forming a gas-chamber surrounding said cylinder and provided with openings *a* at the bottom thereof, in combination with a valve-supporting plate, D′, and cap-piece D^2, attached to the upper flange of the jacket A^2, substantially as and for the purpose described.

2. In an ice-machine, a valve-supporting plate, D′, provided with a series of supply-valves, D^3, arranged in a circle around a discharging-valve, D^4, in combination with a cap or cover, D^2, forming a supply-chamber provided with a cylindrical chamber, E, a piston-chamber, A, oil-chamber C, and pipes leading from the chamber C to the valve-chamber D, substantially as and for the purpose described.

3. In an ice-machine, a valve-receiving plate, D′, provided with valves D^3 and D^4, in combination with a piston, C′, and its lead cap secured to the top portion thereof, substantially as and for the purpose described.

4. An ice-machine provided with the cylinder A, jacket A^2, surrounding the same to form an annular space, A^3, and the pipes communicating with said space, and a valve-chamber and oil-chamber at the top and bottom of the cylinder, substantially as and for the purpose set forth.

5. In an ice-machine, a double-walled pump-cylinder, a gas-chamber between them provided with a glass gage, G′, an oil-chamber receiving the lower end of said gage, and a pressure-regulating pipe, *g*, at the bottom, in combination with an oil-intercepting cylinder, F, provided with a glass gage, F^2, an oil-discharging pipe, F^3, at the bottom, and an inlet-pipe, E^3, and an outlet-pipe, F′, located at the top of the oil-intercepting cylinder, substantially as and for the purpose described.

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

JACOB SCHUHLE.

Witnesses:

JOHN TANNIS,

FRED BADEN.