(No Model.) 4 Sheets—Sheet 1.

W. H. WOOD.

REFRIGERATING AND ICE MACHINE.

No. 321,669. Patented July 7, 1885.

FIG. 1

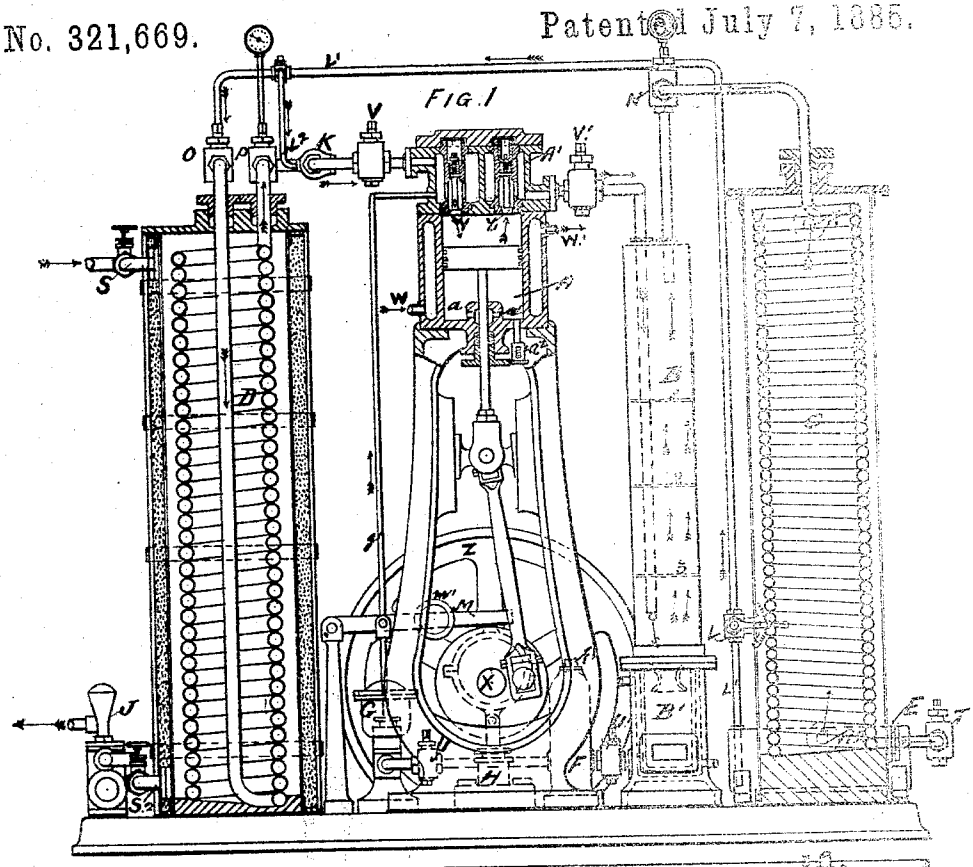
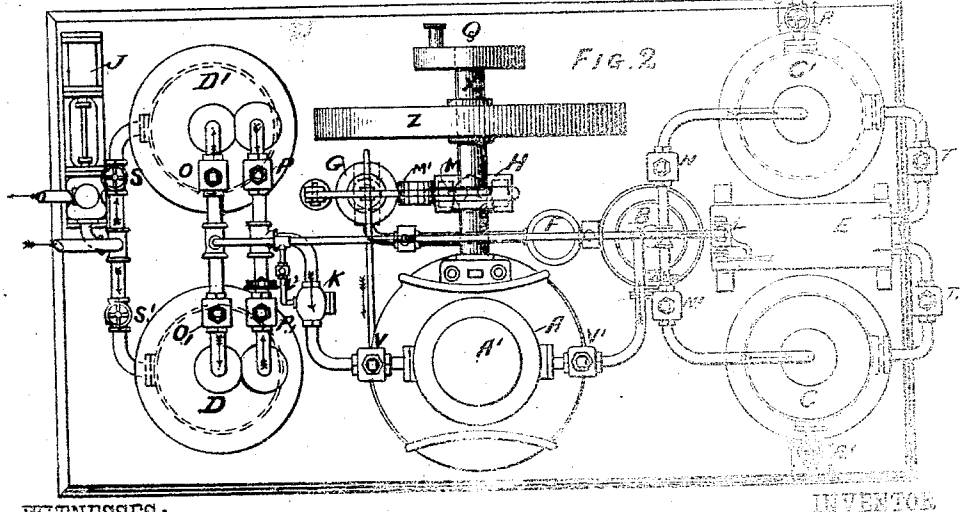


FIG. 2



WITNESSES:

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FIG. 3

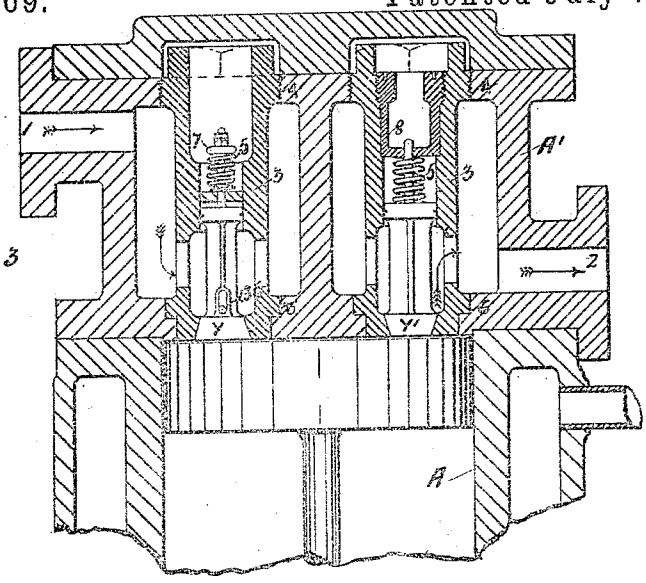
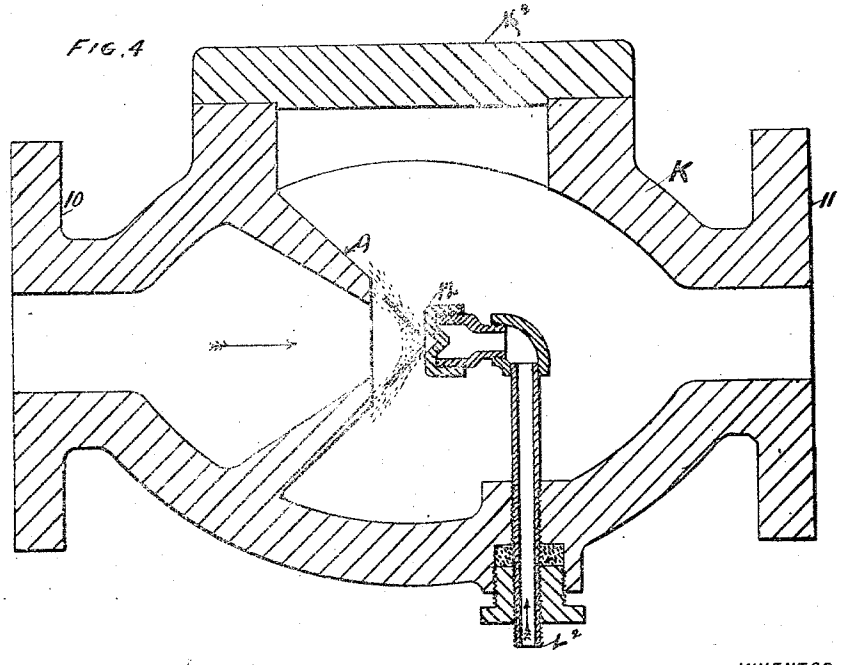


FIG. 4



WITNESSES

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FIG. 5.

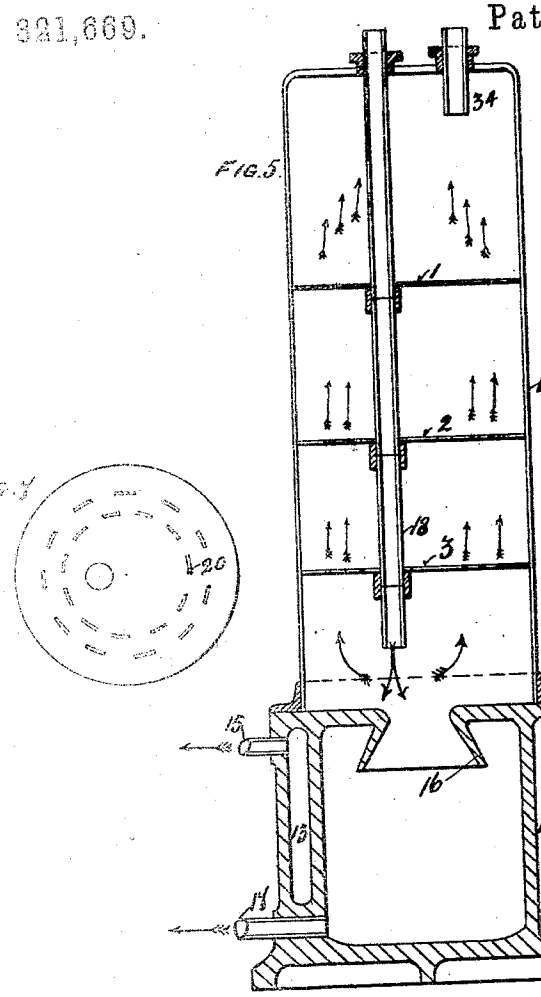


FIG. 7

FIG. 8

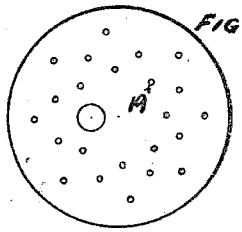
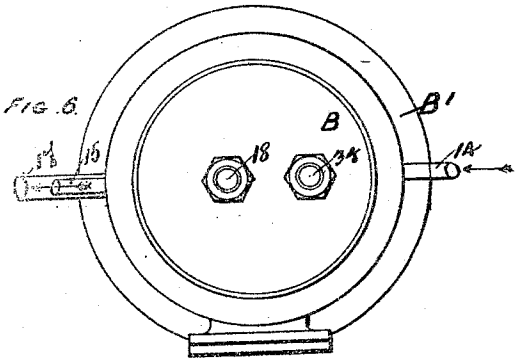


FIG. 6.



WITNESSES

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FIG. 9.

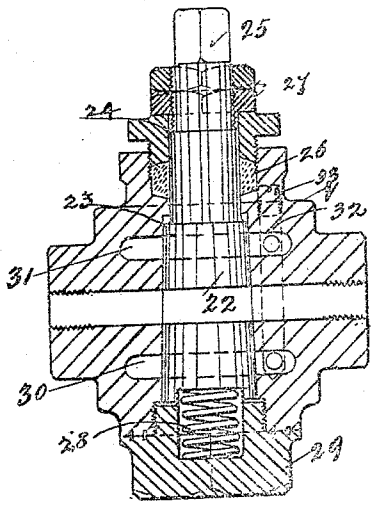


FIG. 10.

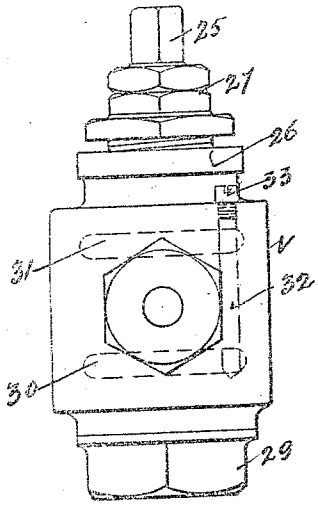
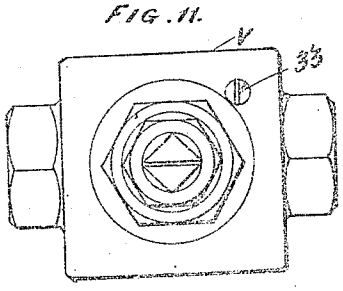


FIG. 11.



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UNITED STATES PATENT OFFICE.

WILLIAM H. WOOD, OF NEW YORK, N. Y.

REFRIGERATING AND ICE MACHINE.

SPECIFICATION forming part of Letters Patent No. 321,669, dated July 7, 1885.

Application filed March 12, 1885. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. WOOD, of New York, in the State of New York, have invented certain new and useful Improvements in Refrigerating and Ice Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form part of this specification.

My improvements relate to that class of refrigerating or ice apparatuses in which the refrigerating effect is obtained by the evaporation of a volatile liquid, the vapors of which are compressed by a pump into the condenser and then liquefied ready to be again subjected to the process of evaporation.

The objects of my invention are the following: First, to prevent overheating of the pump-cylinder, which is the cause of loss of motive power; second, to effect a more perfect stuffing-box of the pump; third, to provide a relief-valve for the pump-cylinder; fourth, to provide a vessel for receiving the lubricating fluid so that the quantity used can be known to have passed through the automatic lubricating-pump to the machine; fifth, to provide an improved receiver for the gas before entering the condensers; sixth, in providing valve-box forming head of cylinder and valves less subject to wear and tear and accompanied with less noise when at work; seventh, in providing duplicate condenser and refrigerator, so that no stoppage can be occasioned by leakage of either one or the other; eighth, in providing improved vapor-cocks for operating the machine.

My invention consists—

First. Of the prevention of overheating of the pump-cylinder by causing a diffusion-valve chamber to be placed between the refrigerator and the vacuum side of the pump, in which a small amount of the liquid ammonia is injected through atomizing-nozzle inside said valve, so that the more rarefied vapor from the refrigerator may be partly saturated in its passage to the pump, which will be evaporated by the heat generated in compressing the gas in the pump.

Second. By placing the stuffing-box inside the pump-cylinder, on which no gas is admitted only that which may escape by the piston in the lubricating-fluid. The recess in the stuffing-box encircling the rod will be covered in the said lubricating-fluid, which will prevent the escape of any of the vapor outside the pump.

Third. In providing a relief-pressure valve on the pump-cylinder. In case more lubricating-fluid having collected than the clearance would allow for, it can be forced out through said valve without causing damage to the pump.

Fourth. In providing a vessel by which the quantity of lubricating-fluid used can be known and automatically put into the pump-cylinder by the lubricating-pump operated by lever and weight from the cam of cold-water pump. The lever and weight, being lifted, supply the power to elevate the lubricating fluid to the pump, so that the exact quantity may be put in as required for the speed at which the pump is worked.

Fifth. In providing a receiver for the gas with, preferably, a cast-iron bottom, with a jacket for water and with a cowl projecting toward the bottom for preventing any saponified lubricating matter being lifted by the action of the gas, and in case more lubricating-fluid being passed through the pump than is required causing the same to froth or combine with the gas, and the trays which are supported round the inlet-pipe having a number of small holes in them to attest the progress of the lubricating-fluid being carried into the condensing-coil.

Sixth. The providing a separate valve-box forming head of pumps, having valves after the equilibrium type which will to an extent prevent the hammering out of the valve-facings and decrease noise of working said machine.

Seventh. In providing an extra duplicate condenser and refrigerator to prevent stopping the machine in case of leakage in the condensing or refrigerating coils.

Eighth. In providing improved vapor-cocks to prevent the escape of the vapor in operating the machine.

The nature of my improvements is fully illustrated in the accompanying four sheets of drawings, in which—

Figure 1 is a sectional elevation of the complete machine and connections. Fig. 2 is a

plan of same. Fig. 3 is an enlarged drawing, in section, of the top of the compression-pump cylinder A and the valve-box A′ with valves and cages. Fig. 4 is an enlarged drawing, in section, of the diffusion-valve K. Fig. 5 is an enlarged drawing, in section, of the receiver B and the bottom B′. Fig. 6 is a plan of the receiver. Fig. 7 is a plan of the trays. Fig. 8 is a plan of the trays. Fig. 9 is an enlarged drawing, in section, of the vapor-cock V. Fig. 10 is an end view of the vapor-cock. Fig. 11 is a plan of the vapor-cock.

Like letters indicate corresponding parts in all figures.

In Figs. 1 and 3, A designates the jacketed pump-cylinder in which the gas is compressed. At W the cold water is admitted, at W′ it flows away.

A′ is the valve-box and cover, with inlet 1 and outlet branch 2. The openings 4 are threaded to receive the valve-cages 3.

Y Y′ are inlet and outlet valves, with angle seatings at bottom and piston form at top, with extended valve-stems, over which steel spring 5 is seated. The cages 3 are circular, with apertures for inlet and outlet of the gas, and are threaded at 4. The top is hexagon shape for screwing them in their places. The center is bored out to receive top part of valve and stem and for the angular seating at the bottom. The shoulder 6 is for the purpose of forming a double gas-tight joint when the cages are firmly screwed down on the valve-box.

The only difference between the inlet and outlet valve is that one opens inward and the other opens outward; the inlet-valve having collar 7 on the stem secured with nut and lock-nut and a steel pin, 36, which is put through the lower part of cage to prevent the valve falling into the cylinder should the valve-stem break; the outlet-valve having a thimble, 8, screwed inside cage for adjusting the spring 5.

a is the compression-pump stuffing-box projecting inside cylinder.

a′ is a recess encircling the pump-rod.

a² is the relief-valve to relieve the amount of liquid that may collect inside the cylinder A.

D is the refrigerator.

The pipes connected with the vapor-cocks P and P′ are for operating either one refrigerator or both together.

In Figs. 1, 2, and 4, K is the diffusion-valve, which has a cone-shaped orifice, 9, in center. The atomizing-nozzle 12 is connected to the pipe L′. The hand-plate K² is for adjusting the nozzle 12. The flanges 10 and 11 are for connecting with the pipes coming from the vapor-cocks P and P′ to the vapor-cock V, which conducts the gas from the refrigerator to the compression-pump. The pipe connecting with vapor-cock V′ is where the compressed gas is forced into the receiver.

In Figs. 1, 2, 5, 6, 7, 8, B is the receiver, having cast-iron bottom B′, with space for water-jacket, the inlet-pipe for water, 14, and the outlet 15, the cone 16 facing downward to the bottom, and the pipe 17 for discharging the lubricating-fluid. The trays 1 2 3 in the upper part of the receiver B are attached to inlet-pipe 18, and have a number of small holes, 19, or slots, 20, drilled or punched in same. The pipe from the receiver to the vapor-cock N and N′ convey the gas from the receiver to the condensing-coils. The vapor-cocks N and N′ are to operate one condenser or both together. The pipes to which the vapor-cocks T and T′ are connected are to operate one condenser or both together, and through them the liquid flows to the collecting-drum.

D is the collecting-drum, having holes to receive pipes from cocks T and T′, and for the outlet-pipe L′, connecting with the expansion-cock.

L is the expansion-cock, on which is fitted suitable lever, with graduated plate to adjust the amount of liquid passing through to the vapor-cocks O and O′ to the refrigerators. The pipes to which the vapor-cocks O and O′ are connected to operate one refrigerator or both together, the supply coming from the pipe L′. Connected thereto is the small pipe L², which connects with the diffusion-valve K for admitting the liquid to the atomizing-nozzle.

F is a vessel to hold a known quantity of lubricating-fluid, charged at F′, and for convenience it may be connected at or near the bottom of the receiver B for the purpose of taking lubricating-fluid that may settle in the bottom of it, if suitable for rinsing, by opening the cock U′ into the vessel F. The pipes connecting the cock U′ and U convey the lubricating-fluid to the lubricator-pump.

G is the lubricator-pump.

M is the lever.

m′ is the weight operated by the cam for working the cold-water pump H for forcing the lubricating-fluid to the compression-pump through the pipe *g′*; the pipe and valves to inlet R² for admitting the condensing-water to the casing encircling the coils. The pipes and valves to outlet R are where the condensing-water can flow away to the sewer.

C and C′ are the condensing-coils, which are connected to operate one coil or both together.

The pump H is for taking water from a tank and putting it into the condenser-casings, operated by a cam on the engine and pump-shaft X. The pipes and valves to inlet S are for admitting the refrigerating medium to the casings encircling the coils. The pipes and valves to outlet S² are where the refrigerating medium is drawn from the casing by the circulating-pump.

D D′ are the refrigerating-coils, and are connected together to operate one coil or both together.

J is the pump for circulating the refrigerating medium to the rooms to be cooled or to the tanks for making ice.

Q represents crank of a suitable engine to work the apparatus, which is preferably placed on the same bed-plate as whole machine.

In Figs. 1, 2, 9, 10, 11, the vapor-cock V is provided with a solid plug, 22, put in body of the

valve the reverse way to what is usual. At or near the top it is shouldered down at 23 for packing-gland, and at 24, where it is threaded for nut and lock-nut, and nut 27, having a square, 25, at the extreme end for operating it. The stuffing-box 26 is threaded for a gland to screw the packing down tightly. The nuts 27 are to keep the plug tight in its position, although it is temporarily held there, when requisite to pack it, by the spiral spring 28 under the bottom side of plug, which is made gas-tight by the screwed cap 29. The circular cavities 30 and 31 are to be filled with lubricating-fluid, and are connected with a vertical hole connecting the two, so that they can be filled from time to time by taking out the threaded plug 33. The lubricating serves to keep the plug so that it can be easily moved, and it prevents the gas escaping round the plug into the atmosphere.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. In a refrigerating-machine, the diffusion-valve chamber K, with the cone-shaped orifice 9, adapted to inject the liquefied vapor in the form of a mist through the injecting-nozzle 12 from the pipe L^2, with the hand-plate K^2, the flanges 10 and 11, placed between the refrigerator and the vacuum side of the compression-pump, all substantially as and for the purpose specified and set forth.

2. In combination with a refrigerating-machine, the vessel F, for holding a known quantity of lubricating-fluid, automatically taken therefrom and put in the compression-pump cylinder by the lubricator-pump G, operated by the lever M and weight m' from the cam of cold-water pump H, and forced up the pipe g' in quantity as requisite for the speed of the pump, substantially as described.

3. In combination with a receiver for a refrigerating-machine, the water-jacket bottom B′, with inlet for water, 14, and outlet 15, the inverted cone 16, facing the bottom of receiver, the discharge-pipe 17, and the trays 1 2 3 in the upper part of the receiver, with holes 19 and slots 20, the inlet gas-pipe 18, supporting the trays, and the outlet-pipe 34, all substantially as shown, for the purpose set forth.

4. In combination with a compression-pump cylinder, A, the valve-box and cover A′, with outlet and inlet branches 1 and 2, forming cylinder-head and cover, with openings 4, the valve-cages 3, having valves, Y and Y′, with angular seats, piston tops, extended stems, steel springs 5, all substantially as and for the purposes herein set forth.

5. In a refrigerating-machine, the combination of vapor-cock V for operating the machine, the solid plug 22, put in the reverse way, and shouldered down, at 23, for stuffing-box and screwed gland 26, and for threading for nut and lock-nut 27 to hold the plug tight in position, the cavities 30 and 31, connected by vertical hole 32, with plug 33, for filling in lubricating-fluid, which insures the plug being freely moved and gas-tight, the spring 28 to keep the plug in position during the process of packing, and the bottom made gas-tight by the screwed cap 29, substantially as and for the purpose described and set forth.

The above specification of my invention signed by me this 7th day of March, 1885.

WILLIAM H. WOOD.

Witnesses:
LOUIS COHEN,
S. FENCHTWANGER.