P. H. VANDER WEYDE.

APPARATUS FOR COOLING AND REFRIGERATING.

No. 105,609. Patented July 19, 1870.

Fig. 1.

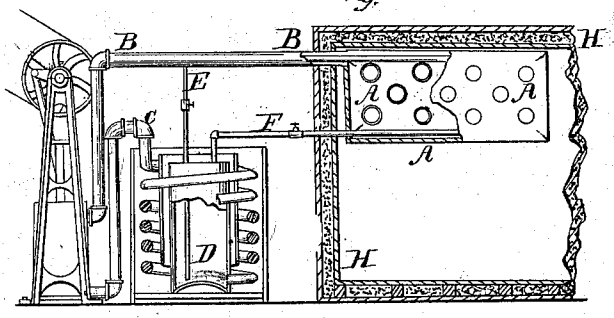


Fig: 2.

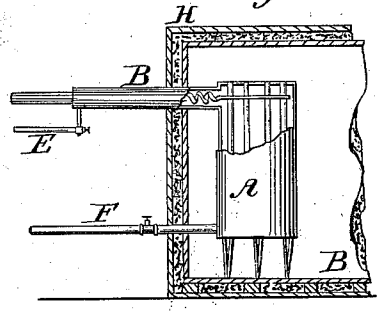


Fig: 3.

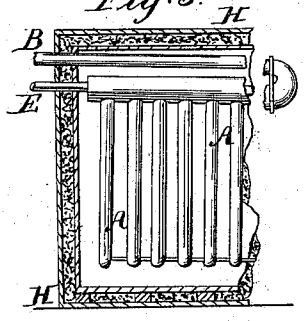


Fig: 4.

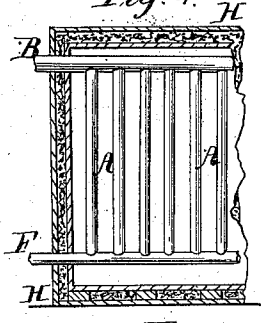


Fig: 5.

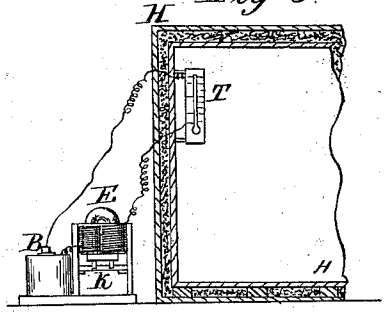


Fig: 6.

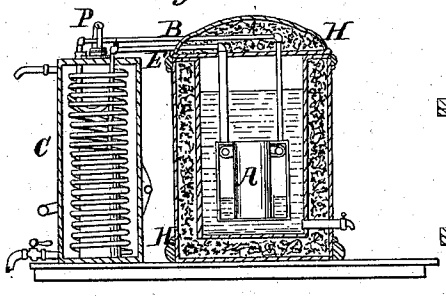


Fig: 7.

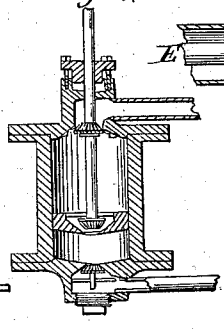
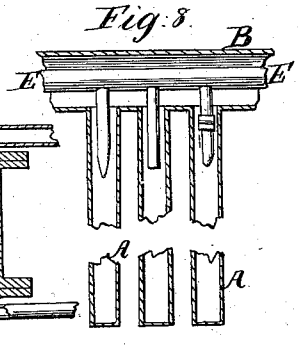


Fig: 8.



Witnesses;

J. H. Lafferre

M. Swendeman

Inventor;

P. H. Vander Weyde M. D.

United States Patent Office.

P. H. VANDER WEYDE, OF NEW YORK, N. Y.

Letters Patent No. 105,609, *dated July* 19, 1870.

IMPROVEMENT IN APPARATUS FOR COOLING AND REFRIGERATING.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, P. H. VANDER WEYDE, M. D. of the city of New York, in the county of New York, in the State of New York, have invented a new and useful Improvement in Cooling and Refrigerating; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing making a part of this specification.

The nature of my invention consists in cooling the air after the same manner as it is heated in the system known as steam-heating. It is in fact the inverse of steam-heating.

In the latter operation the vapors are generated in the boiler, absorb the heat supplied by the fire, make it latent; in their passage carry it along to the tubes or metallic boxes, and in condensing deliver this heat, while changing to the liquid state, in which condition it is returned back to the boiler, to repeat the same operation.

In my apparatus, the volatile liquid is contained in the vessels which are to radiate the cold. A vacuum, generated in them by means of an air-pump, compels the liquid to evaporate rapidly, while the air-pump carries the vapor off as quickly as it is formed. This vapor absorbs the heat just from the remaining liquid, makes this heat latent, and brings it to the vessel where the vapor is condensed by pressure and reliquefied, when the latent heat will be set free, and is disposed of by a current of cold water.

In the adjoined drawing—

Figure 1 represents one of the arrangements adopted by me.

H H is a chamber, made of non-conducting material.

A A is a metallic box, containing the liquid to be evaporated partially, and thus to be evolved by this evaporation.

An air-pump, connected with the tube B, forms the vacuum, and removes the vapor, condensing it by pressure in the coil C, collecting in reservoir D, and from here reconducting it in the liquid state into the box A A, to be again evaporated, while in this way a constant circulation is kept up.

The tube E connects with the bottom of the reservoir D, and brings the liquid, after cooling it in the exit-tube B, back into A A, while the tube F is connected with the top of the reservoir D, and brings the gas or air (which is collected over the liquid and under pressure in D) into the bottom of the box A A, and, there escaping through small holes, stirs up or agitates the volatile liquid in A A, and thus assists the evaporation by the injection of air or vapor bubbles.

I also produce this agitation in another manner by means of a mechanical contrivance, consisting of a rotating axis, provided with small paddles or blades entirely or partially submerged in the evaporating liquid.

In Figure 2 a similar arrangement is represented, with this difference only, that the liquid is contained in an upright tubular vessel, A A, similar to a tubular steam-boiler, and described in my patent for freezing and refrigerating, dated February 16, 1869, No. 67,084.

The vacuum is maintained by the tube B being connected with the air-pump, and the recondensed gas returned by the tubes E and F.

The tubes in A A being open above and below, the air cooled in them will descend, also the air surrounding the vessel, and thus keep up a circulation of cold air in the chamber H H, until the temperature of the whole is reduced to such a degree that there is equilibrium.

In Figure 3 a system of tubes is represented, in each of which the liquid to be evaporated is in the bottom of the same. They may be mutually connected or not.

The vapor is removed by the tube B, while the supply is provided by the tube E and the downward jets, represented more in detail in fig. 8.

Figure 4 represents a modification of the same principle. The vertical tubes A A are connected at top and bottom. The vapor is drawn off by the horizontal upper tube B, and after being recondensed by pump and in coil, supplied in the liquid condition by the lower tube F.

Figure 5 represents an automatic arrangement, to keep the temperature at the same height of 32° or 36° Fahrenheit, or any height desired, as, for some purposes, a temperature below the freezing-point is by no means desirable.

To accomplish this, two platinum wires are melted in the glass of a large mercurial thermometer, T, one in its lower portion, so as to be always in contact with the mercury, and one at that middle part of the tube as corresponds with 32° or 36°, or any other point of the scale below which we do not desire the temperature to descend.

The ends of these wires are connected with the coil of an electro-magnet, E, and a small galvanic battery, B, which will keep the magnet E charged, as long as the circuit remains closed by the mercury of the thermometer touching both platinum wires, reaching through the glass, which will be the case as long as the temperature is above 32° or 36°.

The keeper K of the electro-magnet is, by means of proper leverage, attached to the power, driving the air-pump in such a way that when the keeper drops down, the power is detached from the pump by throwing off the belt or gearing, shutting off the steam, or in any other manner.

It is thus clear that as soon as the temperature has descended to the desired point, 32° or 36°, the break of metallic contact in the thermometer will interrupt the current, cause keeper to drop, and stop the pump, while a rise of temperature above the desired point will re-establish the contact, attract the keeper, reconnect the power with the air-pump, and the refrigeration will recommence.

Figure 6 is an arrangement to cool water or other liquids on a small scale, by hand-power.

H H is the cooling-vessel, containing tubes or a hollow box, K, with the volatile substance inside, and surrounded by the liquid to be cooled.

The vapor is drawn by the air-pump P, through the tube B, condensed and liquefied in the coil in C, which is immersed in cooling water to dispose of the excess of heat, which here, as in every other instance mentioned above, will reach from 150° to 200° Fahrenheit, and cause a corresponding pressure and resistance to the pumps, which is greatly reduced by the water around tubes and pump-cylinder. For this reason this water is kept flowing in a similar way, as with it the worms in a distillery are kept cool.

The liquefied gas returns by another tube, E, to the cooling-vessel, the whole arrangement serving thus to take the heat from the vessel H H and transfer it to the vessel C.

This arrangement may also be modified, so as to place the cooling-tubes or box in any vessel, a pail of milk, for instance, by suspending the cooling arrangement worked by the air-pump, and raise the milk-pail on a support till it reaches the refrigerating tubes or box A, and this plunges in the milk or liquid to be cooled.

Figure 7 represents the valve arrangement of pump, described without the figures in my patent of February 16, 1869, No. 87,084, and which arrangement I have found advantageous for my purposes.

What I claim, and wish to secure by Letters Patent, is—

1. Radiation of cold by the special refrigerating tubes or tanks described, the exhaust B, and supply-pipes E or F.

2. Agitating the volatile evaporating liquid, by means of mechanical arrangements, as described, or their equivalent, by the introduction at the bottom of the liquid, either the liquid itself or its vapor, gas or air, single or combined.

3. The portable mechanical water and milk-cooler, described.

4. The manner of regulating the temperature, described, by means of thermometer, battery, and electro-magnet, in connection with freezing and refrigerating-machines.

In witness whereof I have signed my name in presence of two witnesses.

P. H. VANDER WEYDE, M. D.

Witnesses:

J. W. LASSERRE,

ADOLPH OTT.