(No Model.)

D. D. JOHNSON.

REFRIGERATING APPARATUS.

No. 266,160. Patented Oct. 17, 1882.

Fig. 1.

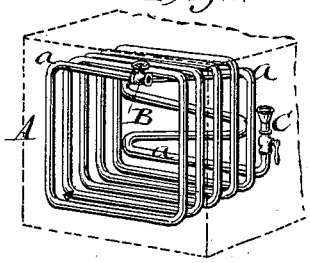


Fig. 2.

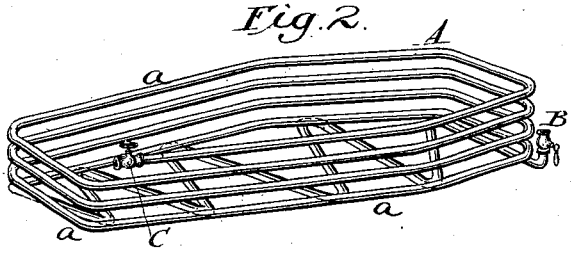


Fig. 3.

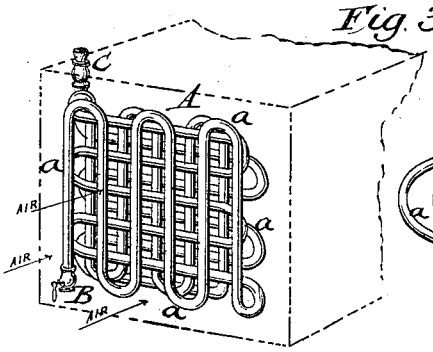


Fig. 4

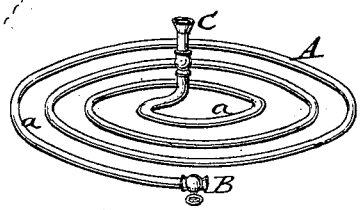


Fig. 5.

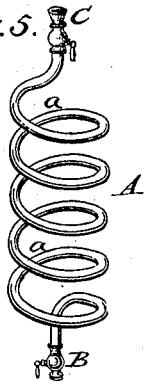


Fig. 6

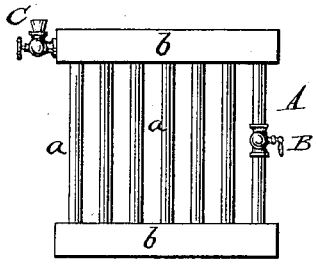


Fig. 7.

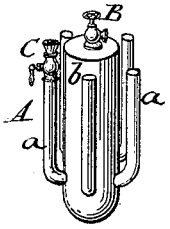


Fig. 8.

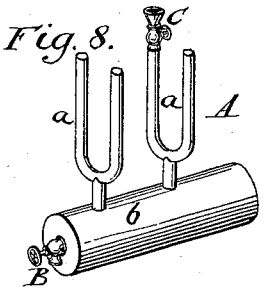
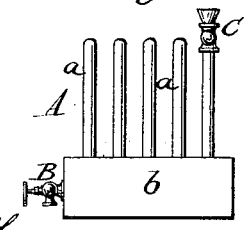


Fig. 9.



Attest.

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UNITED STATES PATENT OFFICE.

DAVID D. JOHNSON, OF NEW YORK, N. Y.

REFRIGERATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 266,160, dated October 17, 1882.

Application filed August 12, 1882. (No model.)

To all whom it may concern:

Be it known that I, DAVID D. JOHNSON, of New York, in the county of New York and State of New York, have invented certain Improvements in Refrigerating Apparatus, of which the following is a specification.

My invention relates to refrigeration by the expansion of compressed or liquefied gases; and it consists in a novel manner of utilizing the surface of the gas holder or receiver as a cooling-surface for the air, gas, or liquid to be refrigerated, and thereby dispensing in whole or in part with the coils now specially provided for the purpose.

In carrying out my invention the details will be modified according to the particular circumstances of each case; but the leading features consist in forming the gas holder or receiver of a tube or tubes, whereby a large surface is secured together with great strength, and placing said holder directly in the cooling-chamber. In domestic refrigerators and other chests or chambers the tubes may be conveniently and advantageously arranged to cover the top, bottom, or sides of the chamber. In corpse-coolers the pipe or tubing may be coiled or arranged to constitute the body of the receptacle. In air-cooling chambers the pipe, tube, or tubes may be arranged in spirals, volutes, or clusters, or may be carried in zig-zag form or in one direction back and forth a number of times, and then at right angles to the first series of folds or bends to form a sort of grating, through the openings or spaces of which the air may travel, being thereby divided up into small streams or currents and brought in contact with a cooling-surface on all sides. In some cases the holder or receiver may be made to consist of a series of tubes extending from one hollow head or box to another; or one end of the tubes may be closed and the other end screwed into or otherwise connected with a hollow box or head.

As gas is permitted to escape from the receiver or holder that remaining within the same will of course expand, and as this expansion takes place intense cold is produced, which, under the common plan of placing the gas-receiver outside of the chamber or space to be cooled, is wasted. By my plan this cold is not only utilized, but by forming the holder or receiver of a series of tubes or of a single pipe or tube coiled into suitable form I produce a very large cooling-surface, and thus utilize the cold fully and to the greatest advantage. The receiver, of whatever form it may be, will be furnished with a cock or valve to regulate and control the escape of gas, and with a filling-opening through which to charge it. The escaping gas may in turn be carried through a separate coil and discharged either into the atmosphere, into a sewer, or into a liquid or substance capable of absorbing the gas and holding it for recompression; or it may be permitted to enter directly into the chamber or space to be cooled where the nature of the case will permit, and with especial advantage where the antiseptic properties of the gas are required.

In the drawings various forms of the gas holder or receiver are shown, which, with numerous other forms, may be adopted for special uses as they may be found adapted thereto.

Figure 1 represents a single pipe bent or coiled to form a lining for a box or chest; Fig. 2, similar structure, but of a form somewhat resembling an ice-pack box such as is used for preserving corpses; and the remaining figures various forms suited for different uses.

In each and all the figures, A represents the holder or receiver as a whole, provided with a cock or valve, B, to permit, regulate, and control the outflow of gas. The body of the holder in each case consists of one or more tubes or pipes, *a*, coiled into the desired form or communicating with a hollow head, box, or drum, *b*, as preferred.

In using the holder or receiver it is to be placed directly within the chamber or compartment in which the air, gas, or liquid to be cooled is contained, or through which the same passes, as indicated in Figs. 1 and 3, the latter arrangement of pipes being peculiarly adapted for cooling a volume of air under pressure or otherwise caused to flow through the space containing the holder.

If desired, the escaping gas may be caused to produce the current of air either through the aid of a fan driven by the gas or in any equivalent manner.

In filling the holders or receivers it is desirable and, in fact, important to displace the air contained therein, and hence I provide, in ad-

dition to the cock or valve B, which, as above mentioned, serves to regulate and control the outflow of a gas, a filling-opening provided with a valve, C, and when filling or charging the holder or receiver the valve B is opened long enough to permit the air to be driven out, and is then closed. When the holder is fully charged the valve C is closed and remains closed until it becomes necessary to recharge the holder. The tubes should be as thin as may be consistent with due strength.

I am aware that coils and pipes have long been used for circulating gas received from a cylindrical receiver and for distributing the cold to different points, and this I do not claim. My invention consists in making the receiver itself of tubular form, whereby I utilize the cold produced therein by the expansion of the gas as a portion is drawn off, which cold has hitherto been lost.

Having thus described my invention, what I claim is—

1. In combination with a chamber or vessel to be cooled, a tubular gas receiver or holder containing compressed or liquefied gas, said holder being located directly within the chamber or vessel in which the cooling is to be effected, whereby the cold of the holder is fully utilized.

2. A gas holder or receiver for use in refrigerating, composed wholly or mainly of tubes or pipes, substantially as shown and described, whereby a large cooling-surface is secured, and the holder is adapted to act also as a cooler.

3. A tubular gas-receiver, substantially such as described and shown, provided with two valves or cocks, the whole constituting a new article of manufacture.

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Witnesses:
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A. I. BAGGOTT.