(No Model.)

H. C. JOHNSON & F. M. McMILLAN.

REFRIGERATION OF BUILDINGS.

No. 262,185. Patented Aug. 1, 1882.

Fig. 1.

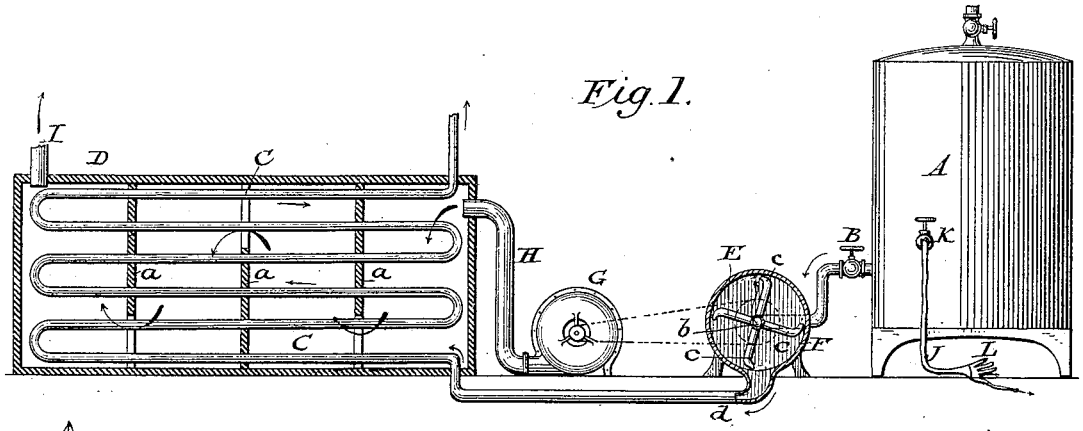


Fig. 2.

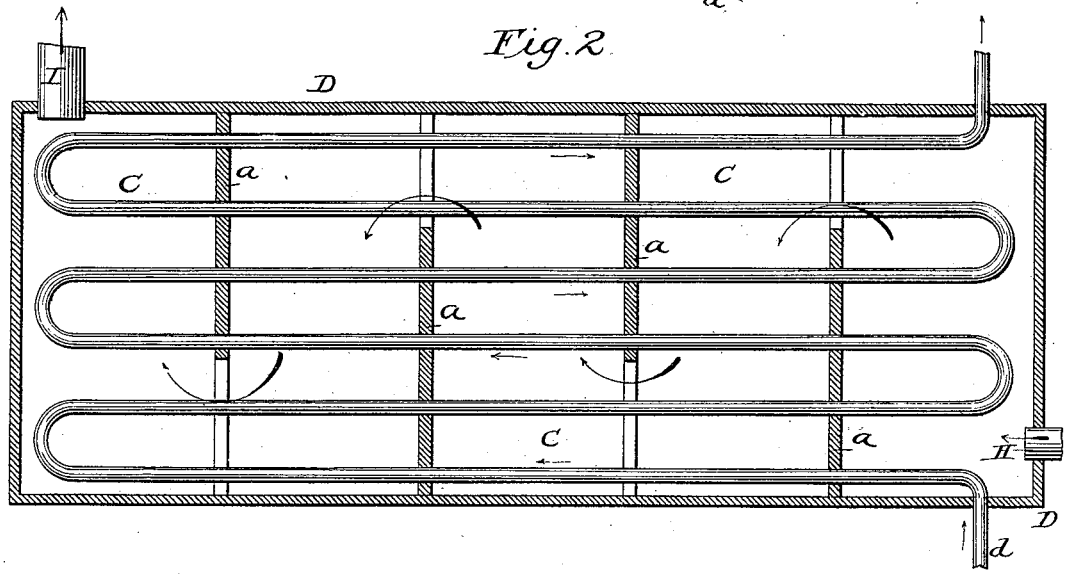
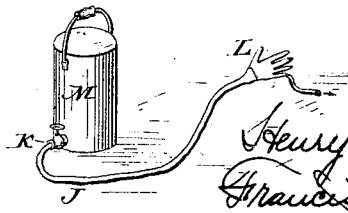


Fig. 3.



Attest.

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UNITED STATES PATENT OFFICE.

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REFRIGERATION OF BUILDINGS.

SPECIFICATION forming part of Letters Patent No. 262,185, dated August 1, 1882.

Application filed May 13, 1882. (No model.)

To all whom it may concern:

Be it known that we, HENRY C. JOHNSON and FRANCIS M. MCMILLAN, of Washington, in the District of Columbia, have invented certain Improvements in Refrigeration of Buildings, &c., of which the following is a specification.

Our invention relates to an improved manner of applying the system of refrigeration or cooling described in our patents dated May 9, 1882, and numbered 257,505 and 257,506, both for ordinary cooling purposes and for special uses in hospitals and sick-rooms.

The improvements consist in providing a fan or blower, or other air-forcing device, to force a volume of air through a chamber cooled by the refrigerating apparatus, and arranging said fan or mechanism to be operated by the gas which effects the refrigeration, and to force the cooled air through flues or pipes to the points where the cooling is to be effected.

The details of the present invention may be modified as desired, a convenient form of apparatus being, however, shown in the drawings, in which—

Figure 1 represents a side elevation of our improved apparatus; Fig. 2, a sectional view of the cooler proper; Fig. 3, a view of a small receiver provided with attachments for surgeons' use.

The invention is designed for application to the cooling of buildings of all kinds, including dwellings, theaters, and halls, packing-houses, breweries, hospitals, &c., but is peculiarly adapted for use in hospitals by reason of its twofold office therein.

Air-forcing apparatus has hitherto been combined with cooling and refrigerating apparatus, but always, so far as we are aware, operated by a motor driven by power specially furnished for that purpose.

By our plan we propose to dispense with the special power and to utilize the pressure of the liquefied gas in lieu thereof, either by permitting it to expand to a greater or less extent in an engine or motor, or by its pressure due to expansion in the receiver.

Heretofore it has been the practice in surgical operations and for kindred purposes, where it is necessary to benumb a portion of the body for treatment, to spray some highly-volatile substance—such as ether—upon the part; but in order to produce the spray, without which the required degree of cold could not be secured, it has been necessary to employ a pump operated by attendants. The operation is therefore dependent upon the attendants, who are not unfrequently so affected by sight of the operation of the surgeon as to render them unable properly to perform their work, and as a consequence very serious results sometimes follow.

By the present plan the whole operation is placed under control of the surgeon or physician, the action is rendered constant, and the necessary condition of the part is much more speedily secured than by the ordinary plan.

Referring again to the drawings, A represents the receiver or vessel in which the liquefied gas is stored, B the cock or valve by which its escape is regulated, and C the coil or chamber in which the gas is expanded to produce the required cooling effect by absorbing the heat of the surrounding air or other body.

In the drawings the coil is represented as incased in or surrounded by a box or chamber, D, preferably divided by partitions *a* into compartments, the partitions having openings alternately at top and bottom, so that the air which is forced through the chamber D shall be caused to travel back and forth across the pipes or coil, and thereby become perfectly cooled. In some cases we propose to provide the chamber D with brine or other non-congealable liquid, and in such case the air will be caused to pass up through the liquid in order to deposit dust and impurities contained in it, and, if desired, the liquid may be medicated to impart to the air like properties.

Instead of permitting the gas to pass directly to the expansion-chamber, as in our patent above referred to, we cause it to first pass through and operate some form of motor and then conduct the exhaust to the expansion coil or chamber. The form of said motor is not essential, though we consider a reaction-wheel to be peculiarly adapted to the purpose, because simple, cheap, and durable in construction, and capable of operation by so small a supply of gas or other agent. Such a device is indicated in the drawings at E, and consists simply of a series of radial arms extend-

ing from a tubular shaft and provided with lateral ports or outlets at their outer ends, as is well understood, the construction being a very old and common one. The wheel E is mounted within a casing, F, and the gas by which it is operated enters through the hollow shaft *b* from the receiver A, and, being discharged at the outer ends of arms *c*, enters and ascends the pipe *d*, which connects with the expansion chamber or coil C.

G represents a fan or blower, which may be upon the same shaft, *b*, with the reaction-wheel E, or in a separate casing and upon an independent shaft, as shown, being in such case driven by belt or gearing from a wheel on the shaft *b*, as shown. The fan forces air through a pipe or trunk, H, into the chamber D, whence it escapes into the delivery-pipe I, by which it is conducted to the desired point or points.

In order to adapt the apparatus for surgical use as well as ordinary cooling purposes, a special pipe, J, and regulating valve or cock K are provided, by which the gas may be conducted to pads or other devices, L, to be therein expanded or discharged directly upon the part to be treated. In order that the necessary supply of gas for such purposes may be conviently supplied at any desired point, we provide a small receiver, M, which may be supplied from the main receiver, and is furnished with the cock K, pipe J, and other fittings, in the same manner as the larger receiver.

The above-described apparatus contemplates the discharge of the spent gas into the atmosphere, into a sewer, or other place where it will be allowed freely to escape and pass off; but we do not limit ourselves to such plan of operation.

We are aware that the exhaust gas from a refrigerating apparatus has been utilized to operate a motor. Our plan differs from this in that the gas is used in the motor before being expanded in the refrigerating apparatus, and thus its force is more effectually utilized, without in any degree lessening its subsequent efficiency, the expansion taking place as the gas escapes from the motor, and being prevented from taking place therein by reason of the enormous pressure behind it.

We are not aware that an organized apparatus has ever before been constructed for cooling and refrigerating purposes in which a fan or air-forcing apparatus constituting part of the cooling mechanism has been operated by a motor driven by the gas which effects the refrigeration.

Having thus described our invention, what we claim is—

1. In combination with a cooling apparatus, substantially such as described, an air-forcing apparatus and a motor operated by the gas which effects the cooling, and arranged to actuate the air-forcing apparatus, substantially as set forth.

2. In a cooling apparatus, the combination of a gas receiver or vessel, an expansion chamber or coil, and a motor located between the receiver and expansion chamber or coil, whereby it is adapted to be operated by the gas passing from the former to the latter.

3. The cooling apparatus herein described and shown, consisting of receiver A, coil or chamber C, surrounding-chamber D, motor E, and fan or blower G, communicating with chamber D, substantially as set forth.

4. In a cooling apparatus, substantially such as described and shown, a receiver adapted to contain liquefied gas, communicating with the expansion-chamber of the cooling apparatus, and provided with pipe J and valve or cock K, said pipe or cock being entirely independent of the circulating-pipes of the cooler, as and for the purpose set forth.

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