(No Model.)

W. C. WREN.

APPARATUS FOR GENERATING COLD ARTIFICIALLY.

No. 319,434. Patented June 2, 1885.

Fig. 1.

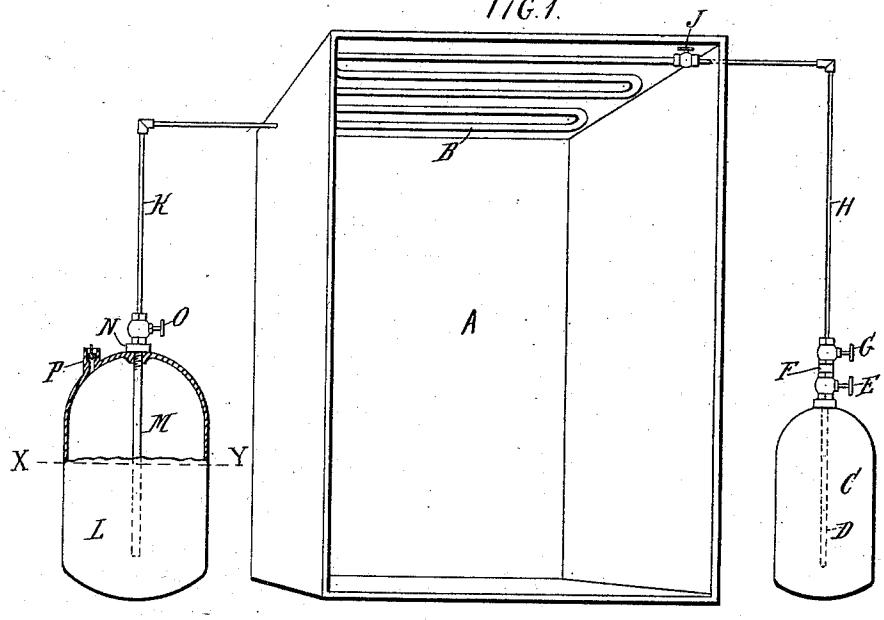
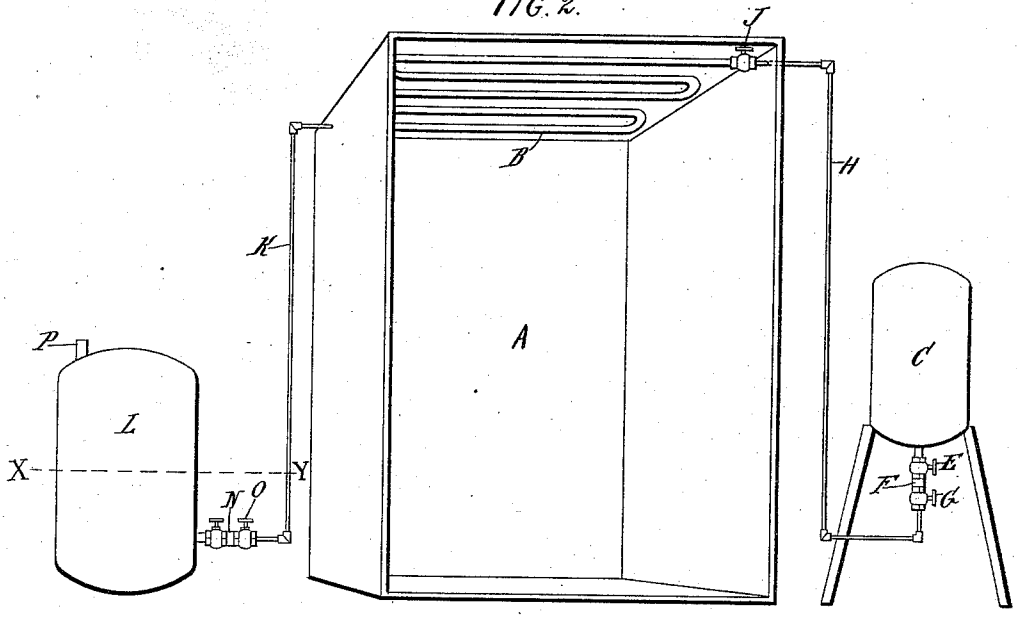


Fig. 2.



Witnesses:
John Buckler.
Wm. A. Gaynor Jr.

Inventor:
William C Wren

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

UNITED STATES PATENT OFFICE.

WILLIAM C. WREN, OF BROOKLYN, NEW YORK, ASSIGNOR TO WILLIAM C. BENJAMIN, OF SAME PLACE.

APPARATUS FOR GENERATING COLD ARTIFICIALLY.

SPECIFICATION forming part of Letters Patent No. 319,434, dated June 2, 1885.

Application filed February 11, 1885. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM C. WREN, a citizen of the United States, and a resident of the city of Brooklyn, county of Kings and State of New York, have invented a new and useful method of and Apparatus for Generating Cold Artificially, of which the following is a specification, and that the same has not, to my knowledge and belief, been in public use or on sale in the United States for more than two years prior to this application.

The object of my invention is to produce cold artificially in portable refrigerators, or in refrigerating-chambers, by the use of detachable cylinders or receptacles wherein any suitable gas, which possesses the property of being compressed into a liquid form, is or may be stored, and by the use of other detachable cylinders or receptacles, wherein is or may be contained any suitable absorbent fluid by means of which the compressed gas, after its cold-producing effect has been exhausted, may be taken up and saved, and to attain such object without the employment of power or force other than that exerted by the gas itself.

Figures 1 and 2 are perspective views of the interior of a refrigerator, or refrigerating-chamber, with the cylinders attached.

Similar letters refer to similar parts throughout the two views.

A in Figs. 1 and 2 is a refrigerator or refrigerating-chamber with the front removed, showing an expansion coil or chamber, B, in the top thereof.

C is a detachable cylinder or receptacle in which any suitable gas having the property, when placed under compression, of condensation into a liquid form, is or may be stored, and into which detachable cylinder or receptacle C is inserted, nearly to the bottom thereof, a tube or siphon-pipe, D, as shown in Fig. 1. This tube or siphon-pipe D is open at its lower end, and its other end is fitted tightly into the top of the detachable-cylinder or receptacle C, and has attached thereto a cock or valve, E, which cock or valve E is connected by a detachable coupling, F, to another cock or valve, G.

A small pipe, H, is connected from the cock or valve G to an expansion cock or valve, J, which expansion cock or valve J is connected to and placed on one end of the expansion coil or chamber B, as shown in Fig. 1. The other end of the expansion coil or chamber B is continued on until it reaches the outside of the refrigerator or refrigerating-chamber A, as shown by K, and is connected with the detachable cylinder or receptacle L, as shown in Fig. 1.

L is a detachable cylinder or receptacle in which any suitable absorbent in fluid form is or may be placed, and into which detachable cylinder or receptacle L is inserted, nearly to the bottom thereof, a tube or siphon pipe, M. This tube or siphon pipe M is open at its lower end, and its other end is fitted tightly into the top of the detachable cylinder or receptacle L, and is connected to a cock or valve, O, which cock or valve O is connected to the detachable cylinder or receptacle L by the detachable coupling N.

P is a small self-regulating pressure-valve, which is inserted into the detachable cylinder or receptacle L, as shown.

It is not necessary to the proper operation of my invention that the detachable cylinders or receptacles C and L shall invariably be placed in the positions shown; but they may be located out of immediate sight, and at some distance away from the refrigerator or refrigerating-chamber A, the pipe-connections H and K being extended to meet such change of location, unless the detachable cylinder or receptacle L is connected in the form and manner shown in Fig. 2, in which case the said cylinder or receptacle L must be situated and placed at some distance below the outlet of the expansion-coil or chamber B.

The expansion coil or chamber B, connecting-pipes H and K, and cocks or valves G, J, and O, having been placed in their proper positions in relation to the refrigerator or refrigerating-chamber A, the detachable cylinder or receptacle C, fitted with its tube or siphon-pipe D, is filled with any suitable gas having the property, when placed under compression, of condensation into a liquid form, and its cock or valve E is then attached to the cock or valve G and the connecting-pipe H by the detachable coupling F, as shown in

Fig. 1. The detachable cylinder or receptacle L, fitted with its tube or siphon-pipe M, as shown in Fig. 1, is then filled to the dotted line X Y with any suitable fluid which has the property of absorption of the gas from the detachable cylinder or receptacle C when said gas is projected into it, and said cylinder or receptacle L is then attached to the cock or valve O and connecting-pipe K by the detachable coupling N, as shown in Fig. 1. The cocks or valves E and G are then opened, which allows the fluid gas to pass from the bottom of the cylinder or receptacle C up through the tube or siphon-pipe D through the cocks or valves E and G, and the connecting-pipe H to the expansion cock or valve J. This expansion cock or valve J is so constructed that it will allow a greater or lesser amount of the liquid gas to pass through it, according to the degree of cold desired in the refrigerator or refrigerating-chamber A. The expansion cock or valve J on the expansion coil or chamber B, and the cock or valve O on the connecting-pipe K then being opened to the desired extent, the pressure upon the fluid gas contained in the cylinder or receptacle C projects said liquid gas through the expansion-cock or valve J with such a degree of force that it enters the expansion-coil or chamber B in the form of spray, and in its further passage through the expansion coil or chamber B said gas increases in volume until it becomes entirely gaseous in form. It then passes out into the connecting-pipe K through the cock or valve O and tube or siphon-pipe M, and is projected into and is absorbed by the absorbent fluid in the cylinder or receptacle L, the gas in such passage absorbing the heat in the refrigerator or refrigerating-chamber A and producing cold.

As the contents of the cylinder or receptacle C are exhausted into and are absorbed by the absorbent liquid in the cylinder or receptacle L, the contents of the cylinder L increase in volume, and to relieve the pressure caused thereby on the air remaining above the fluid-line X Y, such air is allowed to escape through the pressure-valve P.

In order that the entire contents of the cylinder or receptacle C shall be discharged therefrom and reach the expansion cock or valve J in a fluid state, and so produce refrigeratory action in the refrigerator or refrigerating-chamber A, the outlet-pipe D of said cylinder C must be projected into said cylinder C and its contents, and to a point very near the bottom thereof, as shown in Fig. 1; or said outlet-pipe D must be at the bottom of said cylinder C, as shown in Fig. 2, for when the outlet is placed above the contents of said cylinder C the liquid gas contained in said cylinder rises no farther than the outlet-orifice, and by its expansion in the cylinder C refrigeration takes place in the cylinder, and not in the expansion coil or chamber B placed in the refrigerator or cooling chamber A.

It is not necessary that the tube or siphon-pipe M shall extend to the bottom of the cylinder or receptacle L, but it must enter the cylinder in such a manner that its outlet end is below the level of the fluid absorbent contained in the cylinder L, and so bring the expanded gas in actual contact with the body of the fluid contained in said cylinder L, and thus cause said gas to be completely absorbed by said fluid absorbent.

If the exhaust-pipe K is connected to the cylinder L above the line of the fluid-absorbent contained in said cylinder, the gas is not absorbed by the said fluid, and although refrigeration does take place in the refrigerator or cooling-chamber A it ceases when the pressure in the receiving-vessel L equals the pressure in the storage-vessel C. By my invention there is but little adverse pressure—that which is caused in the expansion coil or chamber B and connecting-pipe K by the fluid which rises in the tube or siphon-pipe M.

When the cylinder C is exhausted of its contents, it may be removed by first closing the cocks or valves E and G, and then unscrewing the detachable coupling F. By closing the cock or valve G any contents of the connecting-pipe H between the expansion cock or valve J and the cock or valve G are saved, and any annoyance from the smell of such contents is avoided. The cylinder C may then be replaced by another vessel constructed, fitted, and charged in the same manner as cylinder C, and then attached to the pipe H, as hereinbefore stated.

When the cylinder L can hold no more of the exhaust-gas, the cock or valve O is closed, to retain any contents of the pipe K and expansion coil or chamber B, and said cylinder L may then be removed by unscrewing the detachable coupling N. The cylinder L may then be replaced by another vessel, constructed, fitted, and filled in the same manner as cylinder L, and then attached to the pipe K, as hereinbefore stated.

Having described my invention, what I claim and desire to secure by Letters Patent, is—

1. In apparatus whereby cold is produced artificially by the expansion of a liquid volatile gas, a detachable and portable storage cylinder or receptacle, C, fitted with a tube or siphon-pipe, D, or so fitted that the contents of said cylinder are discharged at or near the bottom of said cylinder C, and having a connecting-pipe, H, in combination with an expansion coil or chamber B, and expansion cock or valve J, as shown and described.

2. In apparatus whereby artificial cold is produced by the expansion of a liquid volatile gas in an expansion coil or chamber, B, a detachable and portable cylinder or receptacle, L, fitted with a tube or siphon-pipe, M, or so fitted to an exhaust-pipe, K, that the exhausted and expanded gas from the expansion coil or chamber B is discharged below the level of the liquid absorbent contained therein, in combi-

nation with an expansion coil or chamber, B, and a connecting exhaust-pipe, K, as shown and described.

3. A detachable and portable receiving cylinder or receptacle, L, fitted with a tube or siphon-pipe, M, or so connected to an exhaust-pipe, K, that the contents of a detachable and portable storage cylinder or receptacle, C, enter and are discharged below the surface of the absorbent fluid contained in said cylinder L, in combination with an expansion coil or chamber B, an expansion cock or valve, J, and a detachable and portable cylinder or receptacle, C, all for the purpose shown and described.

4. A detachable and portable storage cylinder or receptacle, C, fitted with a tube or siphon-pipe, D, or so connected to a connecting-pipe, H, that the contents of said cylinder or receptacle C are discharged at or near the bottom of said cylinder, and a detachable and portable receiving cylinder or receptacle, L, containing a suitable absorbent fluid, and fitted with a tube or siphon-pipe, M, or so connected to an exhaust-pipe, K, and an expansion coil or chamber, B, that the exhausted gas passes directly into the absorbent fluid below the surface thereof, in combination with a cock or valve, G, attached to the end of a connecting-pipe, H, and detachable coupling F, for the purposes shown and described.

5. In apparatus wherein cold is produced by the expansion of a liquefied volatile gas in an expansion coil or chamber, B, a detachable and portable cylinder or receptacle, C, fitted with a tube or siphon-pipe, D, or otherwise connected, as shown, to the expansion coil or chamber B, by an expansion cock or valve, J, having attached thereto by an exhaust-pipe, K, a detachable and portable receiving and absorbing cylinder or receptacle, L, containing a suitable absorbent fluid, said cylinder being fitted with a tube or siphon-pipe, M, or being so connected to an exhaust-pipe, K, that the expanded gas is delivered into the cylinder L below the fluid-line X Y, in combination with a cock or valve, O, attached to and connected with a detachable coupling, N, for the purpose shown and described.

6. The combination, with a detachable and portable receiving cylinder or receptacle, L, containing a suitable absorbent fluid, and fitted to receive exhausted gas, as hereinbefore fully described, of a self-acting pressure-valve, P, attached to and inserted into said cylinder L, for the purpose shown and described.

WILLIAM C. WREN.

Witnesses:
F. W. HANAFORD,
A. B. WREN.