D. E. SOMES.

Air Cooling Apparatus.

No. 51,237. Patented Nov. 28, 1865.

Fig. 3

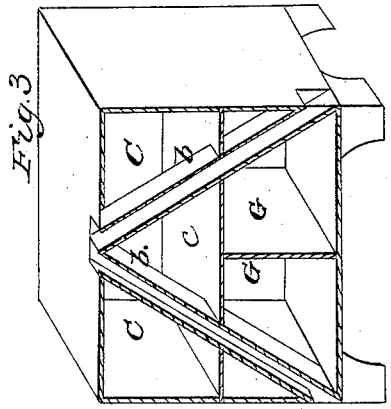


Fig. 4.

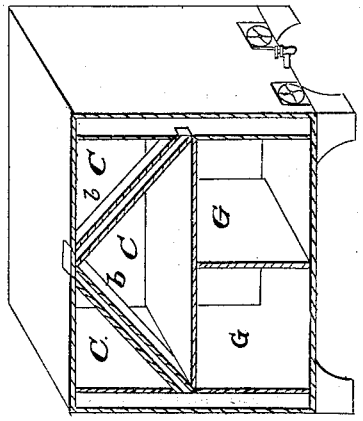


Fig.

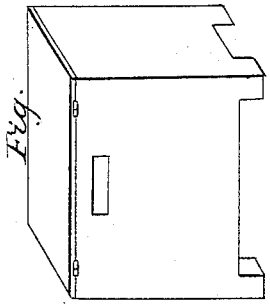


Fig. 5

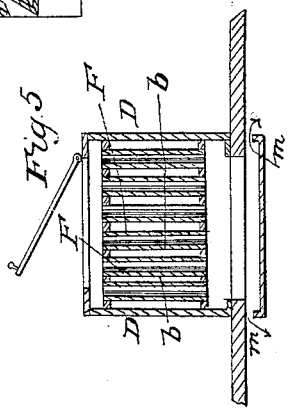


Fig. 7

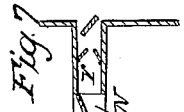


Fig. 6

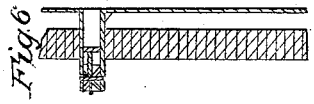
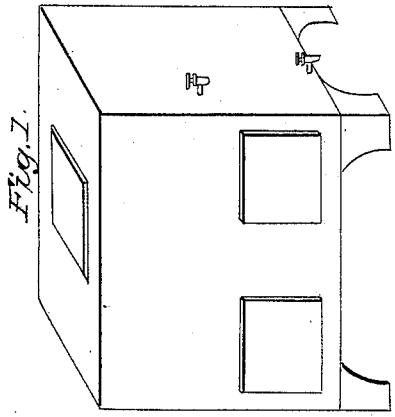
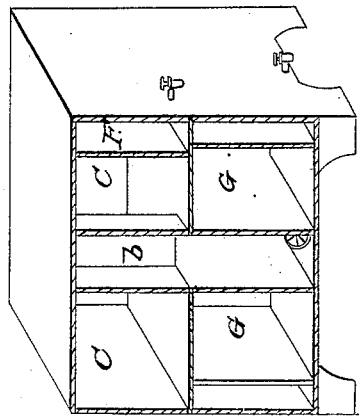


Fig. 1.



Witnesses
A Moore
N W Holcomb

Fig. 2



Inventor
D E Somes

UNITED STATES PATENT OFFICE

D. E. SOMES, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVED MODE OF COOLING AIR.

Specification forming part of Letters Patent No. **51,237**, dated November 28, 1865.

To all whom it may concern:

Be it known that I, DANIEL E. SOMES, of the city of Washington, in the District of Columbia, have made a new and useful Improvement in Cooling Air in Dwellings and other Structures; and I hereby declare that the following is a full and exact description of the same, reference being had to the annexed drawings, making part of this specification.

It is well known that a small quantity of ice, if used properly, will cool a large volume of air, but the principle, though well known, has not been practically applied in the cooling of dwellings, partly for the reason that the full value of such artificial cooling for domestic purposes is not generally understood, and partly from the lack of proper devices and appliances for carrying the principle into practical use.

The object of this invention is to make the cooling of air by means of ice available in cooling the air in dwellings, churches, hospitals, theaters, halls, railroad-cars, ships, boats, and the like, and also to furnish more convenient means for cooling the air in refrigerators, closets, and the like than have heretofore been used.

The amount of air which can be cooled by a given quantity of ice may be calculated in the following manner, using round numbers and general terms: Air is about eight hundred times lighter than water, and its specific heat is about one-fourth that of water—that is, it requires only about one-fourth the amount of heat to raise a pound of air through a given number of degrees of temperature that it would to raise an equal weight of water through the same degrees of temperature. Ice, in becoming liquid or melting, absorbs about 140° Fahrenheit of heat—that is, it absorbs an amount of heat such as would raise the temperature of an equal weight of water through 140° Fahrenheit. It is on this fact that the great value of ice as a cooling medium depends. Thus one pound of ice will cool one hundred and forty pounds of water one degree, and the water derived from the melting ice will be at 32° Fahrenheit. If, now, this water is to be at the end of the operation at the temperature of 62° Fahrenheit, then one hundred and seventy pounds of water would have its temperature lowered one degree; but as the specific heat of air is only about one-fourth that of water, one pound of ice will lower one degree six hundred and eighty pounds of air, or sixty-eight pounds of air ten degrees, or thirty-four pounds of air twenty degrees. It takes thirteen cubic feet of air of the common density to weigh one pound. Therefore sixty-eight pounds of air are equal to eight hundred and eighty-four cubic feet, which will more than fill a cubic space nine feet each way—that is, one pound of ice, in melting, absorbs enough heat to lower the temperature of eight hundred and eighty-four cubic feet of air ten degrees. This is on the supposition that there has been no waste. To take advantage, then, of these natural principles for the purpose of cooling air in the several classes of buildings and structures mentioned above is the object of this invention. To do this it is necessary that the air to be cooled be brought in contact either directly with the ice or with a good conducting-surface which is cooled by the ice. The latter plan is far preferable, so I have adopted it.

In the drawings, Figures 1 and 2 show a portable air-cooler, which will serve as a common refrigerator for preserving perishable articles, for cooling water and other liquids, and for cooling the air of dwellings or parts of dwellings.

The ice is to be placed in the upper part of the apparatus in the space marked C C. Through this ice-space channels or flues, as shown at *b*, are made to pass. These flues or channels are so arranged that air can freely enter at the top, and, coming in contact with the walls of the flues, which are already cooled by being in contact with the ice, the air is cooled, becomes heavier than the air below, and thus an inward current of air is produced. The bottom of these flues should have dampers, so as to control the flow of air.

Modifications of Figs. 1 and 2 are shown at Figs 3 and 4. In them the air-flues *b b*, instead of being perpendicular, are arranged as shown. Dampers and registers may be arranged in these.

In Fig. 5 is shown the arrangement of cooler

which I prefer when large quantities of air are to be cooled.

The cooler D may be placed in the top of the building to be cooled, or it may be placed in any of the upper halls or closets, or in one of the upper rooms of the building.

The ice-space is shown at E, and is traversed by numerous air flues or tubes, *b b b*. The lid or cover of the ice-space is shown raised so as to admit the air to the entrance of the flues. As the air is cooled it will fall and will enter the room to be cooled by the openings *m m*. Instead of these openings *m m*, there may be flues such as are commonly used for conveying air, so arranged as to convey the cold air to any part of the building.

The lid L may have a cord attached, so that it can be opened or closed to any extent desired in order to admit the proper quantity of air to the cooling-flues.

When it is desirable to have the air admitted to the cooler with some force, the arrangement shown in Figs. 6 and 7 may be adopted. The vane N is so arranged that it will catch the current of wind and direct it into the flues *n*, and the valve *r* will prevent any return of the air.

In each and all of the coolers above described the ice-space should be surrounded by walls of good non-conducting material, so as to prevent any access of heat to the ice by conduction from the walls or from the outside air. The flues for conveying cold air should in like manner be protected. By this arrangement the ice can receive heat only from the air entering through the flues that lead into the building. In the portable cooler shown in Figs. 1 and 2 it is desirable to have spaces F for cooling water and other liquids, as beer, ale, and the like. The water or other liquid in these spaces is cooled only by contact with the cold walls of the ice-space, and is not mixed with the water from the melting ice. This arrangement makes it unnecessary to have perfectly clean ice for cooling water. Any kind of ice or snow will answer for filling the ice-chamber, or ice and salt or other cooling-mixture may be used.

The devices above described may be used either alone or in conjunction with the processes of cooling described in the several patents heretofore issued to me for cooling by means of the low temperature of the earth at certain depths, by the cooling effects of evaporation, compression, and expansion, and by other modes of cooling, as explained in the specifications attached to my several patents heretofore issued. The extent to which each process shall be used will depend upon considerations of economy and convenience, which can be easily settled in each particular case as it arises. Where ice is abundant and cheap the method herein described will generally be found preferable.

The apparatus, as shown in Figs. 1 and 2, may be manufactured as an article of furniture and placed in any apartment to be cooled. It is not intended to confine the construction of these portable coolers to the form or the proportions shown in the drawings, as these may be indefinitely varied, as convenience, taste, or fancy may dictate.

In Figs. 1, 2, 3, and 4 are shown space or small chambers G, which are be used as refrigerators for cooling or preserving meats, vegetables, fruits, and other articles. These spaces are provided with ventilating flues or tubes which pass through the ice-chamber, or near it, in order that the air in said tubes may be cooled before it is admitted into the chambers. The ventilating-flues are provided with stop-cocks to regulate the amount of air as may be required.

In describing the portable apparatus shown in Figs. 1, 2, 3, and 4, I have above referred to them only as coolers; but it is intended, whenever desired, that they be so constructed as to be used at pleasure as heaters or coolers, as circumstances may require. When used as heaters their operation will be reversed. The flues, in having cold air to fall through them, will have warm air to rise and diffuse itself through the apartment to be warmed. The ice-spaces may be filled either with the products of combustion or with hot water, so as to warm the air in the flues *b b b*.

In Figs. 7 and 9, at *p*, is shown a device for either drawing out or forcing in air. The device consists in two propeller-wheels operated by the currents of wind. A single propeller will answer. On the periphery of the wheels are vanes or buckets, as shown in Fig. 9, arranged so as to cause the propellers to turn in opposite directions, the buckets being made so as to catch the wind on different sides. As the wheels are turned by the action of the wind on the buckets the propeller-blades draw in or force out the air, according to the direction in which the wheels are turned. When the wind blows at right angles to the side of the building it will enter and turn the wheels without acting on the buckets upon the periphery.

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

1. The combination of the vane with an air-cooling apparatus, as described.

2. The valves to conduct air and prevent the back thereof, in combination with air-cooling apparatus, as described.

3. The liquid cooler or coolers, in combination with the air-cooling apparatus, substantially as described.

4. The combination of the refrigerating-chambers with an air-cooling apparatus, substantially as described.

5. The devices for admitting and regulating the air, as described.

6. The refrigerating-chambers D, constructed and cooled substantially as described.

7. The air-cooler, in combination with tubes

or channels for conducting air to different apartments, as described.

8. The combination of devices so as to form apparatus to be used for either heating or cooling air or water or air and water, substantially as described.

9. The combination of the propeller-wheels with air flues or ducts, so as to operate substantially as described.

D. E. SOMES.

Witnesses:
H. S. BROWN,
FRED B. GINN.