2 Sheets—Sheet 1.

J. C. MACK.

AIR COOLING APPARATUS.

No. 188,923. Patented March 27, 1877.

Fig. 1.

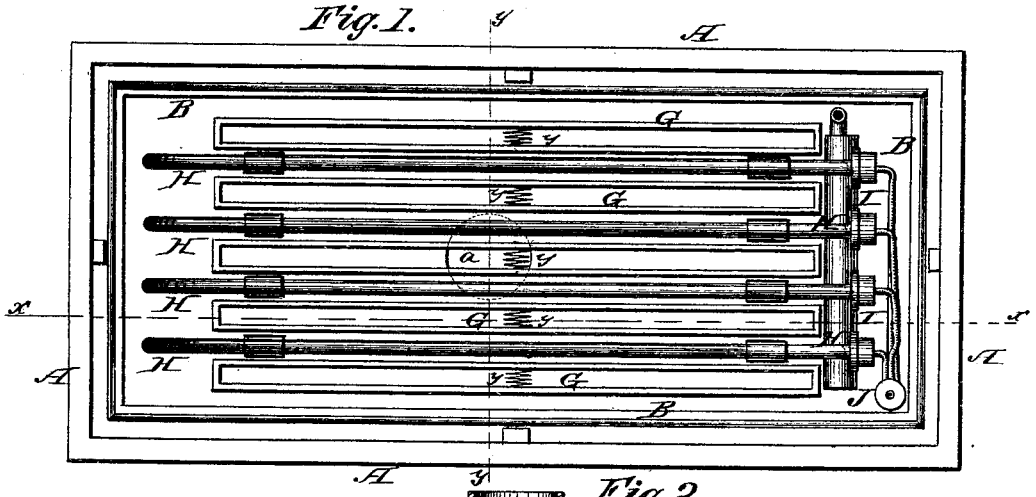
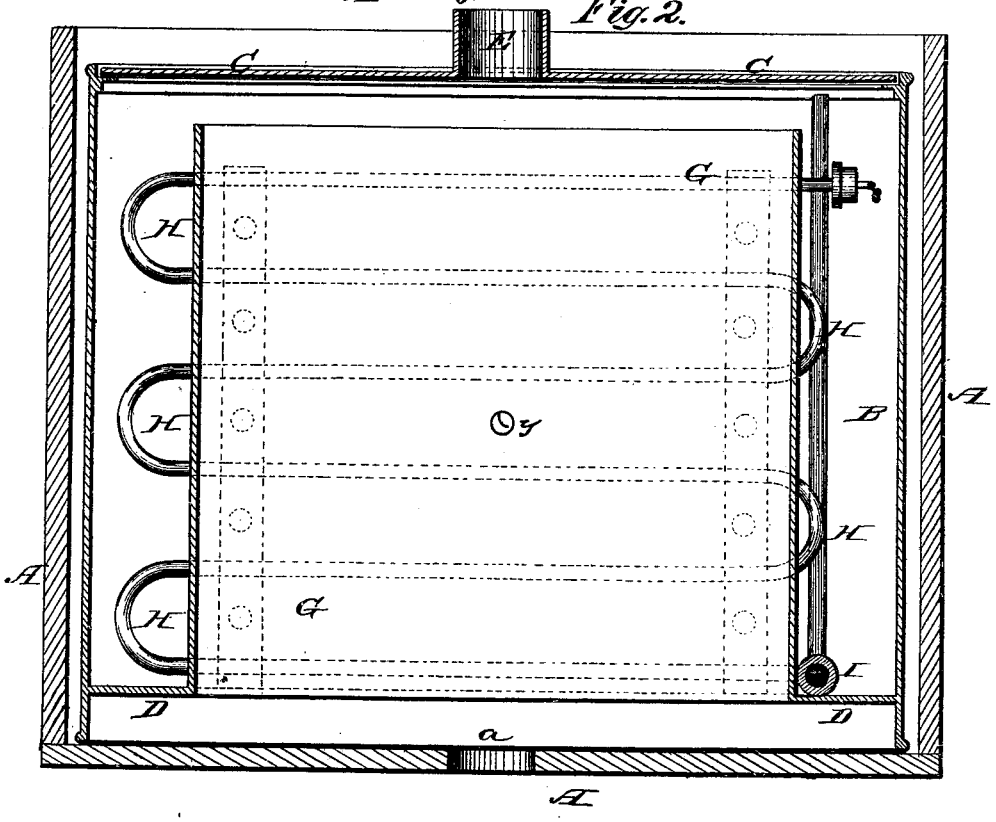


Fig. 2.



Witnesses:

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2 Sheets—Sheet 2.

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Fig. 3.

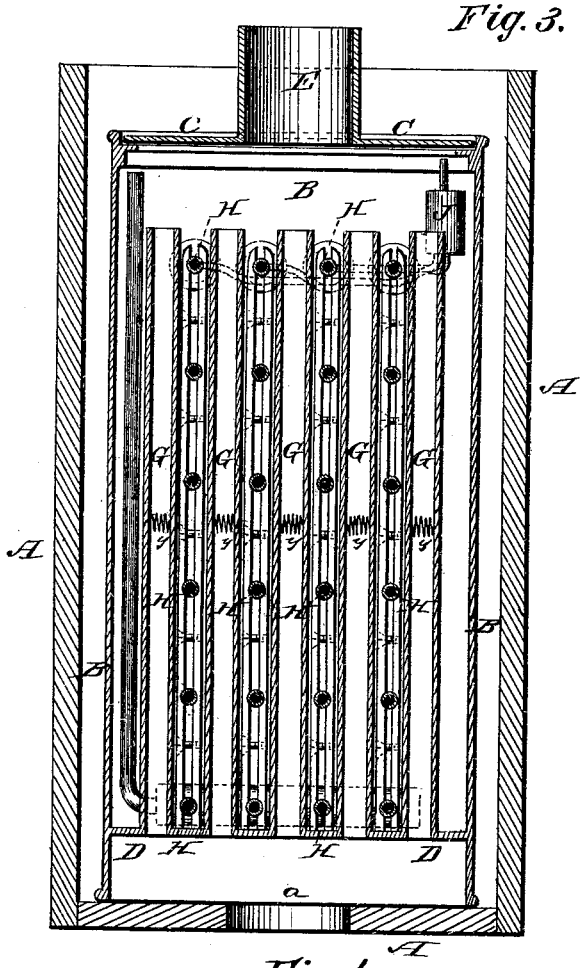
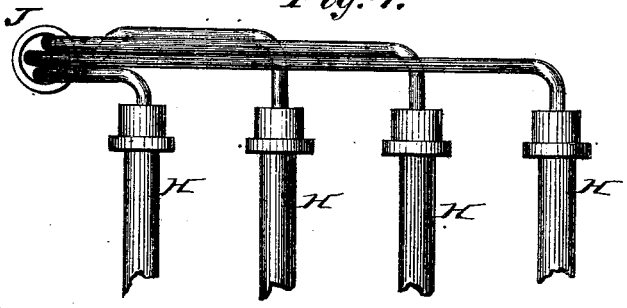


Fig. 4.



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UNITED STATES PATENT OFFICE.

JAMES C. MACK, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN AIR-COOLING APPARATUS.

Specification forming part of Letters Patent No. **188,923**, dated March 27, 1877; application filed March 13, 1877.

To all whom it may concern:

Be it known that I, JAMES C. MACK, of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Ice-Machines and Air-Coolers; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The nature of my invention consists in the construction and arrangement of a machine for the manufacture of ice and supplying buildings, vessels, &c., with dry cold air, and also answering the purpose of a refrigerator, as will be hereinafter more fully set forth.

In the annexed drawings, Figure 1 is a plan view of my machine with the top of the inside tank removed. Fig. 2 is a longitudinal vertical section of the same through the line *x x*, Fig. 1. Fig. 3 is a transverse vertical section through the line *y y*, Fig. 1; and Fig. 4 is a detailed view of a part thereof.

A represents the outside tank, made of wood or other suitable material, and provided with a central aperture, *a*, in the bottom. B is the inside tank, of light plate-iron, placed on the bottom of the tank A, as shown. The space between the sides of the tanks A and B is to be filled with some suitable non-conducting material, and the inside tank B is closed at the top by a cover, C, having a suitable central inlet-pipe, E.

The bottom D of the inside tank B is elevated a suitable distance above the lower edges of the tank, so as to leave a space below the same for the escape of air from the air-flues. G G represent the air-flues, passing through the bottom D, nearly up to the cover C, leaving a suitable space between their upper ends and said cover.

Between the air-flues G G are placed a series of horizontal coils of pipe, H H, the lower end of each coil communicating with a pipe, I, and their upper ends connected to a pipe, J. The pipes I and J are connected with similar devices as those used in other ice-machines, to cause a circulation of the freezing-chemicals, while the air is forced from the top downward through the flues G, and out through the bottom aperture *a*.

The interior tank B is filled with fresh water up to the proper height, and the freezing agent allowed to circulate. As soon as the temperature of the water falls to 40° Fahrenheit the air-circulation can commence. The cold will gradually gain, and in from ten to sixteen hours the tank will become a solid mass of ice frozen at a temperature of many degrees below congelation. The circulation of the freezing agent can now be stopped for a long interval, but that of the air continued.

Ordinarily in machines where air is cooled by artificial means any derangement or stoppage of the machinery, for even a short time, occasions a rise of temperature, which will continue until it has reached a normal temperature, during which time perishable articles would be ruined, or in any case a deprivation and loss of the required benefits of low temperature be caused.

In my machine, when, for any reason, a stoppage of the machinery is made, the large mass of new ice will admit of such stoppage for long and frequent intervals. During such time a circulation of air would, however, be essential; but as, to furnish the same, but a small amount of power is necessary, the duties of the machine and attendance are light. By the aid of this "congealer" the risks are reduced to a minimum, and an almost complete safety insured.

For the convenience of steamers, and for places where a supply of ice for other purposes than those mentioned would be required, a smaller congealer, situated within the larger one, and charged with brine, like the ordinary tanks of ice-making machines, may be used.

The air-flues G may be made in various shapes, and conducted through the ice in different ways. They can be run from and returned to the congealer by distinct branches, instead of being collected, as shown.

In places where a refrigerator-space is needed for provisions, and the cold air also required, the flues conducting the air from the congealer pass through the refrigerator, and the radiation from the air-tubes is sufficient to keep the space

and contents cool for all practical purposes, the air being carried to other parts. This may also be applied to a refrigerating-room, the ice being formed in a tank situated within the room, either at the top or bottom, and the air-cooling tubes running horizontal and parallel to each other, with their ends turned either up or down, the conducting-tubes for the freezing agent being in this case straight tubes, connected to a manifold. In most cases, however, the plan of the vertical coils is preferable for the production of cold air.

By accelerating the rapidity of the flow of the freezing fluid and of the air an increase of cold is produced, so that cold from 40° to zero may be obtained.

The vaporization of the volatile fluid produces a degree of cold many degrees below zero, and the temperature is imparted to the ice, which, in turn, communicates its temperature to the air to be cooled.

No complication of joints and tubing, glands, connections, or lead piping is required. The whole apparatus can be made tight at the erection of the work, and will remain so.

The congealer can in most cases be inside and at the end of the refrigerator; but, when not so arranged, the congealer should be guarded by a suitable non-conductor, as described, between the two tanks A B.

Charcoal is preferable to fibrous material, as it has a low specific heat, is not affected by moisture, nor liable to spontaneous combustion. It may be used in its ordinary state, with a portion only granulated to fill up small crevices.

The air to be cooled enters at the top and is discharged at the bottom, circulating continuously the same air.

For supplying air of a low temperature to buildings and steamers for ventilation, the air need not be returned, but fresh air cooled and supplied incessantly. The fan for air-circulation may be placed in any convenient locality.

The air-flues may be provided with one or more interior springs, *y*, to prevent the flues from being closed up by the expansion of the water in freezing.

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

The combination of an ice-machine and air-cooler, the air-channels, and refrigerant means inclosed within said machine, whereby the ice is formed and utilized to cool the air passing through said machine, substantially as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JAMES C. MACK.

Witnesses:
P. C. DIETERICH,
C. H. WATSON.