W. H. H. BOWERS.

Ice-Machine.

No. 161,474. Patented March 30, 1875.

Fig. 1.

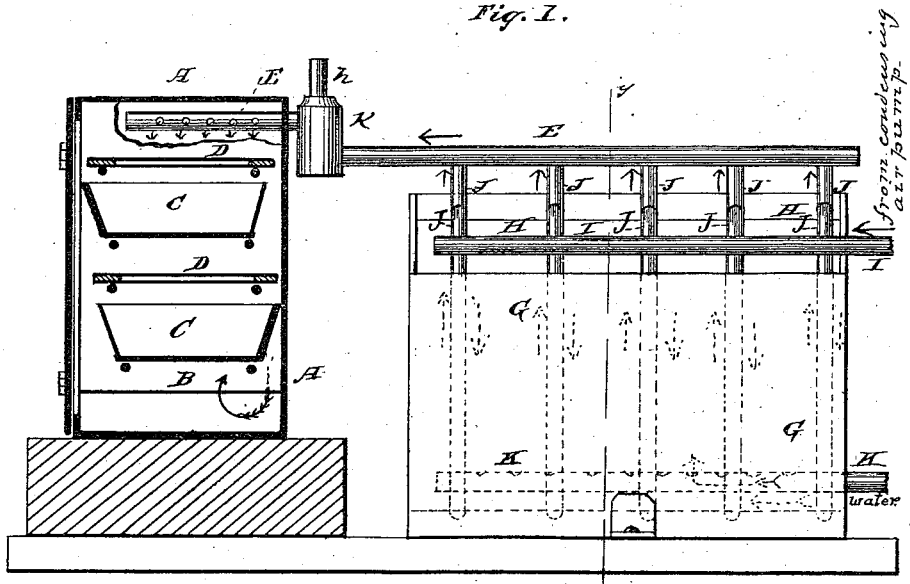


Fig. 2.

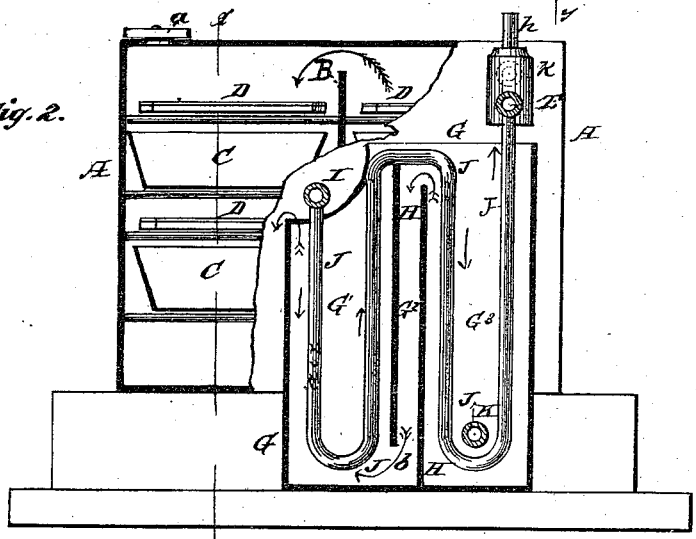
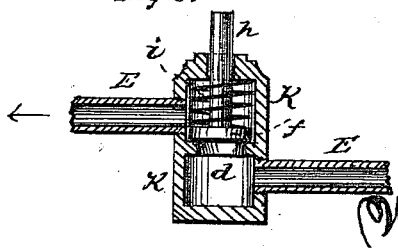


Fig. 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

WILLIAM H. H. BOWERS, OF FRANKLIN, KENTUCKY.

IMPROVEMENT IN ICE-MACHINES.

Specification forming part of Letters Patent No. **161,474**, dated March 30, 1875; application filed March 9, 1875.

To all whom it may concern:

Be it known that I, WM. H. H. BOWERS, of Franklin, in the county of Simpson and State of Kentucky, have invented certain new and useful Improvements in Ice-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, that 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 combination of divided compartments, and the pans arranged alternately, and muslin screens; also, in the divided compartments and air-pipes, whereby the compressed air is cooled on its way to the freezing-tanks, as hereinafter more fully described.

In the annexed drawing, Figure 1 represents a side elevation, partly in section on line *x x*, Fig. 2, of a device embodying my invention. Fig. 2 is a vertical section on line *y y*, Fig. 1, and Fig. 3 is a detail view.

A represents the compartment in which the ice is to be made. This compartment is divided by one or more vertical partitions, B, into two or more sub-compartments, communicating with each other alternately at top and bottom. In each of these sub-compartments is arranged a series of pans, C C, placed alternately close to the right and left side thereof. Over each pan C is placed a muslin screen, D, as shown. The compressed air enters the compartment A at the top, near one side, through a pipe, E, and the heat or caloric absorbed from the water in the pans C is carried off through valves *a a* at the top on the other side of the compartment. G represents the radiator divided by two vertical partitions into three compartments, G^1 G^2 G^3, the two former communicating at the bottom by an opening, *b*. The compressed air passes from the air-pump through a pipe, I, above the compartment G^1. From the pipe I a series of smaller pipes, J J, pass downward to the bottom of said compartment, then upward and over the top of partitions H H, downward to the bottom of the compartment G^3, and up to the pipe E.

By allowing the compressed air to pass through a series of small pipes, the radiation is more rapid and thorough.

K represents the perforated water-pipe, through which a constant stream of water is admitted into the compartment G^3, filling the same, and overflowing the first partition H into the middle compartment G^2. From here it passes through the bottom opening *b* into the compartment G^1, rising in the two latter at the same time, until it passes out over the top of the compartment G^1.

It will be noticed that by this arrangement the coldest water surrounds the pipes J nearest to the pipe E, so as to absorb the radiated heat from the compressed air, which has already lost a great portion of its heat, while the water thus heated is still proportionately cold enough to absorb the heat radiated in the compartment G^1, where the compressed air first enters the radiator. The pipe E is divided in two parts, communicating with a valve-chamber, K, having an interior horizontal partition, *d*, forming the valve-seat. *f* is the valve, closing downward by means of a spring, *i*, surrounding the valve-stem *h*. The compressed air enters through one part of the pipe E into the lower part of the valve-chamber, and when the pressure exceeds that at which the valve has been set, it opens the valve, and the compressed air passes through the other part of the pipe E into the refrigerating-compartment.

It is well-known that in compressing air the heat is increased in the same proportion as the pressure, and that this increased heat radiates, so as to reduce the heat of the compressed air to about the same as the surrounding atmosphere. When this compressed air is then allowed to escape into any suitable compartment it expands, and reduces the temperature in about the same proportion.

This well known principle I apply in my process for manufacturing ice. The compressed air passes through the pipes I, J, and E into the valve-chamber, its heat being radiated and absorbed by the constant current of cold water flowing through the radiator. If the valve *f* is set to, say, three hundred pounds pressure, the air will not pass into the refrigerating-compartment until it attains

that pressure, or twenty times the pressure of the atmosphere. It then raises the valve *f* and passes into the compartment A, and having its heat reduced in the radiator to that of the atmosphere—say, 80° or 85°—the temperature in said compartment is reduced to one-twentieth of said 80° or 85°, producing an intense cold, which is maintained therein by the constant current of compressed air passing into the compartment. This cold current passes alternately backward and forward over the pans C C in the first sub-compartment, to the bottom thereof, then up in the same manner through the next, and the heat absorbed by it is allowed to escape through the valves *a a*. The muslin screens D over the pans C prevent the water in the same from being agitated by the current of cold air in passing downward, and also delay or hold the air close to the top of the pans on its upward passage. The water in the pans C soon becomes frozen, when they are removed and others substituted.

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

1. The divided compartment A, in combination with the pans C and the muslin screens D, all as and for the purpose specified.

2. The combination of the radiator-compartments G^1 G^2 G^3, pipes I, J, and E, valve-chamber K, and water-pipe K′, all constructed substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 6th day of March, 1875.

WILLIAM H. H. BOWERS.

Witnesses:
C. H. WATSON,
H. C. SCOTT.