J. KRAFFERT.

MACHINE FOR COOLING AIR AND FOR THE MANUFACTURE OF ICE.

No. 110,573. Patented Dec. 27, 1870.

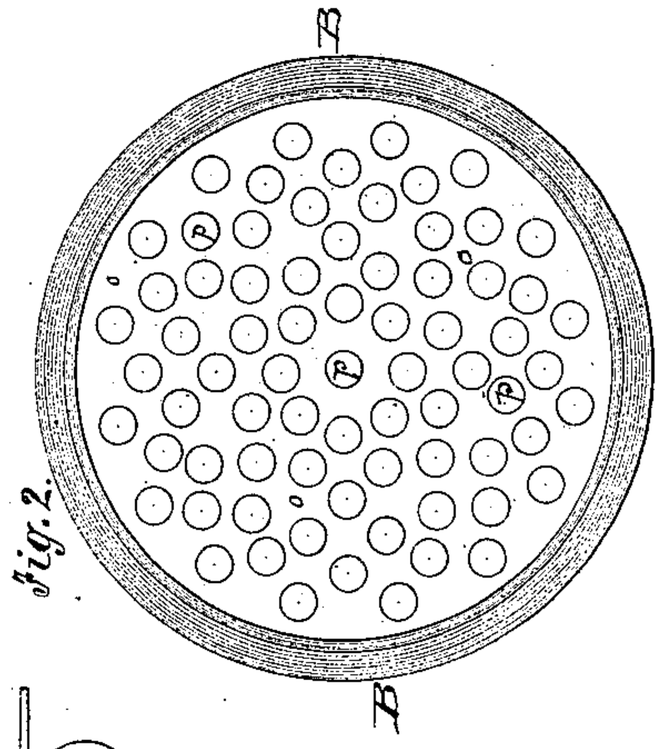

Fig. 2.

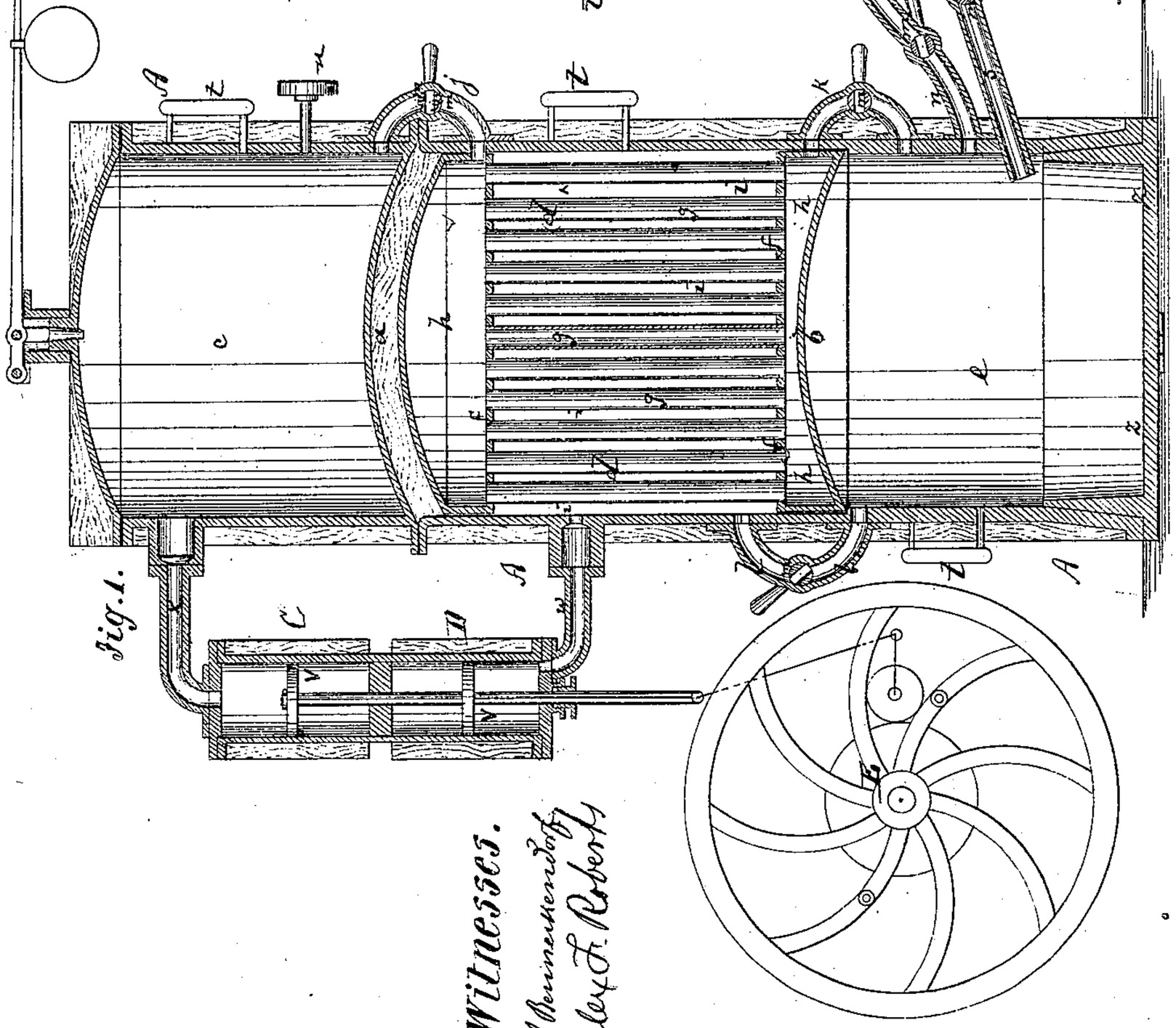

Fig. 1.

Witnesses.

A. Bennendorf

Alex. F. Roberts

Inventor.

J. Kraffert

per Munn & Co

Attorneys.

UNITED STATES PATENT OFFICE.

JULIUS KRAFFERT, OF HOBOKEN, NEW JERSEY.

IMPROVEMENT IN MACHINES FOR COOLING AIR AND FOR THE MANUFACTURE OF ICE.

Specification forming part of Letters Patent No. **110,573**, dated December 27, 1870.

To all whom it may concern:

Be it known that I, JULIUS KRAFFERT, of Hoboken, in the county of Hudson and State of New Jersey, have invented a new and Improved Machine for, and Process of, Cooling Air; 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 make and use the same, reference being had to the accompanying drawing, forming part of this specification, in which—

Figure 1 represents a vertical sectional view of my improved air-cooling machine. Fig. 2 is a detail horizontal section of the outer vessel, the plane of section being indicated by the plane of the line *x x*, Fig. 1.

Similar letters of reference indicate corresponding parts.

This invention relates to a new machine for expanding, and consequently cooling, the air that is passed through a series of vessels, to enable such air to absorb the heat of water or other fluid, for the purpose of producing ice, preserving animal or vegetable matter, or lowering the temperature in heated apartments.

The invention consists, first, in the arrangement and connection of a series of vessels in such a manner that compressed air entering the same from one end will be gradually expanded and rarefied, until its temperature has been reduced to the desired degree.

The invention consists, further, in the construction and arrangement of the vessel for receiving and cooling the water while on its way to the freezing-chamber.

A in the drawing represents a large cylindrical casing made of wood or other suitable material. It contains two transverse partitions, *a* and *b*, which divide it into three main chambers, *c*, *d*, and *e*. The middle chamber, *d*, has, furthermore, two horizontal partitions, *f f*, which are connected by open-ended pipes *g g*. These pipes serve as communications between the upper and lower ends *h* of the chamber *d*, and traverse a chamber, *i*, which is formed by and between the partitions *f*. A pipe, *j*, connects the lower part of the chamber *c* with the upper part of *d*, or rather *h*. Another pipe, *k*, connects the lower part of the chamber *h* with the chamber *e*, and a third pipe, *l*, connects the chambers *i* and *e*.

All these pipes have suitable stop-cocks, *m m*, by which they can be opened or closed at will. B is a cylindrical vessel, of suitable size, set up near the cylinder A, and connected with the lower chamber *e* of the same by a pipe, *n*, which also has a stop-cock, *m*. Within the vessel B are two transverse partitions *o o*, connected by open-ended pipes *p p*, which unite the upper and lower chambers *g*, and traverse the middle chamber *r*. The pipe *n* enters the middle compartment *r*, while another pipe, *s*, extends from the lower chamber *q* into the compartment *e*. Each of the vessels heretofore specified is provided with a thermometer, *t*. A manometer, *u*, should be applied to the upper chamber *c*. C D are the two cylinders of a double-acting air-pump, the plungers *v* of which are operated by a rotary crank-shaft, E, or other machinery, to which motion is applied by suitable mechanism. The lower sucking-pipe *w* of said pump enters the compartment *i*, while the upper discharging-pipe *x* enters the chamber *c*. The pump is of suitable construction, and provided with all necessary valves.

The operation is as follows: The pump withdraws air from the chamber *i*, and compresses that within the chamber *c*. When the air in *c* has been compressed to the desired degree, the pipe *j* is opened, and it is allowed to enter the chamber *h*, passing through the pipes *g g*, which are cold, by being surrounded with rarefied air in *i*. The air from *c* is thus at once expanded, and additionally cooled in *h*, the degree of heat-absorption by the pipes *g* and plates *f* increasing in the same ratio in which air is withdrawn from the compartment *i*. The air is from the chamber *h* allowed to enter *e* by the pipe *k*, and is within the compartment *e* further expanded and cooled. Thence it passes through the pipe *n* into the chamber *r*, cooling the pipes *p* and plates *o*. Water to be frozen enters the upper chamber *q* through a pipe, *y*, and is reduced in temperature by contact with the cold plates *o* and pipes *p*. It passes through the pipes *s* into the chamber *e*, where it is congealed by contact with the rarefied air therein. The ice will be formed upon the bottom *h* of the vessel *e*, which bottom, being hinged, can be swung down whenever the ice is to be removed. The pipe *l* can be opened whenever complete circulation is to be obtained through the chambers *i*, *e*, and

h, and when, also, by the pump, the air is to be withdrawn from both chambers *e* and *i*. When the cold air is to be used for other than ice-making purposes, the vessel B can be dispensed with, and the rarefied air conducted to the apartments or devices which are to be cooled. It is evident that the number of vessels used for successively expanding the air can be varied at will, as well as their size, shape, and position to each other, and that the power of the machinery is increased by the addition of other vessels.

It will also be seen that, in this machine, no agency but power is required, and the expense of ice-making is consequently reduced to the mere production of power and repair of mechanism.

I am aware of the patent of Franz Windhausen, dated March 22, 1870, No. 101,198, and disclaim anything therein contained; but

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of the tubular chamber *h* and its inclosing-chamber *i* with the double-acting air-pump and the compression-chamber.

2. The combination of the tubular chamber *h* and its inclosing-chamber *i* with the freezing-chamber *e*.

3. The combination of the tubular cooling-chamber *q* and its inclosing-chamber *r* with the freezing-chamber *e*.

4. The combination and arrangement of the freezing-chamber *e*, tubular expansion-chamber *h*, and the compression-chamber *c*, as described.

JULIUS KRAFFERT.

Witnesses:
A. V. BRIESEN,
GEO. W. MABEE.