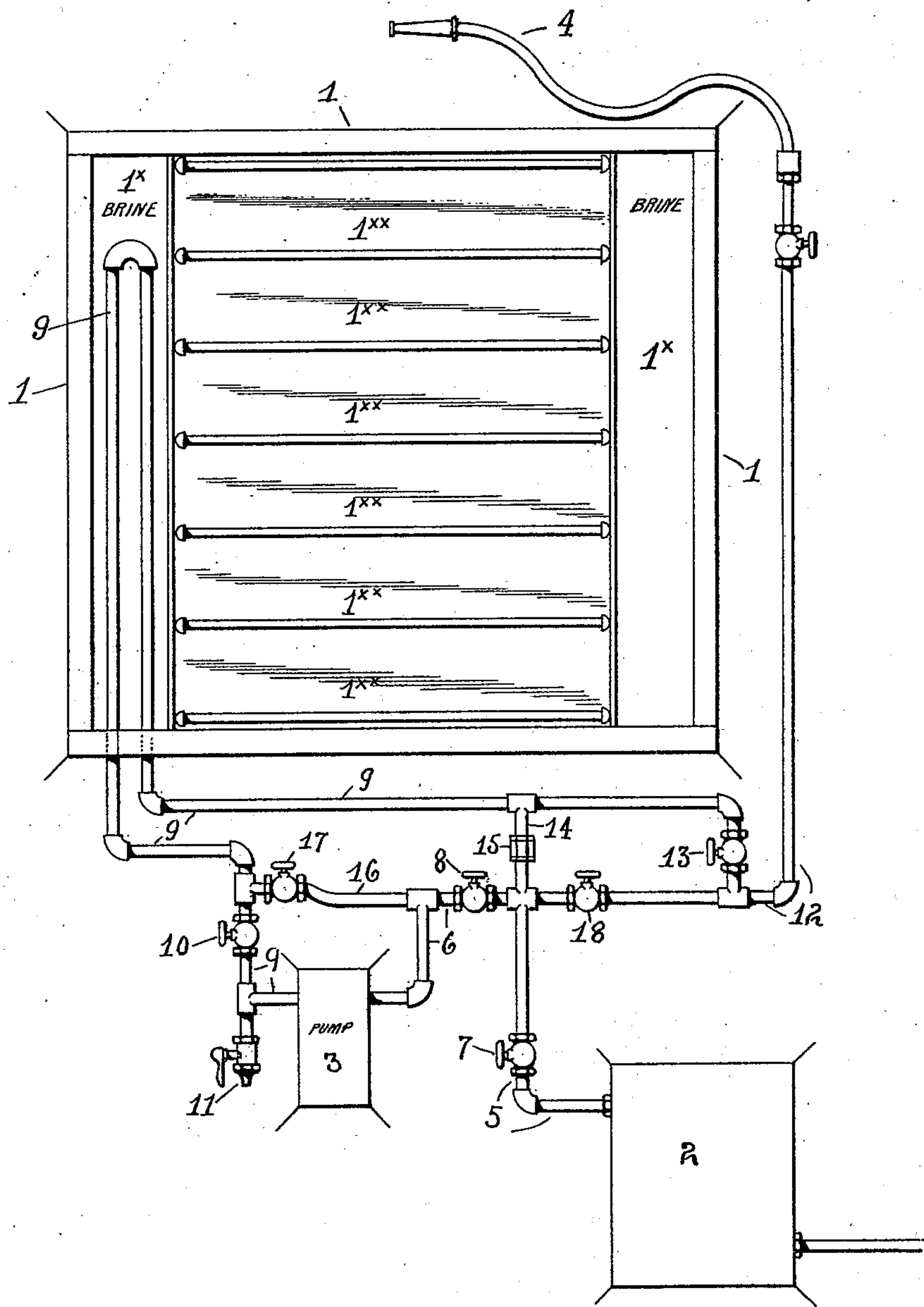


(No Model.)

E. C. FUCHS.
APPARATUS FOR MAKING ICE.

No. 497,650.

Patented May 16, 1893.



WITNESSES:

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APPARATUS FOR MAKING ICE.

SPECIFICATION forming part of Letters Patent No. 497,650, dated May 16, 1893.

Application filed April 21, 1891. Serial No. 389,858. (No model.)

To all whom it may concern:

Be it known that I, ERNST CHARLES FUCHS, of the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in the Mode of and Apparatus for Making Artificial Ice, of which the following is a specification, due reference being had to the accompanying drawing, which illustrates a plan view of so much of such an apparatus or machine as is necessary to enable others skilled in the art to which my invention appertains to understand, make, and use the same.

Heretofore in practice the real and full congealing of the feed-water in the making of artificial ice takes place in an open vessel or mold, resulting always in the finished product—a block of ice—being feathered or having a white cone, generally at the top center, whereby more surface is exposed to the attack of air than would otherwise be the case were the block of ice homogeneous or perfectly solid, having the disadvantages as an article of manufacture of melting more rapidly, together with being unsightly.

Ice is generally manufactured only from distilled water obtained by condensing steam, and to make this condensed steam, *i. e.*, distilled water, absolutely free of air, it is re-boiled in a closed vessel provided with a vent which serves as an escape for the vapor and the air. By this process water chemically pure and free of air is obtained. This pure and airless water is transmitted from the re-boiler through a series of pipes which serve as coolers, the cooling agent therewith being generally "well-water," into one or more filters and thence into a storage-tank, in which said water is further cooled by the not altogether exhausted energy of the ammonia returning from the freezing-tank, and from this storage-tank the water reaches the molds through a pipe, hose and filler. Throughout this operation the distilled water does not come in contact with the atmosphere and has had no opportunity to absorb any air. The result of congealing water chemically pure and free of air should be a homogeneous block of ice, which is not obtained in practice however, as every block of ice manufactured has the feather or white-cone to a greater or less ex-

tent according to the temperature under which it is frozen. It is conceded from all sides that this feather or white-cone in the finished product is air, which I have discovered is absorbed by the water in the following manner—As a rule the pipe connecting the storage-tank with the mold-filler is connected at or near the bottom of the tank and therefore water of a lower temperature than 38° Fahrenheit cannot be drawn off for the reason that any of the contained water of a lower temperature than 38° Fahrenheit has necessarily expanded more or less, and because of its lighter volume risen above the connection of the pipe with the tank, and to change the point of connection of said pipe with the tank to suit the point of expansion is impracticable, as the temperature of the water in the tank is constantly changing from 38° to 50° and above as the water supply is fed to the tank, and thence to the molds, therefore it will be readily understood that by delivering the water to the molds at its greatest obtainable density 38° Fahrenheit, and subsequently cooling it to freezing point in the molds, the expansion of the water, which means agitation of the water takes place in the molds and exposed to the atmosphere and by this agitation the water absorbs air with the result that the finished product—a block of ice—has the objectional feather or white-cone.

It is the object of my invention to prevent any absorption of air by the feed-water during the necessary final congealing of the water and so produce a block of ice that will be perfectly clear, solid, and free of the feather or white-cone, and to the end sought I connect a pump with the storage tank and pump the water therefrom—which as stated is first freed of air—through a system of valve controlled pipes to the molds, a portion of said pipe system being submerged in a non-congealable mixture of low-temperature, such as brine,—whereby the water in its passage through the pipe-system so submerged, to the molds, is lowered or cooled in temperature to about 32° Fahrenheit and is delivered to the molds at such low temperature. Lowering the temperature of the water to 32° Fahrenheit means expanding or cooling the water, but, as is obvious, the expansion or cooling does not take

place in an open-vessel or mold or in contact with the atmosphere, but within the pipe system, with the result of obtaining the expansion or cooling of the feed water, first freed of air, to the desired degree, without absorbing air. The water so expanded or cooled is fed to the molds and no perceptible agitation follows in the final congealing of the water by reason of its previous expansion or cooling, and the product is not only a perfect homogeneous block of ice, that is to say, without the feather or white-cone, but as will be understood, since the water is fed to the molds at a freezing temperature a great saving of time is effected in obtaining the finished product, thus materially reducing the cost of manufacture in increasing the capacity of a given plant.

The pump serves to make my process reliable in action, for by its use and the use of the valves on the pipe-system, the flow of the feed-water from the storage-tank to the molds may be controlled to suit the varying temperatures of the feed-water and the non-congealable mixture in which a portion of the pipe system is submerged, whereby the feed water may be cooled to the desired extent prior to and for its delivery to the molds;—further the pump serves to keep up the necessary continuous feed of the water to the molds to prevent it freezing in the pipe, and by the proper manipulation of the valves and pump jointly, to free the pipes of water for the same given reason when the molds are filled and the feed unnecessary, all as shown in the drawing, and hereinafter more fully described.

Referring to the drawing in which the parts are indicated by numerals similar numerals denoting like parts, 1 is the freezing tank and 1^x its chamber for containing the brine or other non-congealable mixture. 1^{xx} the molds, 2 the cooling or storage-tank; 3 a pump, and 4 a hose or the like for directing and feeding the water to the molds, connected to the pump and storage-tank by a valve-controlled pipe-system, a portion thereof being shown located in the brine-chamber of the freezing-tank so as to be submerged in the non-congealable mixture, but may otherwise be suitably and conveniently located, for instance in a proper and separate tank or vessel containing a non-congealable mixture of low temperature. I shall, however, for convenience of description, describe the construction shown in the drawing, in which the submerged portion of the pipe system is located in the freezing tank.

In the operation of filling the molds with water for freezing, the pump 3 is put in action and takes its supply of water of a temperature varying generally from 38° to 50° from the tank 2,—which has a source of water supply,—through its intermediate pipe connections 5 and 6, the valves 7 and 8 thereon being open, and discharges it therefrom

through the pipe 9—the valve 10 thereon being open and valve 11 closed—which leads into the brine chamber 1^x of the freezing tank and out again connecting with a pipe 12. A valve 13 on the pipe 9 being open permits the passing of water to said pipe 12. This pipe 12 connects at one end to and at the point of juncture of the pipes 5 and 6 and is provided with a valve 18—which is closed when the pump is working,—and at its other end is provided with a hose 4 through which the water is delivered to the molds as stated. The pipe 9 is connected to the pipes 6—12 at their juncture with pipe 5, by a pipe 14 having a spring controlled valve 15 and the said pipes 9 and 6 are again connected by a by-pass pipe 16 having a valve 17, all for purposes presently set forth.

As will be understood by those skilled in the art to which my invention appertains, the water taken from the tank 2 in its passage through the pipes to delivery to the molds, in passing through that portion of the line located in the brine chamber of the freezing tank which has a temperature of about 16°, is expanded or cooled by having its temperature lowered to about 32°, at or about which temperature it is discharged into the molds with the attended result of rapid freezing and the obtaining of perfectly clear and solid ice. As will also be understood to keep up a continuous circulation of the water and prevent its freezing in the pipes when it is desired to stop the feed to the molds, is the purpose of the pipe connection 14, the spring valve thereon serving to permit the passing of the contained water from the direct feed line to the pipe 6 to be again taken into the pump and discharged therefrom as before. To free the pipes of water the respective valves 7, 10 and 13 are closed and all the other valves opened when as will be obvious the water will be discharged through the outlet 11, the by-pass 16 facilitating the operation.

I do not desire to restrict my invention in its structural features to the arrangement of parts depicted in my drawing, but wish it understood that I may vary the same in any manner to better carry out the principle of my invention without departing from the true scope thereof.

I do not claim to free distilled or other water of air by expansion or cooling, or broadly to expand or cool water in the art of artificial ice-making, but what I do claim as my invention is my own particular means of preventing the feed-water, once freed of air, from absorbing any air during the final congealing of the water in the formation of an artificially produced block of ice, having for its result the obtaining of a block of artificially produced ice, free of feather or white cone.

I claim—

In an artificial ice-making apparatus, the

combination with the cooling or storage-tank, freezing-tank, and molds, of a pump, and a connected system of valve-controlled pipes, one end of said system being in connection with the storage-tank, the other end
5 provided with means for delivering feed-water to the molds, and the intermediate portion being submerged in a non-congealable

mixture within the freezing-tank, substantially as described.

In testimony whereof I have hereunto signed
my name this 14th day of March, A. D. 1891.

ERNST CHARLES FUCHS.

In presence of—

JOHN JOLLEY, Jr.,

CHAS. BUSH.