E. BIGELOW.

LIQUID COOLER FOR COOLING LIQUIDS UNDER PRESSURE.

No. 108,318. Patented Oct. 18, 1870.

Fig: 1.

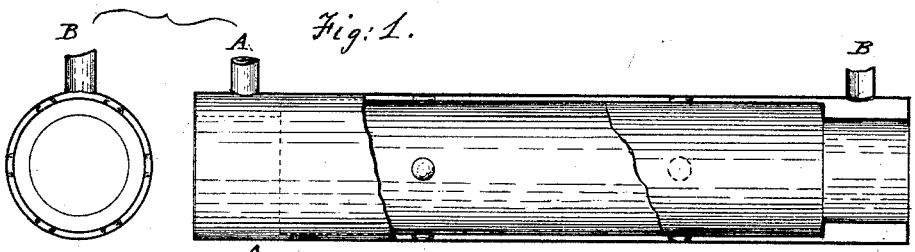


Fig: 2.

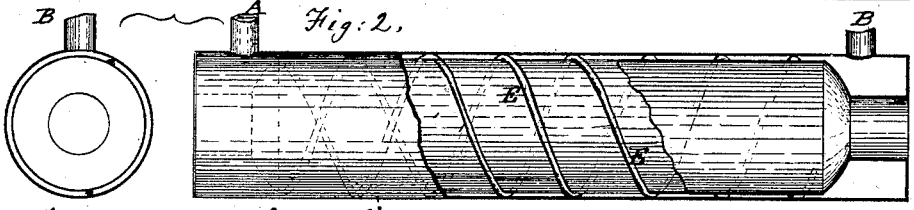


Fig: 3.

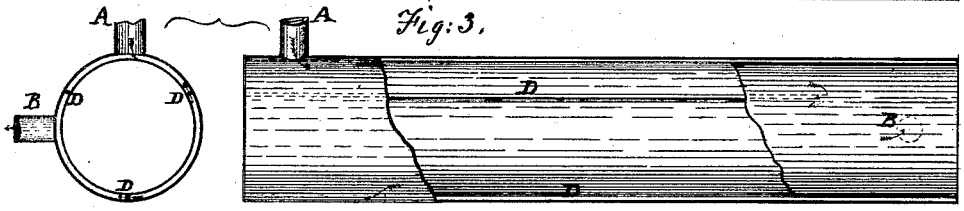


Fig: 4.

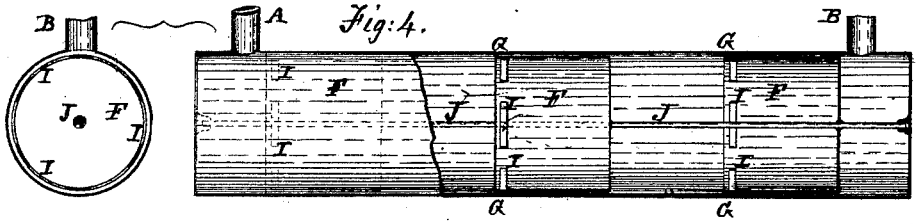
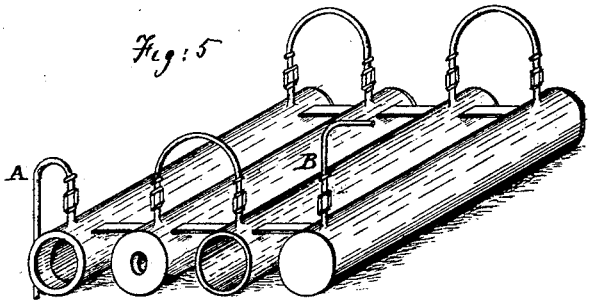


Fig: 5



Inventor,

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EDMUND BIGELOW, OF SPRINGFIELD, MASSACHUSETTS.

Letters Patent No. 108,318, dated October 18, 1870.

IMPROVEMENT IN LIQUID-COOLERS FOR COOLING LIQUIDS UNDER PRESSURE.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, EDMUND BIGELOW, of Springfield, Hampden county, Massachusetts, have invented a new and improved Cooler for Cooling Liquids under Pressure; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon.

The nature of my invention consists in so constructing and arranging a chamber or chambers in a cooler, that the liquid to be cooled is brought in contact with the artificially cooled outer and inner walls of the chamber in thin sheets, and is kept in contact with said walls for such part of the time occupied in its passage from the inlet to the outlet of the cooler, as to reduce the liquid to a very low temperature with great rapidity.

That others may understand my invention I describe it as follows:

The best shape for the cooler is a cylinder or a series of cylinders connected together, though I do not confine myself to that precise form, though, in this description, I shall speak only of a cylinder or cylinders.

I construct a metallic cylinder of suitable strength to resist the pressure of liquids charged with carbonic acid gas, whether fermented liquids or liquids artificially aerated, and of suitable length and size for the ice-chest in which it is to be kept. In its exterior this cylinder presents no peculiar features; within, it may be arranged in several different ways.

First, it may contain within it another cylinder of metal, and of suitable strength, fastened to the outer cylinder or shell, and so much less in size than the shell that, when it is in place, there is a space between its outer surface and the inner surface of the shell of one-thirty-second part of an inch, more or less, in depth, with a somewhat deeper space at each end of the cylinder. The supply-port is so arranged that the liquid to be cooled is let into the apparatus between the shell and the inner cylinder, and is immediately spread out into a sheet only one-thirty-second part of an inch in thickness, and separated from the ice in which the cooler, when in use, is packed, by only the thickness of the shell; and when, as may be done, the cylinder is so constructed that its ends are open, so as to have a hollow cylinder within the inner metallic cylinder, ice or ice water is in contact also with the inner surface of the inner cylinder, as well as with the outer surface of the shell.

The liquid carried through a cooler of this construction is rapidly cooled.

This form of cooler is shown in fig. 1, in which the supply-port is shown at A, and the discharge-port at B.

Second, another arrangement of the interior of the cooling cylinder, which gives it greater capacity for cooling, and which I have found to be of great usefulness, is as follows:

The shell or outer cylinder is constructed, as before described, with a supply-port at one end and a discharge-port at the other. A spiral thread is raised, either on the inner surface of the shell or on the outer surface of the inner cylinder of such height as to fit against the surface of the cylinder opposite that on which it is raised. The space between the threads may be of an inch in width, or more or less, as preferred, and should be so arranged that the liquid entering at the supply-port passes spirally around the inner cylinder, making one complete revolution or more, about the inner cylinder before reaching the discharge-port, thus being disposed for a greater distance to the cooled inner surface of the shell. The result may be obtained by winding the inner cylinder with a wire of suitable size, or by any other means, which will divide the space between the shell and the inner cylinder into a spiral passage-way for the liquid.

This arrangement is shown in Figure 2, in which a part of the shell has been removed, showing the raised thread or wound wire at E, on the surface of the inner cylinder.

Third, a similar effect may be produced by dividing the space between the shell and the inner cylinder longitudinally into two, three, or more chambers, by raising a thread running longitudinally along the inner surface of the shell or the outer surface of the inner cylinder, or by other suitable means, so that the liquid would travel back and forth along the cylinder once or more times before reaching the discharge-port, the outlets from the several chambers being alternately at one end and the other of the cylinder. The method of accomplishing this is shown in Figure 3, D representing the longitudinal strips.

In all these arrangements the end of the cylinder, except where the shell and the inner cylinder are united, may be open, so that there be a hollow space within the inner cylinder, open to the direct action of the ice or ice-water, as the case may be, when the cooler is imbedded in ice for use.

Fourth, another arrangement of the interior of the cooling-cylinder which I regard as better than either of those already described, is as follows:

The shell or outer cylinder is constructed as before, with a supply-port at one end, and a discharge-port at the other. Within this shell is placed a series of open-mouthed metallic cups, F, of such diameter as to leave a space outside them, and within the inner surface of the shell, one-thirty-second part of an inch, more or less, in depth.

The lip of each cup is made to flare, so as to fill the entire cross-section of the shell, as shown at G.

Each cup is perforated in or near the lip, with a

number of small holes, I, sufficient to discharge the liquid freely.

The cups may be three or four inches in depth, or more or less, if preferred, and are best arranged by being soldered to a stout wire, J, which passes through the center of the bottom of each, and at such distances from each other that the lip of each cup is about one inch from the bottom of the next, and that the two extreme cups extend to within about an inch of the head of the cylinder.

The ends of the wire on which they are strung fit each into a socket in the head of the cylinder.

The liquid entering at the supply-port fills the space behind the bottom of the first cup, and passes in a thin sheet between the shell and the outside of the cup, being rapidly cooled in its progress; then passes through the small holes in or near the lip of the cup into the cup and space between it and the next cup, and on in a thin sheet again between the second cup and the shell, through the holes in or near the lip of the second cup, and thus on until it reaches the discharge-port.

By this arrangement a comparatively large quantity of liquid is kept constantly cooled to a very low temperature.

This arrangement is shown in Figure 4, showing the supply-port at A, and the cups F F F arranged upon the stout wire J, extending through the entire length of the cylinder.

For the purpose of cooling soda water on draught, the cooler is most advantageously made with a series of cooling-cylinders, connected together by suitable tubes, and of the proper length and size to be placed in the ice-compartment of the soda apparatus, as shown at Figure 5.

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

1. A cooler, having a metallic shell and inner walls of sufficient strength to resist the pressure of fermented or artificially aerated liquids, and so arranged by means of the relative size of the shell and the interior walls, and by means of a thread raised on the interior wall or the inside of the shell, or a wire wound substantially as set forth, that the liquid to be cooled shall be carried spirally in a thin sheet around the interior wall and in contact with the inside of the shell, substantially as described.

2. A cooler, having a metallic shell, and within the shell a series of cups arranged substantially as hereinbefore set forth, the whole being of sufficient strength to resist the pressure of fermented or artificially aerated liquids.

3. As a part of apparatus for drawing fermented or artificially aerated liquids, or liquids in any way charged with carbonic acid gas, a cooler constructed with a cylinder or a series of cylinders, made with either, or any, or all of the arrangements of the interior of the cylinders hereinbefore described.

EDMUND BIGELOW.

Witnesses:

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EDWARD C. KEEHILL.