

(No Model.)

W. L. SPOON, Jr.
APPARATUS FOR COOLING LIQUIDS.

No. 599,202.

Patented Feb. 15, 1898.

FIG. 1.

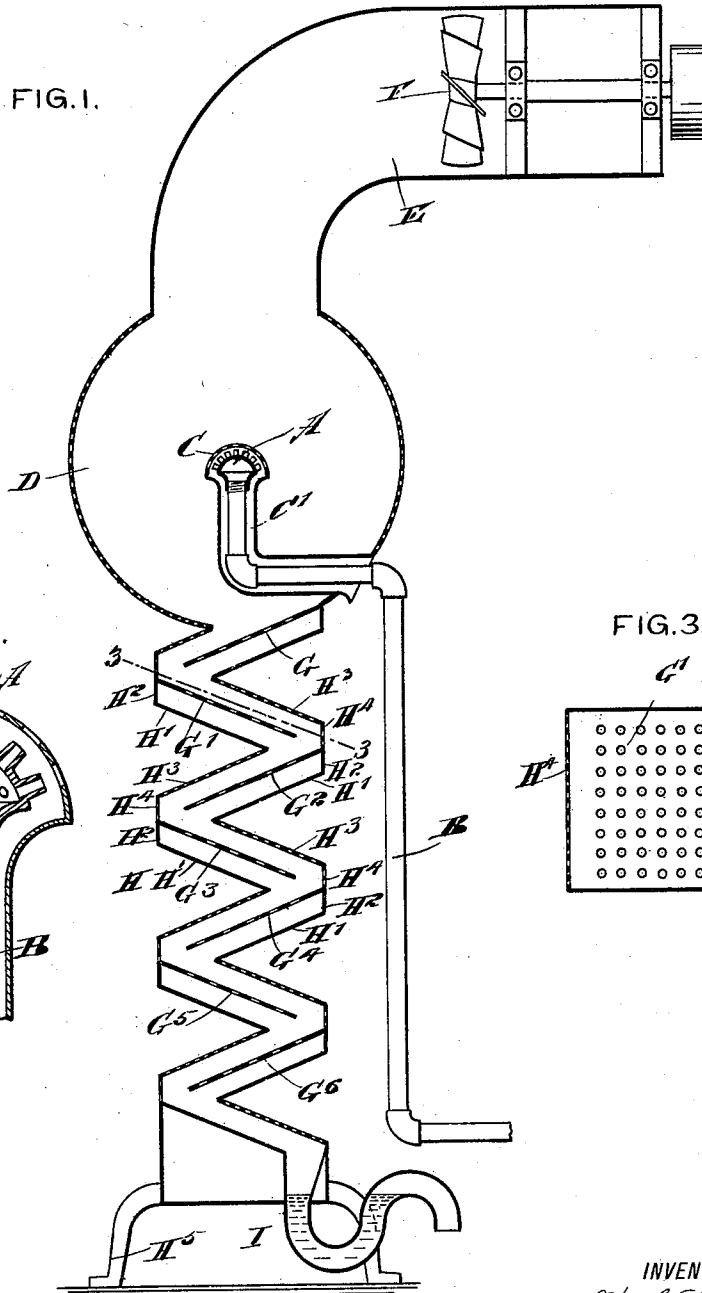


FIG. 2.

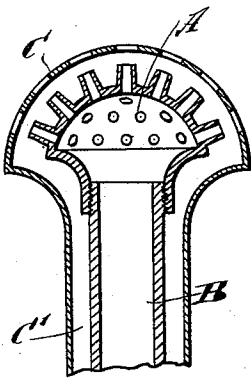
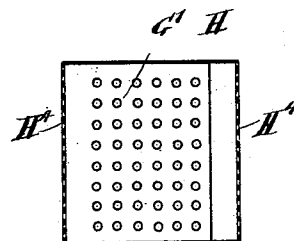


FIG. 3.



WITNESSES:

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APPARATUS FOR COOLING LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 599,202, dated February 15, 1898.

Application filed October 28, 1896. Serial No. 610,324. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. SPOON, JR., of Burlington, in the county of Alamance and State of North Carolina, have invented a new and Improved Apparatus for Cooling Liquids, of which the following is a full, clear, and exact description.

The invention relates to apparatus for cooling hot water or other liquid used in ice-machines and the like; and its object is to provide a new and improved apparatus for cooling water and other liquids in a very simple and effective manner and permitting of using the liquid over and over again with a minimum percentage of loss by evaporation.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side elevation of the apparatus. Fig. 2 is an enlarged side elevation of the combination water and air nozzle, and Fig. 3 is a sectional plan view of the improvement on the line 3 3 of Fig. 1.

The improved apparatus is provided with a nozzle A, held on one end of a liquid-supply pipe B, through which flows the hot liquid to be cooled. The nozzle A is surrounded by a nozzle C, connected with a pipe C', surrounding a part of the supply-pipe B and opening into the outer air, so that the liquid ejected through the openings in the nozzle A creates a suction in the pipe C', so that the inrushing air acts on the water issuing through the nozzles A and C to atomize the liquid, so that the latter is atomized and sprayed by the two nozzles. The nozzle C is arranged within a perforated casing D, supporting the pipe C', and connected at its upper end with an outlet-pipe E, containing a suction-fan F, of any approved construction.

The bottom of the casing D opens upon an inclined perforated plate G, discharging at its lower end on a second plate G', inclined in an opposite direction and discharging on a third plate G², likewise inclined, but in an opposite direction to the plate G'. Plates G³, G⁴, G⁵, and G⁶ are arranged one below the other and

alternately inclined in opposite directions to form a series of such perforated plates, one of which discharges upon the other. The several plates G G' G² G³ G⁴ G⁵ G⁶ are inclosed within a zigzag leg H, supporting the casing D and having the several members each formed with an inclined bottom H', and the lower half H² of the sides is solid, while the inclined top H³ and the remaining part H⁴ of the sides are perforated to permit air to enter the zigzag members of the leg. The lower end of the leg H rests on feet H⁵, and the leg connects with a trap I, through which passes the cooled liquid back to the apparatus or machine for further use.

Now it will be seen that when the suction-fan F is in motion a current of air passes through the casing D and the leg H, so that the liquid sprayed by the nozzles A and C is subjected to a current of cool air to cool the liquid by accelerated evaporation. The sprayed liquid from the nozzles falls upon the first inclined plate G and flows down the same with the air passing up through the perforations in the plate, the liquid finally passing in a zigzag manner over the several plates in the leg H to finally arrive in a cool state at the trap I, from which the liquid is returned to the machine for reuse. It is expressly understood that the liquid is atomized and sprayed in a very finely-divided state and then subjected to a current of air of ordinary or low temperature, so that an accelerated evaporation and a consequent cooling of the liquid takes place.

It is further understood that when the suction-fan F is in operation the density of the air is at once reduced within the apparatus, and to restore this reduced density to that of the outer air an inrushing current begins at once to set in through the perforations in the casing D, nozzle C, and leg H. It is well known that when air or any gas passes from a higher to a lower pressure its volume varies inversely—that is, the air when passed through the above-named perforations expands, being in a region of less density, and hence the air is rendered cool by expansion, which expansion takes place either in contact with the sprayed water within the casing D or as it passes in a zigzag flow against or over the plates G G' G² G³, &c. Thus in spraying

a hot liquid in an expanding current of rarefied air I accelerate evaporation.

By making the perforations in the casing D and leg H small and increasing the size of the pipe E and the efficiency of the suction-fan F the difference in density of the air within the apparatus and that of the outside air may be made so considerable that, though the water enters at a temperature of 200° Fahrenheit and the normal heat of the outside air may be even 100° Fahrenheit or 110° Fahrenheit, the water discharged from the machine may be reduced to a temperature as low as 40° Fahrenheit.

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

1. An apparatus for cooling liquids, comprising a perforated casing, means connected with the upper end of the casing for forcing a current of air through the same, a nozzle arranged in the perforated casing and connected with a liquid-supply for spraying the liquid within the said casing, and a perforated zigzag leg containing perforated plates and supporting the said casing, substantially as shown and described.

2. An apparatus for cooling liquids, comprising a perforated casing, means for forcing a current of air through the said casing, a nozzle connected with a liquid-supply for spraying the liquid within the said casing, a zigzag leg connected with the said casing and having perforated tops, and perforated plates

within the members of the said leg, substantially as shown and described.

3. An apparatus for cooling liquids, comprising a perforated casing, means for forcing a current of air through the said casing, a nozzle connected with a liquid-supply for spraying the liquid within the said casing, a zigzag leg connected with the said casing and having perforated tops, and perforated plates within the members of the said leg, and a trap connected with the lower end of the said leg, substantially as shown and described.

4. In an apparatus for cooling liquids, the combination with a perforated casing, means for forcing air through the same, and a nozzle arranged in the casing for spraying the liquid in the said casing of a zigzag leg communicating with the casing and through which the water from the casing passes, said leg having the tops of its members perforated, substantially as described.

5. In an apparatus for cooling liquids, the combination with a casing, means for forcing air through the same, and a nozzle for spraying the liquid in the casing, of a zigzag leg communicating with the casing, the tops and half of the sides of the members of the legs being perforated, and inclined perforated plates in the members of the legs, substantially as described.

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Witnesses:

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