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1,490,254

E. BURHORN

WATER COOLING APPARATUS

Filed July 10, 1920

Fig. 1.

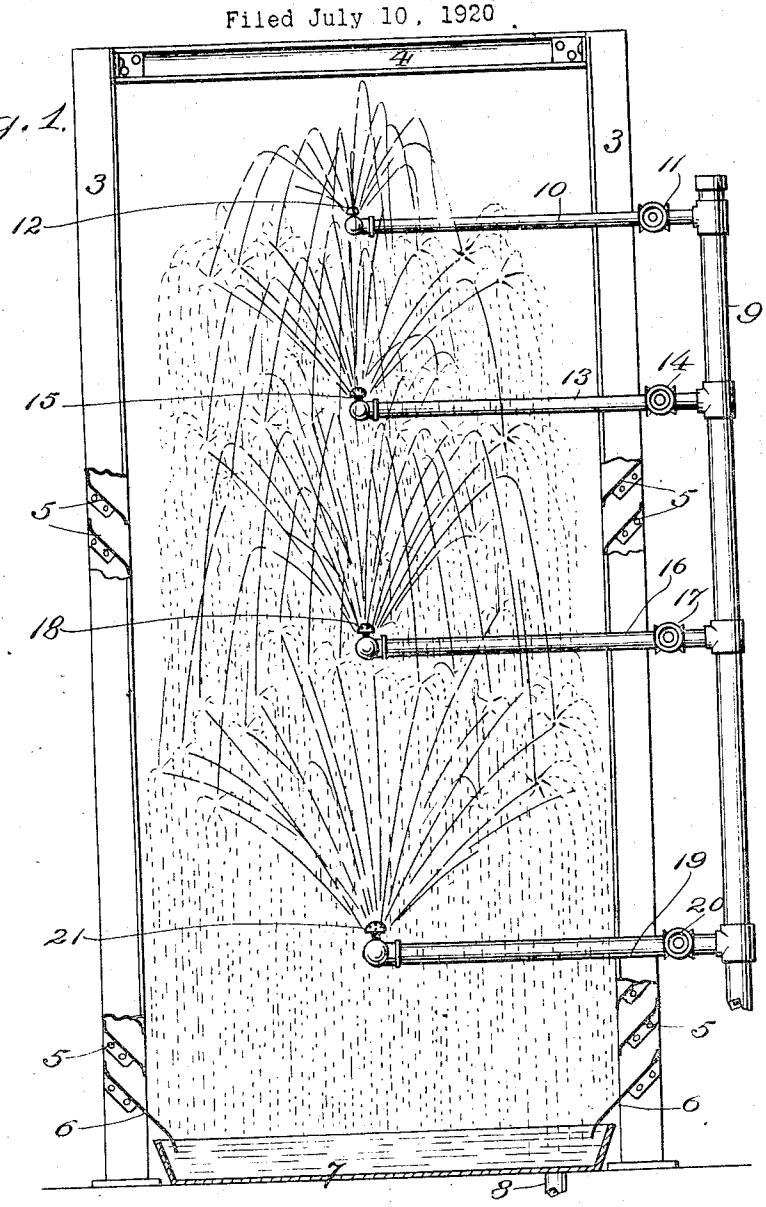
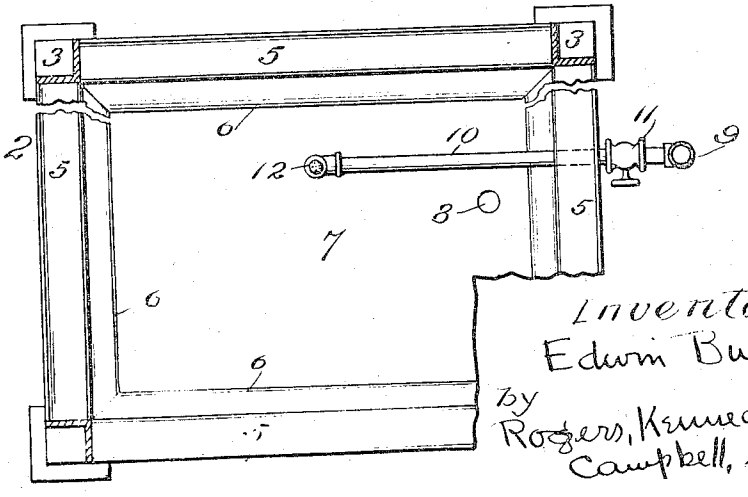


Fig. 2



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UNITED STATES PATENT OFFICE.

EDWIN BURHORN, OF HOBOKEN, NEW JERSEY.

WATER-COOLING APPARATUS.

Application filed July 10, 1920. Serial No. 395,253.

To all whom it may concern:

Be it known that I, EDWIN BURHORN, a citizen of the United States, residing at Hoboken, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Water-Cooling Apparatus, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to water cooling, and involves a novel water cooling apparatus or tower. The invention relates more particularly to the cooling of water by natural air currents, especially in connection with a so-called water cooling tower through which liquid is caused to descend by gravity while subject to the cooling influence. The cool water drawn off at the bottom may be used for example in a condenser and after again being heated, passed again through the cooling tower.

The main general objects of the present invention are to simplify and cheapen the cost of cooling apparatuses, and at the same time to simplify and cheapen the maintenance of the system while preserving a high degree of efficiency. Other objects and advantages will appear in the hereinafter following description of one form or embodiment thereof, or will be apparent to those skilled in the art.

To the attainment of the above referred to objects and advantages, the present invention consists in the novel apparatus, combinations, arrangements, and other features shown or described herein.

In the accompanying drawings, Fig. 1 is a side elevation of an apparatus embodying the present invention, the same being partly broken away to show the louvers on two of the sides, the louvers at the other two sides being omitted for purpose of illustration. Fig. 2 is a top plan view of the apparatus shown in Fig. 1.

The principle on which the present invention operates is the formation of a plurality of sprays of the warm water so that their paths will intersect and tend to contact and break up each other into finer particles, thus enhancing the cooling effect both by transmission of heat to the natural air currents, and by evaporation of the warm water. Specifically, I prefer to use superposed upwardly directed spray nozzles so arranged that the upward spray from one nozzle, in its subsequent descent, will meet the path of a second upward spray from a nozzle arranged at a lower level; and the number of nozzles may be indefinitely increased. Preferably the nozzles or the sprays therefrom are of progressively increasing size toward the bottom so that the sprays approximately conform with the gradually increasing diameter of the descending flow of water. Preferably also, the entire arrangement is enclosed within a cooling tower of the type having louvers such as to freely permit natural air currents, and yet minimize the loss of water by being forced or splashed outside of the apparatus.

Referring specifically to the embodiment disclosed in the drawings, the cooling tower is shown as comprising four corner posts 3. These are braced by cross beams 4. At each of the four sides may be provided a series of inclined louvers 5, arranged so that water splashing upon them drains back into the apparatus. The bottom louver 6 at each side is wider than the others so as to overlie the collecting pan or basin 7.

The outlet or pipe 8 from the pan 7 conveys the cool water to the condenser or other place of use. The warm or hot water which is to be cooled is brought to the apparatus by pipe 9, shown as extending vertically at one side of the tower. From the pipe 9 near the top of the tower, extends inwardly, a pipe 10, having a valve 11, and conducting the water to a centrally located spray or nozzle 12. At a substantially lower level is a similar inwardly reaching pipe 13, having a valve 14, and nozzle 15. There may be a third pipe 16, with valve 17 and nozzle 18, and a fourth pipe 19 having valve 20 and nozzle 21.

The four superposed or intersecting sprays are shown of a progressively increasing size downwards, which may be effected by the graduated sizes of the nozzles 1, 15, 18, and 21 or to the adjustment of the valves 11, 14, 17, and 20 or both.

The drawing diagrammatically illustrates the preferred relation of the sprays, and the mode in which the water from one tends to impact and break up the water from another spray, and delay the descent.

The efficiency of the apparatus for the thorough cooling of the water is manifest from the description and drawing, as also the simplicity, cheapness, and durability of the apparatus as compared with prior apparatuses of this nature but wherein the

water is broken up and delayed in its descent by successive mechanical structures or decks.

It will thus be seen that I have described a means for cooling water embodying the principles and attaining the advantages of the present invention. Since many matters of arrangement, combination, and detail may be variously modified, without departing from the spirit of the invention, I do not limit myself to such features except so far as specified in the appended claims.

What is claimed is:

1. An outdoor cooling tower comprising the upright frame presenting sides open to flow of natural currents of air, a plurality of upwardly directed nozzles within the tower, each adapted to deliver an upward fountain-like discharge of water, and said nozzles arranged at substantially different levels in such manner that ascending drops from one nozzle may collide with descending drops from another nozzle, whereby to more finely break up the drops, while subject to the natural air currents, and each lower nozzle being such as to deliver a larger fountain than the next higher nozzle, collecting means at the tower bottom, and means for supplying water to said nozzle.

2. An outdoor cooling tower comprising the upright frame presenting sides open to flow of natural currents of air, a plurality of upwardly directed nozzles within the tower, each adapted to deliver an upward fountain-like discharge of water, and said nozzles arranged at substantially different levels in such manner that ascending drops from one nozzle may collide with descending drops from another nozzle, whereby to more finely break up the drops, while subject to the natural air currents, collecting means at the tower bottom, and means for supplying water to said nozzles, comprising separate passages to the respective levels, and valves in the respective passages permitting regulation of the pressure of water delivered to each nozzle.

In testimony whereof, I have affixed my signature hereto.

EDWIN BURHORN.