Oct. 12, 1926. 1,602,843

E. BURHORN.

COOLING TOWER

Filed Feb. 25, 1924

Fig. 1.

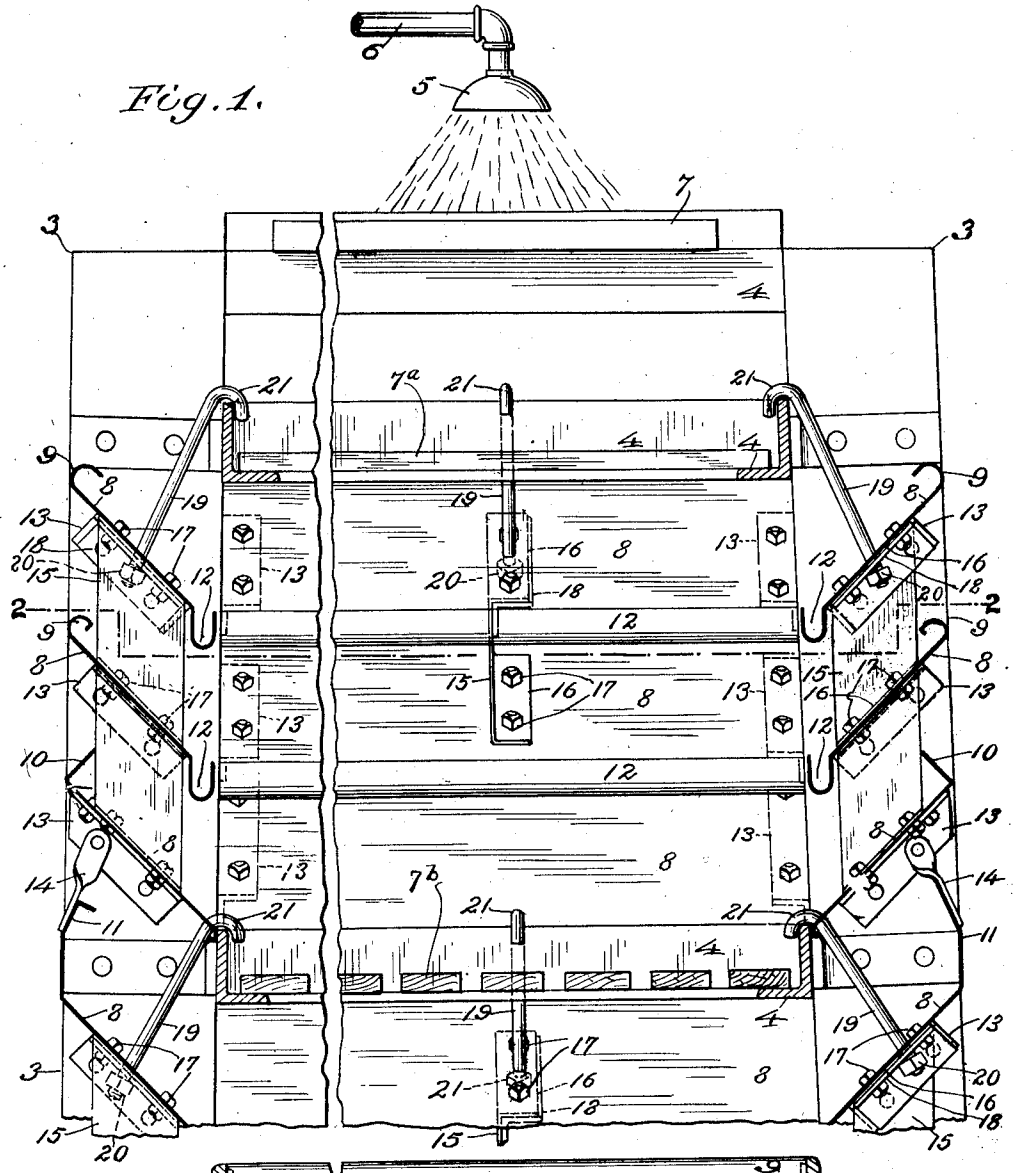
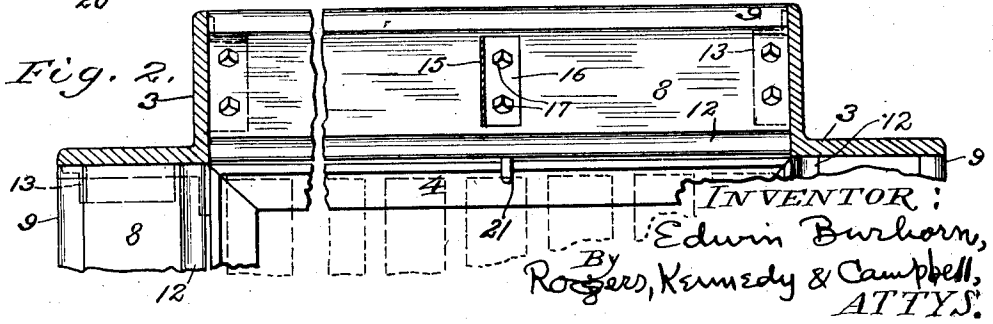


Fig. 2.



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COOLING TOWER.

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This invention relates to cooling towers, or structures arranged for cooling water by its distributed descent, subject to the cooling effects of natural air currents. The liquid is passed down by gravity through the tower, and the sides of the structure are commonly provided with louvers or inclined sheet members arranged to minimize loss of liquid while permitting flow of air. An instance of this type of apparatus is in my prior Patent 973,163 of October 18, 1910.

With such towers, when of large size, with a large span from one frame upright member to another a difficulty has arisen in the tendency of a very long louver to bend or sag due to its own weight, and the weight of water carried by it, or other forces. This drawback is a substantial one, because displaced or distorted louvers prevent proper operation of the tower, and to avoid it tower frames have been tried having many additional upright frame members, so as to subdivide the spaces into short spans and permit the use of short louvers, but incurring substantial additional cost, and impeding proper air flow. The difficulty referred to is accentuated by the use of louvers made of non-corrosive metal, invariably softer than iron, and subject to bending, but otherwise advantageous in giving maximum life to a tower.

The main object of the present invention is to overcome the drawbacks referred to and afford a cooling tower structure of low cost, long life and free from the louver-sagging tendency. Other objects and advantages will be hereinafter pointed out, or will be apparent to those skilled in the art. To the attainment of such objects and advantages the present invention consists in the novel cooling tower, and the novel features of structure, arrangement and detail herein described or illustrated.

Fig. 1 is an interior elevation of a cooling tower embodying this invention, the near side omitted and the horizontal elements at the left and right shown in section.

Fig. 2 is a plan and horizontal section taken on the line 2—2 of Fig. 1.

The invention, generally, comprises the series of superposed louvers, of substantial length, extending laterally from one upright to another of the frame, together with a series of tie members extending from intermediate portions of the louvers, tying each louver to the one above or below, for example the center of each louver being thus connected to the louvers above and below, a common supporting means supporting the entire series of group, and bending or sagging being thus prevented.

The frame may have structural iron corner uprights 3 connected by cross bars 4. A water delivery or sprinkler 5 is shown at the top, fed with warm water by pipe 6, and the descending water may be interrupted in its descent at a number of points, or decks, for example by the pans 7 at the top, which, as well known, receive the water, redistribute it, and redeliver it by overflow or otherwise, the water thus passing progressively downward, from the pans to the successive decks 7^a, 7^b etc., subject to the cooling action, and finally passing into a suitable receiving vessel at the bottom from which it is drawn for use.

The louvers 8 extend from frame upright to upright. When the tower is less than 10 feet or so square, the louvers extend from one corner upright to another; but towers may be many times this size, with side uprights between the corners to avoid having excessive spans between uprights. In such cases the louvers may extend from corner to side upright and between side uprights. The louvers are preferably composed of zinc or alloy or other non-corrosive composition, and may be of the full length or span from one tower upright to another. The louvers may be of any desired form, for example, like said prior patent, with a channel or flange along its upper edge, shown curved in one form 9, and straight in another form 10. Certain of the louvers are shown with upward extensions 11. Some of them are shown with gutters 12 along their lower edges, as in the prior patent. The ends of the louvers may be connected to the frame uprights 3 in any manner, for example, through supporting angle plates 13. Some of these angle plates are shown provided with hangers 14 to which the louver extensions are connected.

Each louver may have one or more intermediate points connected by tie members to the louver above or below, for their mutual support and prevention of deflection. For illustration a single intermediate point of support is shown. The tie members 15 are shown in the form of vertical plates, having rhomboid shape, each plate extending across the space between two louvers, and

preferably having a substantial horizontal dimension, as shown. Each tie plate has upper and lower attaching flanges 16, secured by bolts 17 to the louvers, one or both such connections may be stiffened by inserting angle plates 18.

The complete series of louvers may be so connected as a single group, but I prefer to connect them in smaller groups. Thus the first and second louvers are shown connected by tie plates and the second to the one beneath. The tie plates are preferably in substantial vertical alinement, and a common supporting means for the group is in practical alinement as well. This might take various forms, being shown as a brace rod 19 to which the upper louver of the group is connected by an adjustable nut 20, and the rod having a hook 21 at its upper end engaging over a frame cross piece 4. In this way all of the louvers of the group are solidly supported at one or more intermediate points. The next group below may be similarly supported.

In operation, the water is distributed by the spray 5 at the top and descends progressively through the tower by gravity while being interrupted or delayed in its descent by the cooling decks 7, 7^a, 7^b, etc., being finally received at the bottom and drawn off in any well known manner for use. At the same time natural currents of air pass through the tower and subject the descending water to cooling action both by contact and by evaporation. The entering air, for example at the left, is directed downwardly by the slanting louvers and after traversing the interior of the tower passes out between the opposite louvers. The slanting character of the louvers, together with the gutters 12 at their lower edges and flanges 9 at their upper edges substantially prevents loss of water by splashing, and any water received on the louvers is drained back into the gutters 12 and thence returned to the tower.

It will thus be seen there has been described a cooling tower embodying the principles and attaining the objects of the present invention. Since many matters of combination, arrangement, design and detail may be variously modified without departing from the principles of the invention it is not intended to limit the invention to such matters except to the extent specified in the appended claims.

What is claimed is:

1. In a cooling tower, an upright frame, means at the top of the tower to distribute water to descend through the tower subjected to the action of natural currents of air, a series of superposed elongated louvers each extending from one frame upright to another, a series of tie members consisting of suspension pieces extending from louver to louver at intermediate points and suspending each louver from the one above, and a brace connected to the frame and supporting the series of intertied louvers and tie members.

2. In a cooling tower, an upright frame, means at the top of the tower to distribute water to descend through the tower subject to the action of natural currents of air, a series of superposed elongated louvers each extending from one frame upright to another, a series of tie members consisting of suspension pieces extending from louver to louver at intermediate points and suspending each louver from the one above, each tie member consisting of a sheet metal member set with its plane substantially radial to the center of the tower.

In testimony whereof, I have affixed my signature hereto.

EDWIN BURHORN.