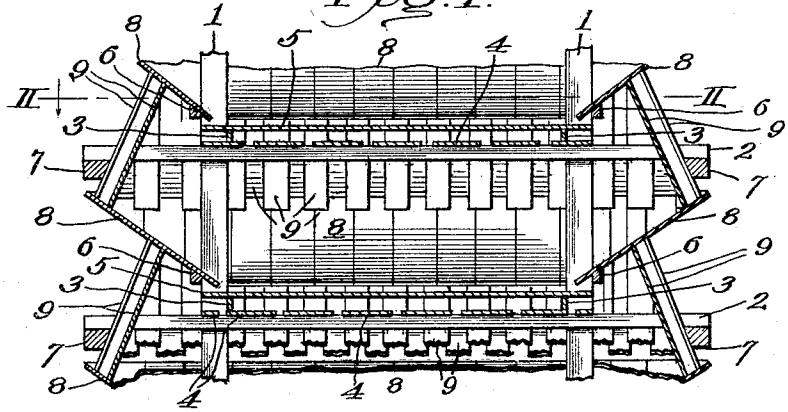
April 26, 1932. L. T. MART 1,855,526

COOLING TOWER

Filed Nov. 17, 1930

FIG. 1.



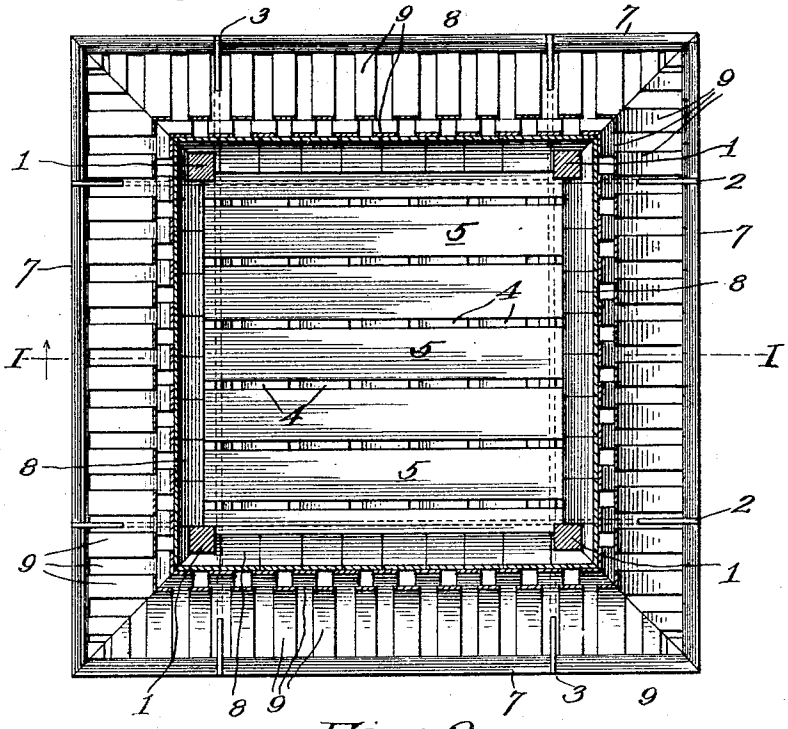


FIG. 2.

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UNITED STATES PATENT OFFICE

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COOLING TOWER

Application filed November 17, 1930. Serial No. 496,119.

This invention relates to cooling towers, particularly of the deck-equipped type, and has for its primary object the production of a construction which materially decreases the drift loss now experienced with towers of the general type under consideration and which will also increase the efficiency of the tower under all conditions of air velocity.

In the standard production of towers of the general character under consideration, the solid louvre surrounding each splash deck must be positioned at a high angle in order to guard against loss of liquid splashing entirely over the top of the louvres, and this high angle necessarily impairs the circulation of air through the tower to effect the cooling of the liquid falling from deck to deck, particularly through the fact that the restricted air outlet effects the stratification of the air currents within the tower producing a parctically dead air space adjacent the decks and progressively higher velocities from the deck upwardly. The higher velocities entrain much vapor, while the lower velocities, dead air spaces and consequent local eddies, have practically no cooling effect.

The prime object of the invention, therefore, is to provide a construction which will efficiently prevent the splashing of the liquid over the tops of the sold louvres and will, at the same time, permit a larger volume of air to circulate through the tower without an increase in drift loss by producing substantially equal air velocities through the greater part of the area between adjacent decks.

In ordinary towers, the air is turned in its course and commences to speed up just at the point of greatest flow of water from the overlying deck, inasmuch as the water, when the wind is blowing with a reasonable velocity, always tends to pile up on the lee side of the tower. As heretofore stated, it is at this point that the existing towers tend to restrict the outflow of air with the result that the velocity, through a limited area, the drift loss, and the turbulence within the tower, are all increased. A further object of the invention, therefore, is to provide a construction in which the air is permitted to flow equally for practically the full space between the decks and in which all of the air passes beyond the area of greater downflow of water, before there is any serious restriction to the air flow or turbulence in the air passing out of the tower, this result being accomplished by providing baffles at a distance beyond the vertical plane of the superposed decks as will hereinafter appear.

With the general objects named in view, and other as will hereinafter appear, the invention consists in certain novel and useful features of construction and combinations of parts as hereinafter described and claimed; and in order that it may be fully understood, reference is to be had to the accompanying drawings, in which:—

Figure 1 is a central vertical section taken through a cooling tower embodying the invention, said section being on the line I—I of Figure 2.

Figure 2 is a horizontal section through a cooling tower embodying the invention, said section being taken on the line II—II of Figure 1.

In the said drawings, where like reference characters identify corresponding parts in all of the figures, 1 indicates a series of uprights which are provided throughout their length with pairs of horizontal supports arranged at right angles to each other and identified as 2 and 3, said cross supports extending beyond the area demarcated by the uprights as illustrated.

Supported by said horizontal supports 2 and within the area surrounded by the uprights 1, are a series of spaced splash boards 4 resting on the members 2, and immediately overlying such deck and supported by the frame members 3 is a second splash deck comprising spaced boards 5. The desired num-

ber of decks, as thus produced, are installed in superposed relation throughout the height of the tower.

Secured to the uprights 1 and extending around the tower in a horizontal plane, are a series of supports or girders 6, and parallel thereto and secured to the projecting ends of the frame members 2 and 3, are a series of supports 7, the girders or supports 6 and 7 indirectly supporting boards 8 forming solid barriers or louvres surrounding each splash deck, the ordinary construction, not shown, being such that the angle with the vertical formed by the louvres 8 is relatively small, the upper ends of said louvres customarily overlapping or extending into the horizontal prolongation of the superposed deck, so that the liquid splashing from deck to deck cannot rebound over the tops of the barriers. The small angle required to prevent this splashing of the liquid, results in further loss in efficiency in that such construction means that the distance between the top of one louvre and the bottom of the superposed louvre is small. Thus, a strong wind entering one side of the tower ends to create a pressure within the tower and the air rushing through the confined channel at high velocity entrains a large amount of moisture, resulting in what is technically called drift loss, while the air below the high velocity stream is practically dead or is circling in local eddies within the tower. The cooling efficiency of such a construction is limited to the high velocity stream effected with a great drift loss. The overall efficiency of such a tower is, therefore, low.

It will, thus, be obvious that erectors of such towers must compromise in determining the angle of the solid barriers 8, the smaller the angle with the vertical, the less the loss by splashing, but such small angles interfere too greatly with air circulation by effecting stratification and local eddies, and increase velocities leading to drift losses as hereinbefore described, although the total air flow through the tower is relatively small.

It has been found that these objections may be remedied and an efficient splash tower produced by the following construction, illustrated in the drawings. The angle of the louvres 8 to the vertical, is made large compared with present practice, and the ends of said louvres do not overlap the horizontal plane of the superposed deck. In order to prevent splash loss, which would otherwise occur and to decrease drift loss, the space between the upper face of each louvre 8 and the lower face of the superposed louvre 8 is screened by a baffle 9, which preferably comprises two sets of spaced boards arranged in overlapping relation to form a tortuous course for the air passing from the tower. It will be obvious with a construction such as illustrated, that any water splashing on the baffle 9 will be directed back onto the louvre 8 and hence to the deck, and that as the air passes out of the tower it will be forced to deposit a large percentage of its moisture on the baffle 9, and that such drift recovery will also be drained back to the solid louvre 8 and hence to the deck.

It will be evident that by increasing the area of the air outlet and baffling the same, the effect within the tower is to equalize velocities between the decks and thereby gain in the total volume of air passing through the tower as compared to the old construction in which the outlet is materially restricted, as the air may exit through a relatively wide area without drift or splash losses, as distinguished from a narrow outlet, high velocity, stratification and local eddies of the prior art construction.

From the above description it will be apparent that while I have described and claimed the preferred embodiment of the invention, it is to be understood that I reserve the right to make all changes falling within the spirit of the invention and without the ambit of the prior art.

I claim:

1. The combination in a cooling tower, of a series of decks adapted to receive liquid falling thereon, a solid louvre surrounding each deck and extending outwardly and upwardly therefrom to provide air passageways between adjacent louvres and baffles interposed in said air passageways to remove liquid from the air passing therethrough and to insure return of said liquid to the cooling tower.

2. The combination in a cooling tower, of a series of decks adapted to receive liquid falling thereon, a solid louvre surrounding each deck and extending outwardly and upwardly therefrom and terminating short of the horizontal plane of the superposed deck to provide air passageways between adjacent louvres, and baffles interposed in said air passageways to remove liquid from the air passing therethrough and to insure return of said liquid to the cooling tower.

3. In an atmospheric cooling tower comprising a cooling chamber provided with a series of perforate decks adapted to receive and distribute liquid falling through the cooling chamber, the perimeter of each deck being bounded by upwardly inclined solid louvres whereby the air passageways between superposed decks and their corresponding louvres shall be of substantially the same area to avoid eddy currents between decks and a Venturi effect on the lee side of the tower, and baffles interposed in said louvre passageways to remove liquid from the air passing therethrough and to insure the return of said liquid to the cooling tower.

4. The combination in an atmospheric cooling tower of a series of decks adapted to receive liquid falling thereon, a solid louvre

surrounding each deck and extending outwardly and upwardly therefrom to provide air passageways between adjacent louvres, and a series of baffles interposed in said air passageways and outside the area of liquid falling within the tower to remove liquid from the air passing through the passageways and to insure the return of said liquid to the cooling tower.

In testimony whereof I affix my signature.

LEON T. MART.