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REDISTRIBUTION TYPE COOLING TOWER

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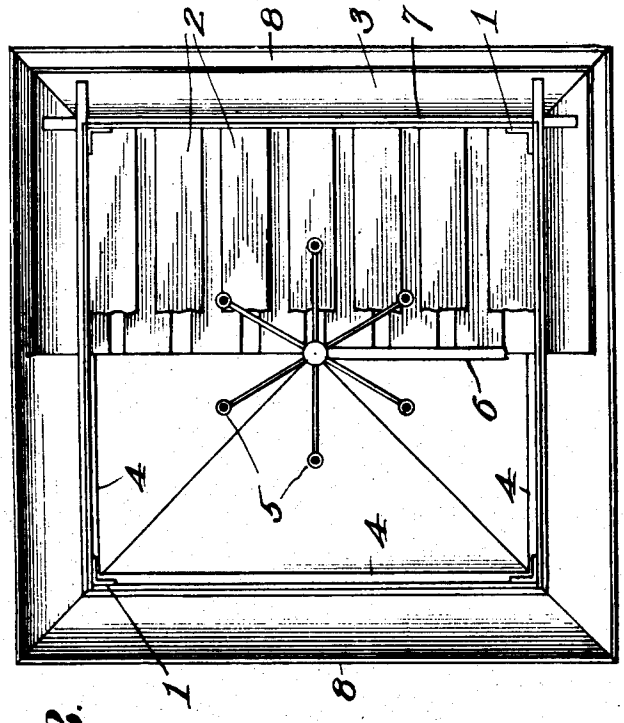

Fig2.

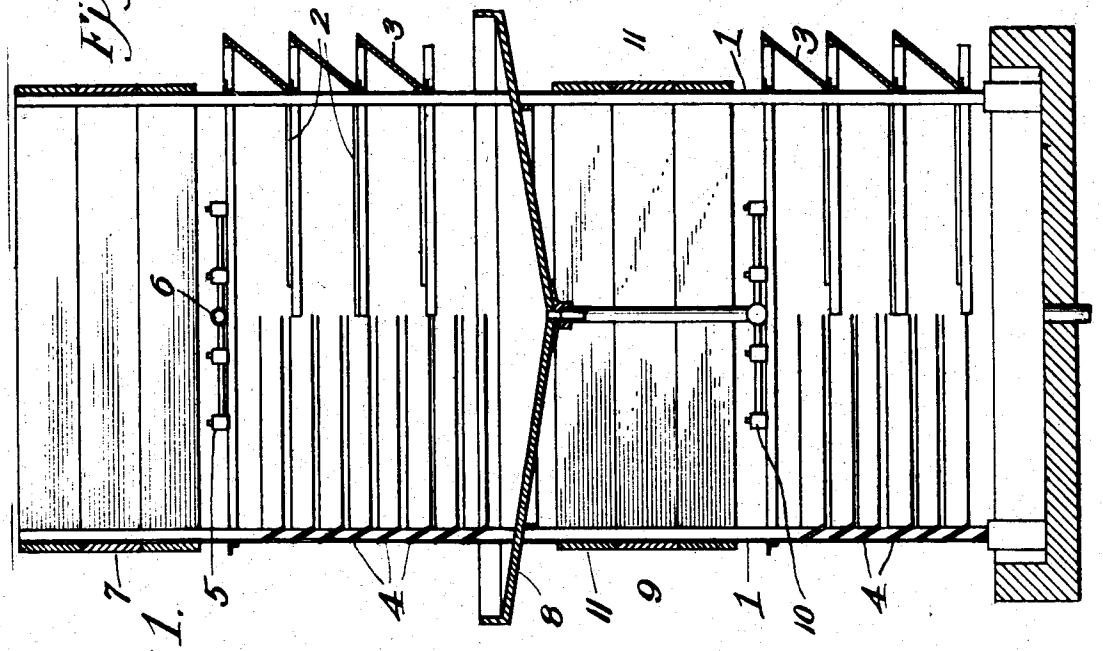

Fig 1.

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REDISTRIBUTION TYPE COOLING TOWER

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2 Claims. (Cl. 261—111)

This invention relates to cooling towers of that class where the liquid to be cooled is allowed to fall downwardly within a louvred or ventilated column. With all towers of this character, the liquid is discharged adjacent the top of the tower in such a fashion as to secure substantially uniform distribution over the cross sectional area of the tower. The liquid is either permitted to fall freely to the lower end of the tower or the tower is filled with a plurality of drip boards or decks which interrupt the fall of the liquid and force it to trickle from deck to deck.

With all cooling installations of the above character where natural draft or wind force is depended upon to effect cooling of the liquid, the falling liquid, both in the free fall type and the deck type, will tend to pile up on the side of the tower opposite that through which the wind enters. In both types of installation this piling up of the water means a material loss of efficiency, as the tower operates most efficiently when the water is evenly distributed and is in finely comminuted state. In the deck type tower, the piling up of water to one side of the tower has the added disadvantage of permitting the decks to dry out which leads to warping, cracking and other difficulties.

Many efforts have been made to remedy the difficulties recited, such as, the use of adjustable vanes or deflectors, and the like, but as far as I am aware no one has yet produced a satisfactory redistributing system for use with natural draft or louvred or ventilated side towers.

The prime object of the invention, therefore, is to provide means whereby substantially even distribution of water may be secured throughout the height of the tower under ordinary or normal conditions of wind pressure or force, without the use of manually adjusted deflectors or other devices. The objects of the invention are accomplished through provision of means for redistributing the water across the tower at one or more points throughout the height of the tower. The number of redistributing devices will vary in accordance with the height of the tower and the average wind velocity of the place of installation.

A further object is to provide a gravity fed spray and collecting deck intermediate the height of the tower for the redistribution of the liquid and to increase the effective height of the tower by breaking the water into very fine particles for better heat transfer between the liquid and the air.

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

Figure 1 is a central vertical section taken through a cooling tower embodying the redistributing apparatus of the invention, the cooling tower being indicated on opposite sides of the center line as of the splash deck and straight fall types.

Figure 2 is a top plan view of the construction shown in Figure 1.

In the said drawing where like reference characters indicate corresponding parts in all of the figures, 1 indicates a plurality of uprights forming the frame of the cooling tower and as illustrated in the right halves of Figures 1 and 2, is provided with a plurality of decks 2 comprising boards or the like, the joints between the boards of adjacent decks being offset horizontally so that the drip from each deck will be interrupted or caught by the next succeeding deck, and with standard louvres or ventilators 3 to permit circulation of air, but to prevent loss of the liquid to be cooled. The left hand side of Figures 1 and 2 illustrate a free fall tower construction without splash decks and with any suitable louvres 4.

Adjacent the top of the tower any suitable water distributing system is provided, but the preferred system comprises a plurality of spray nozzles 5 having a liquid feed connection 6, said spray nozzles discharging the liquid upwardly in the form of a fine spray. The frame of the tower, where spray nozzles are employed, is closed against the loss of water drift by a closed fence 7. It will be apparent that the water discharged from the spray nozzles will fall downwardly and will gradually pile up to one side of the tower, in accordance with the operation hereinabove described.

In order to collect the liquid and redistribute the same evenly over the cross-sectional area of the tower, a catch basin 8 in the form of a liquid tight deck is interposed in the tower at such a distance below the water distributing system as may be determined desirable, according to the cross sectional area of the tower and the prevailing wind pressure.

The liquid collected by the basin 8 is fed by a pressure-head line 9 to a second liquid discharge apparatus, as illustrated, comprising a second series of spray nozzles 10, the height and diameter of the line 9 being such as to provide sufficient

pressure for an efficient spraying of the liquid and its consequent redistribution throughout the cross-sectional area of the tower. Where the redistribution system comprises a plurality of spray nozzles as illustrated, the sides of the tower are solidly closed by a boxing or fence 11 to prevent loss of water drift due to wind force as will be readily understood.

It will also be evident that by the use of the spray nozzles 10 gravity fed from the basin 8, the effective height of the tower is increased, as the uniform acceleration of the falling water is interrupted and the effective height is further increased by the height of the spray.

From the above description, it will be apparent that I have produced a construction embodying all of the features of advantage set forth as desirable and while I have described and claimed the preferred embodiment of the same, it is to be understood that I reserve the right to make all changes properly falling within the invention in view of the prior art and within the spirit and scope of the appended claims.

I claim:

1. In liquid cooling apparatus the combination of a supporting framework having a solid closed area intermediate its height and a series of louvred areas, a liquid discharging and distributing apparatus adjacent the upper end of the framework and within the same, a closed liquid receiving and collecting deck intermediate the height of the tower, a drain pipe receiving the liquid from said deck, and an upwardly discharging spray nozzle fed by said pipe and arranged to discharge within the solid closed area of the tower.

2. In liquid cooling apparatus the combination of a supporting framework having a solid closed area intermediate its height and a series of louvred areas, a liquid discharging and distributing apparatus adjacent the upper end of the framework and within the same, a closed liquid receiving and collecting deck intermediate the height of the tower, a drain pipe receiving the liquid from said deck, and a spray nozzle fed by said pipe and arranged to discharge within the closed area of the tower.

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