Sept. 12, 1933. E. CLINE 1,926,970

COOLING SYSTEM

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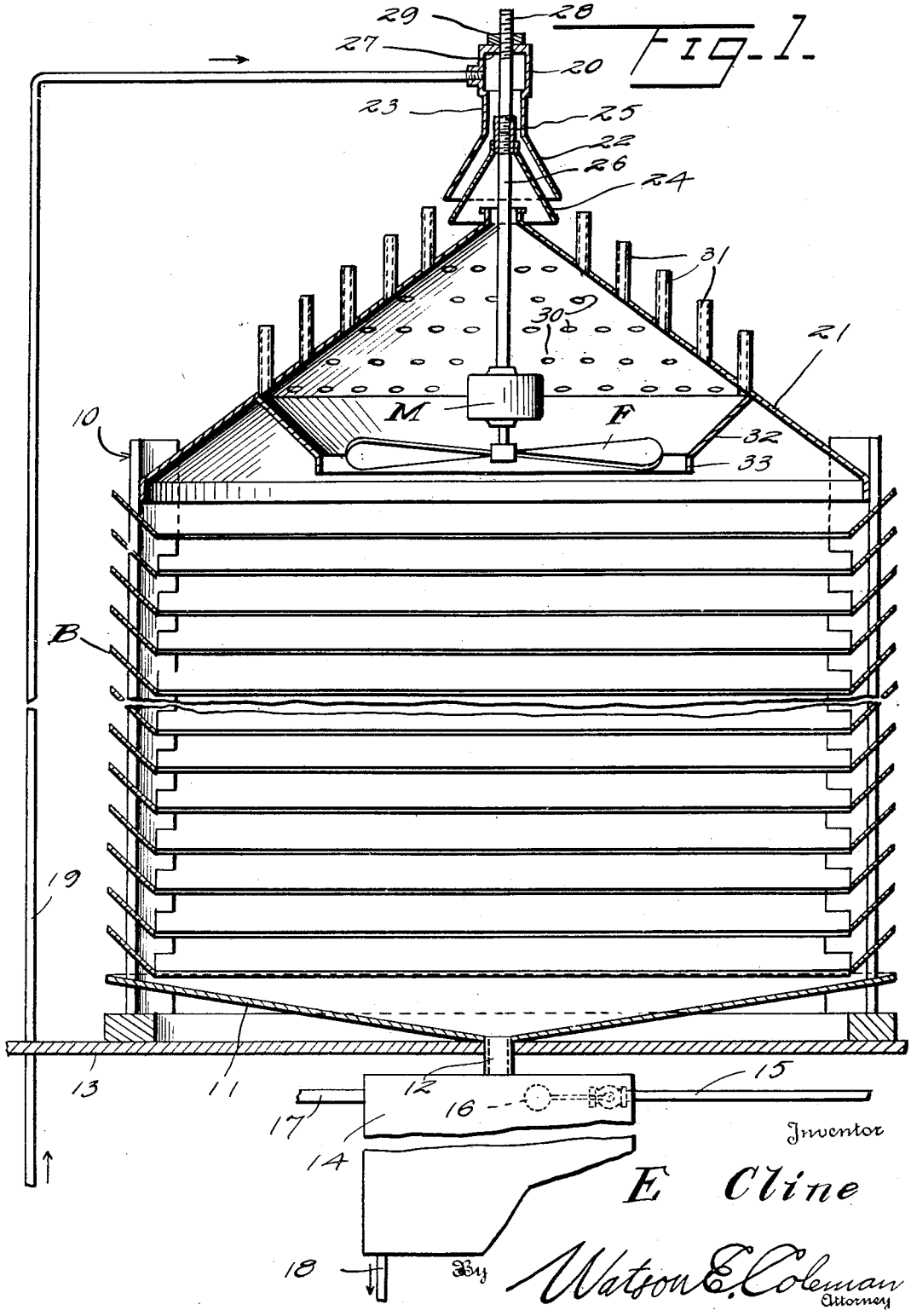


Fig. 1.

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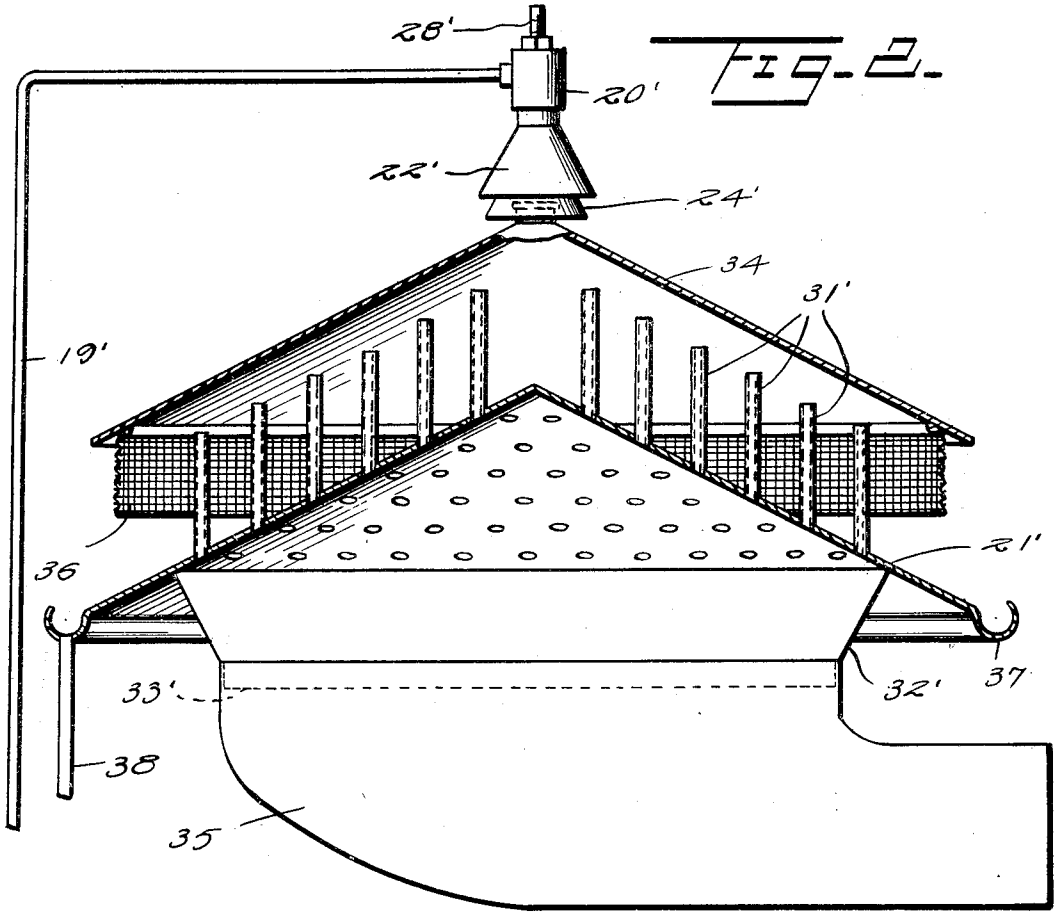
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Fig. 2.



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COOLING SYSTEM

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6 Claims. (Cl. 261—112)

This invention relates to cooling systems and more particularly to a cooling means which can be readily adapted for use in cooling of either water or air.

An object of this invention is to provide a cooling means which is so constructed that it can be readily used for the cooling of liquids or air and when used for the cooling of air, the device provides means whereby the air is thoroughly washed before entering the air ducts.

Another object of this invention is to provide a cooling means of this kind which may be mounted on the interior or roof of a building and the water which is being cooled and passed over the exterior surface of the device will not be blown away by high winds or the like.

A further object of this invention is to provide a foundation cooling means which can be combined with shields or covers of various kinds, so that either water or air may be readily cooled.

The above and various other objects and advantages of this invention will in part be described and in part understood from the following detailed description of the present preferred embodiment, the same being illustrated in the accompanying drawings, wherein:—

Figure 1 is a fragmentary vertical section partly in diagrammatic form of a device constructed according to the preferred embodiment of this invention;

Figure 2 is a similar view of a modification of the device.

Referring to the drawings wherein like numerals of reference designate corresponding parts throughout the several views, the numeral 10 designates generally a cooling tower including a plurality of superposed baffles and this tower is adapted to be mounted on the exterior of a building and preferably on a roof or other horizontal support 13.

This tower is provided with a bottom 11 having a drain 12 which empties into a reservoir 14. This reservoir has a pipe connection 15 which is connected to a source of water supply, and a float valve 16 is connected to this pipe line 15 so as to control the quantity of water entering the tank 14 and so that a predetermined quantity of water will always be in this tank. An overflow pipe 17 is connected to this tank 14.

A pipe line 18 is also connected to the tank 14 and is adapted to be connected to a pumping system including a refrigerating plant or the like (not shown) and a return pipe 19 coming from the cooling system empties into a coupling 20, which is connected to the discharge end of this return pipe 19. This coupling 20 is mounted in upwardly spaced relation to a cone-shaped cooling member 21 which is mounted on the upper surface of the baffle tower 10 with the apex of the cone disposed upwardly.

A frusto-conical shield 22 is connected by means of a short pipe connection 23 to the coupling 20 and a distributing shield 24 is mounted on a coupling 25 disposed concentrically of the shield 22. This distributing shield 24 is adjustable vertically on a vertically disposed pipe or conduit 26 which extends concentrically of the cone 22, and has an end portion thereof disposed through the closed top 27 of the coupling 20. This extended end portion or upper end 28 of the conduit 26 is provided with a nut 29, so that the conduit 26 with the cone 24 may be vertically adjusted relatively to the cone 22 and the cooling cone 21. This conduit 26 is hollow and is adapted to receive suitable lead wires (not shown) which are connected to a motor or power member M disposed on the lower end of the conduit 26.

A fan element F is mounted on the motor M with the blades disposed so as to direct a draft of air upwardly toward the cone or cooling member 21. The cone 21 is provided with a plurality of apertures 30 therethrough and a plurality of vertically disposed tubes 31 are mounted in these apertures and extend upwardly from the surface of the cooling member 21. In this manner, the draft of air created by the fan F will be blown through the apertures 21 and as the water or liquid distributed by the distributing shield 24 flows gravitatingly over the surface of the cone member 21, the tubes 31 will provide a tortuous passage for the liquid and the water or liquid will be cooled by absorption of the heat by these tubes 31 which are cooled by the draft of air blown upwardly or downwardly therethrough by the fan F. The air blown by the fan F is drawn through the baffles B of the tower 10 and this air is likewise cooled by the falling water dropping over these baffles B.

An inner inverted frusto-conical member 32 is secured at the base thereof to the inner surface of the shield or cooling member 21, and is provided at the lower end thereof with an annular nipple or ring-shaped member 33 which is disposed about the circle of the fan F. As the cooled water flows downwardly over the cooling member 21 and drops onto the baffles B which are directed inwardly of the tower 10, the water will gravitatingly flow from baffle to baffle until it reaches the collecting member or bottom 11 from which

point it passes outwardly through the drain 12 and into the tank 14.

As shown in Figure 2, the cooling cone 21' is provided with the tubes 31' which communicate with the inner frusto-conical member 32'. The return pipe line 19' is connected to the coupling 20' which is similar in detail to the coupling 20 and the shield 22' is connected to this coupling 20' as hereinbefore described. The inner distributing cone 24' is disposed in upwardly spaced relation to an imperforate shield 34 which is supported from the conduit 28'.

In this instance, the motor or power member is dispensed with and the water is distributed over the imperforate shield 34 and flows over the lower edge thereof and drops onto the shield or cooling member 21'. The connecting ring 33' has connected thereto an elbow 35 which is connected to a suction conduit so that air is drawn downwardly through the tubes 31'. This air is washed or cooled by the liquid screen formed by the water flowing over the edge of the cone 34.

A screen or hardware cloth member 36 is suspended from the lower surface of the cone 34 adjacent the peripheral edge thereof so that any water which is drawn toward the tubes 21 by the suction formed in the suction pipe line will be broken up into a fine spray and will gravitatingly fall under the upper surface of the cone 21'. This cone 21' is provided with a gutter or collecting member 37 which has a pipe line 38 connected thereto so that the water or liquid can be returned to the pumping system and returned back through the pipe line 19'.

It will be noted from the disclosure in Figure 2 that the water forms a screen for washing or cleaning the air which is drawn through the tubes 31, and the direction of the flow of air through the tubes 31' is reversely from the disclosure in Figure 1.

It will be noted from the foregoing that the cooling means including the conical member 21 and the tubes 31 can be used with various cooling systems either liquid or air, the tubes 31 providing a tortuous passage over the surface of the conical member 21 while providing means for the passage of air in either direction through the shield or cooling member 21, depending only on the direction of movement desired.

It will be obvious that this cooling means may be connected to a refrigerating system so as to properly cool the water or liquids used in the refrigerating system, or the device may be coupled with an air suction line such as a ventilating system for a building, wherein the air drawn through the ventilating system is not only cooled but is washed by the liquid screen disposed about the cooling member.

It is, of course, understood that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims.

What is claimed is:—

1. A cooling means comprising a substantially cone-shaped member, a plurality of tubes secured at one end to the member and extending upwardly therefrom, a water discharging means supported above the apex of the member, a distributing means, means for adjustably mounting said distributing means for adjustment relative to the discharge means, and means for collecting the liquid at the base of the member.

2. A cooling means comprising a substantially cone-shaped member, a plurality of tubes secured at one end to the member and extending upwardly therefrom, a water distributing means supported above the member, a second cone-shaped member supported above the top of the tubes, and a screen carried by the lower portion of said second member adjacent the base thereof.

3. A cooling means as set forth comprising a substantially cone-shaped member, a plurality of tubes secured at one end to the member and extending upwardly therefrom, a trough carried by the lower edge portion of the member, a second cone-shaped member supported above the tops of the tubes, a screen carried by the lower portion of the second member, water distributing means disposed above the second named member, and a duct connected to the first named member whereby to draw off the cooled air passing through the water gravitatingly dropping off of the second named member.

4. A cooling means comprising a substantially cone-shaped member, a plurality of tubes secured to the member and extending upwardly therefrom, liquid distributing means supported above the member, a frustro-conical member secured to the first member in inverted position and opposed to the first member, and an annular member secured to the lower portion of said frustro-conical member.

5. A cooling means comprising a substantially cone-shaped member, a plurality of tubes secured at one end to the member and extending upwardly therefrom, a water distributing means supported above the member, a frustro-conical member secured to the first member in inverted position and opposed to the first member, a plurality of baffles supported below the base of the first member, and a collecting means supported below the baffles.

6. A cooling means comprising a substantially cone-shaped member, a plurality of tubes secured at one end to the member and extending upwardly therefrom, a water distributing means supported above the member, a frustro-conical member secured to the first member in inverted position and opposed to the first member, a plurality of baffles supported below the base of the first member, a collecting member disposed below the baffles for collecting the liquid discharging therefrom, and means for forcing a draft of air downwardly through the tubes and outwardly of the baffles.

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