Dec. 16, 1930. R. O. ANDERSON ET AL 1,785,572

COOLING TOWER

Filed Dec. 9, 1929

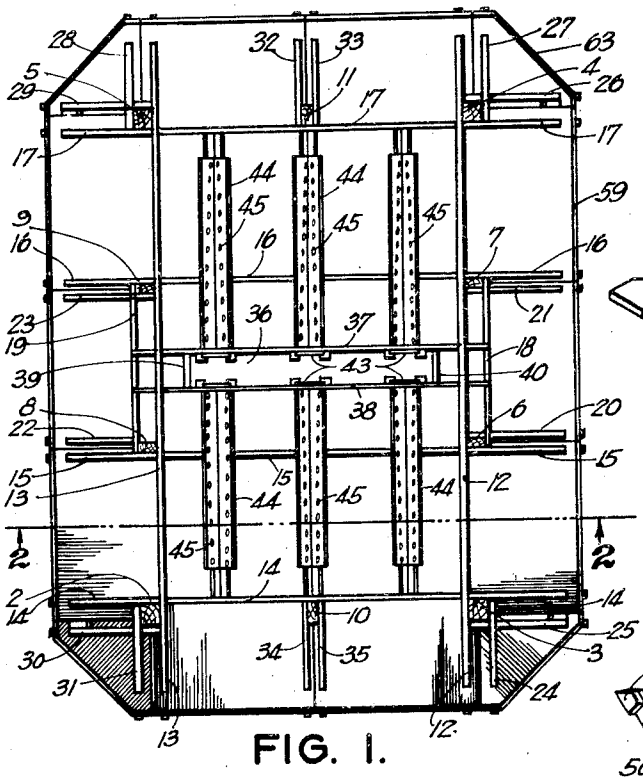


FIG. 1.

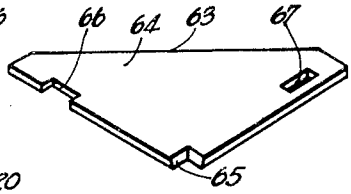


FIG. 4.

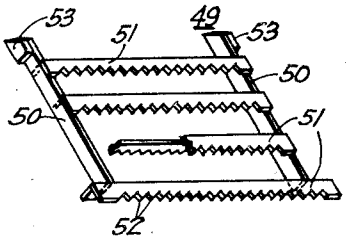


FIG. 3.

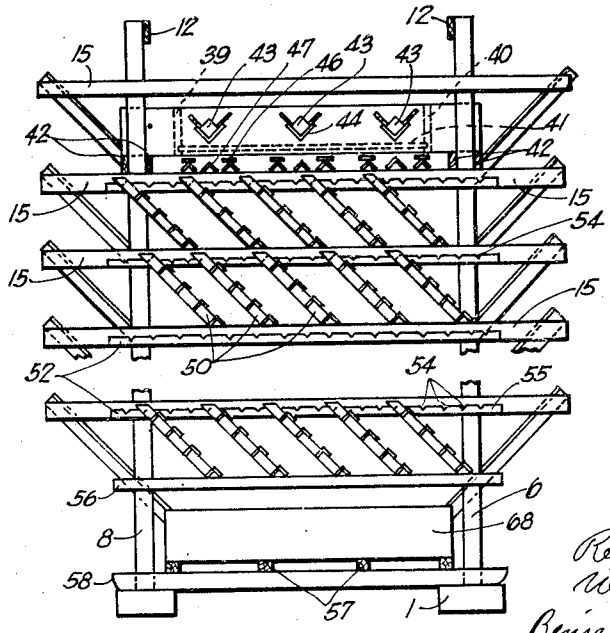


FIG. 2.

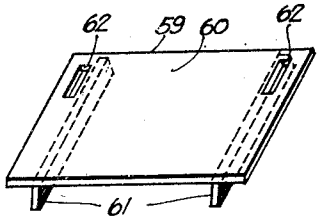


FIG. 5.

Retford O. Anderson
Wyssee L. Ruby
Benjamin M. Geesa INVENTOR
BY Lloyd J. Miller
ATTORNEY

Patented Dec. 16, 1930 1,785,572

UNITED STATES PATENT OFFICE

REXFORD O. ANDERSON, OF SEMINOLE, ULYSSES S. RUDY, OF OKLAHOMA CITY, AND BENJAMIN M. GESSEL, OF TULSA, OKLAHOMA

COOLING TOWER

Application filed December 9, 1929. Serial No. 412,892.

Our invention relates to cooling towers for reducing the temperature of liquids.

The objects of our invention are to provide a device of this class which is new, novel, practical and of utility; which may be used in connection with steam plants for quickly cooling the water collected from the exhaust steam from the engine; which may be used in any place usual to cooling towers; which may be constructed as a stationary unit, but which is intended primarily for steam plants of temporary character such as are used in oil fields; which may be easily transported from place to place in knocked-down condition; which may quickly be assembled or disassembled; which will be of substantial construction; which will be provided with a plurality of interchangeable baffle units; which will permit, after assembly, the insertion of additional baffle units if desired; which will permit, during or after assembly, the disposition of its baffle units in any one of several different positions; which has removable and interchangeable louvers; which will have means for separating the incoming liquid into a large plurality of small drip streams; a device the supporting members of which are adapted to be bolted together, other members and units of which are adapted to be held in place by means of coacting lugs, slots and the like; which will prevent loss by wind; which will have a greater cooling capacity than other towers of the same exterior dimensions; which will be efficient in accomplishing all the purposes for which it is intended.

The use of cooling towers in connection with steam plants, ice plants and the like is common. In so far as these applicants know or can ascertain, however, such towers are designed and constructed as stationary units, and are wholly unsuited for removal from one location to another. Any attempted removal of such a unit would result in its destruction. The baffles of such units are usually of horizontal flat faced timbers which quickly become water soaked and sag in their unsupported sections. As a result of the sagging, the water runs to the low portions of these baffles and pours off them in large streams, thus impairing the efficiency of the unit, as a small number of large streams are not cooled by the atmosphere so rapidly as a large number of small streams or drips. Cooling towers of present use are difficult of access for cleaning, replacement of parts or for repair.

Our cooling tower, though constructed substantially and suitably for stationary use, is adapted especially for disassembly and removal from one site to another. Its construction, too, is such that its inner members are readily accessible for cleaning, repairing or replacement. With the exception of its top row, all of its baffles are of an inverted V type, insuring the shedding of water, rather than its retention thereon in certain low spots. All its baffles are so supported as to prevent sagging and the V shaped baffles are so designed as to shed the water in a large number of small streams, rather than a smaller number of large streams. The efficiency thus attained enables a tower of our design of small size to cool a volume of water which would require a much larger tower of usual design.

With these and other objects in view as will more fully appear, our invention consists in the construction, novel features, and combination of parts hereinafter more fully described, pointed out in the claims hereto appended, and illustrated in the accompanying one-sheet drawing, of which,

Figure 1 is a top view of the tower;

Figure 2 is a sectional view along the lines 2—2 of Figure 1.

Figure 3 is a perspective view of one of the removable baffle units;

Figure 4 is a perspective view of one of the corner louvers; and

Figure 5 is a perspective view of one of the side and end louvers.

Like characters of reference designate like parts in all the figures.

It is understood that various changes in the form, proportion, size, shape, weight and other details of construction, within the scope of our invention may be resorted to without departing from the spirit or broad principle of our invention and without sacrificing any of the advantages thereof; and it

is also understood that the drawings are to be interpreted as being illustrative and not restrictive.

One practical embodiment of the invention as illustrated in the drawings comprises:

A suitable base 1, which may be of any desired material and of substantial design. From base 1 arise the corner posts 2, 3, 4 and 5. Spacedly between posts 3 and 4 arise studs 6 and 7, and between posts 2 and 5 arise studs 8 and 9.

Between posts 2 and 3, and 4 and 5, respectively, arise studs 10 and 11. To the inside faces of said posts 3 and 4, and studs 6 and 7 are flatly attached a plurality of vertically spaced horizontal, longitudinal sway braces or joists 12. Likewise upon posts 2 and 5 and studs 8 and 9 are a plurality of vertically spaced longitudinal sway braces or joists 13.

Supported by each horizontally alined pair of said joists 12 and 13 are the transverse sway braces or joists 14 and 17 which respectively are flatly attached to the inner faces of said post and stud members 2, 10 and 3 and 5, 11 and 4. Similar transverse joists 15 and 16 are spacedly supported, respectively upon each tier of said joists 12 and 13 and are flatly attached to said studs 8 and 6 and 9 and 7 respectively.

Between each alined pair of said joists 15 and 16, flatly attached thereto and respectively to said studs 6 and 7 is a cross member 18. A similar cross member 19 upon the opposite side of the tower is also disposed between and attached to each alined pair of joists 15 and 16, and is flatly attached to said posts 8 and 9.

Horizontally alined with each pair of joists 15 and 16 and parallel thereto a short louver supporting member 20 is flatly attached to said stud 6. A similar member 21 is attached to stud 7. Oppositely two similar supports 22 and 23 are flatly attached respectively to said studs 8 and 9. At the four corners of the tower, respectively, are provided, horizontally alined with said joists 14 and 17 a plurality of louver supports shown respectively as 24, 25, 26, 27, 28, 29, 30 and 31, each flatly attached to and outstanding lengthwise from its supporting respective corner post, 2, 3, 4 or 5.

Two parallel louver supporting members respectively 32 and 33, horizontally alined with transverse joist 17 and rigidly attached thereto, are attached to the respective sides of said stud 11, and extend laterally as to joist 17. Similar parallel louver supporting members 34 and 35 extend outward laterally as to said transverse member 14 and are attached to said stud 10.

Centrally disposed, adjacent the top members of the tower, I provide a receiving box 36. Box 36 is rectangular, has sides 37 and 38, closed ends 39 and 40, a closed bottom 41 and an open top. Box 36 is positioned transversely as to supporting members 15 and 16, and is supported upon that tier of members 15 and 16 next adjacent the top tier of same by a plurality of supporting members shown in Figure 2 as 42.

The said receiving box 36 is provided upon each of its sides 37 and 38 and adjacent its bottom 41 with a plurality of apertures, each of which is closed by a removable sliding gate, 43. Communicating respectively with said apertures in box 36 and extending laterally from either side of said box are a plurality of V shaped troughs 44, those upon one side being supported by transverse joists 14 and 15; those upon the other side being supported by joists 16 and 17. Both sides of each said trough 44 are provided with a plurality of alined through perforations shown as 45, those perforations adjacent said box sides 37 and 38 being nearer the upper edge of the trough sides than those perforations adjacent the further ends of the troughs.

Said box 36 is provided for first receiving a flow of the liquid which is to be cooled. With such gates 43 as may be desired, removed, the water flows into the open troughs 44 and passes through such perforations 45 as are below its level in the said trough, in small streams.

For receiving and breaking up the small streams as described, are first provided, below said troughs, a plurality of baffles, one type of which is shown as 46 and another as 47. Baffles 46 and 47 are supported transversely by members 14, 15, 16 and 17.

Below said box 36, and so disposed as to best receive and further break up the water which splashes and drips from said first baffles 46 and 47, are a plurality of removable baffle units 49.

Each baffle unit 49 comprises two supporting end members 50, across which are attached in a usual manner a plurality of inverted V shaped baffle plates 51, the lower edges of which are serrated as shown at 52. The upper end portions of said end members 50 are each provided externally with an outstanding block 53. Said blocks 53 are designed to fit in spaced notches shown as 54 upon the plates 55 which are attached to both faces of the members 15 and 16 and to the inner faces respectively of members 14 and 17. The lower said baffle plate 51 of each said unit 49 rests loosely upon that transverse supporting member next below the member which supports its blocks 53. It will be obvious that a greater or less number of such units 49 may be used with our cooling tower, and that same are readily susceptible of removal and of replacement. In the positioning of said units as shown in Figure 2, it will be seen that the water splashing from any of said baffles 46 and 47 will fall upon

some one or more of the baffle plates 51 of the top tier of said units 49, and that each successive tier of said units therebelow will further break up said water, thus allowing a greater contact of the atmosphere therewith. The lower tier of transverse baffle supporting members is shown as 56, and therebelow, supported by longitudinal supports 57 across the sills 58, is the lower receiving tank 68, preferably of sheet metal.

Side and end louvers, one of which is shown in Figure 5 comprise a flat faced plate 60 supported adjacent its end portions by transverse members 61. Plate 60 is provided adjacent its two upper and outer edge portions respectively with a rectangular slot shown as 62. In assembly with the tower, said plates 60 are positioned in tiers with the outer end portions of adjacent supporting members such as 14 and 15, 20 and 21, or 35 and 12, projecting through said slots 62, the lower edge of said plate resting upon the supporting cross members such as 14 and 15, 20 and 21, or 35 and 12 of the tier therebelow. Corner louvers 63, as shown in Figure 4 are triangular in shape, have a face 64, which is notched at its apex as shown at 65 and adjacent one corner as shown at 66. A rectangular slot as shown at 67 adjacent its other corner. Said corner louvers are positioned much like said side and end louvers 49, said notch 66 and slot 67 embracing the end portion of adjacent supporting members, its lower edges resting upon the previously described supporting members, two of which are shown as 12 and 14 therebelow, its notch 65 for one of said corner posts 2, 3, 4 or 5. The lower tier of said louvers 49 and 63 are made with extending lower portions for directing the water thereupon into said tank 68.

Obviously, the invention is susceptible of embodiment in forms other than that which is illustrated in the accompanying drawings and described herein, and applicable for uses and purposes other than as detailed, and we therefore consider as our own all such modifications and adaptations and other uses of the form of the device other than as herein described as fairly fall within the scope of our invention.

Having thus described our invention, what is claimed and desired to be secured by Letters Patent, is:

1. In a cooling tower, the combination with a superstructure of suitable uprights and tiers of cross members, of a plurality of baffles adapted to be selectively positioned in a sloping manner between two of said tiers of cross members, said baffles each having a plurality of baffle members each having serrations for preventing the accumulation of liquid.

2. In a cooling tower for liquid, the combination with a superstructure having spaced upright standards and a first plurality of vertically alined crossmembers connecting said standards and having a second plurality of vertically alined crossmembers connecting said standards at right angles to said first crossmembers, of a plurality of plates having spaced notches in their upper edges, said plates attached one each upon each inside face of one group of said crossmembers, and a plurality of baffles each comprising two end members supporting therebetween a plurality of longitudinally extending baffle members having their lower edges serrated, said end members adapted at their upper ends to be removably and selectively secured in said notches and to support said baffle members in a sloping manner therebelow with the lower baffle member of each baffle resting upon a pair of said crossmembers next below.

3. In a cooling tower for liquid, the combination with a superstructure having spaced upright standards and a first plurality of vertically alined crossmembers connecting and extending outwardly past said standards and having a second plurality of vertically alined crossmembers connecting and extending outwardly past said standards at right angles to said first crossmembers, of a plurality of plates having spaced notches in their upper edges, said plates attached one each upon each inside face of one group of said crossmembers, a plurality of baffles each comprising two end members supporting therebetween a plurality of inverted V shaped baffle members having their lower edges continuously serrated, said end members adapted at their upper ends to be removably and selectively secured in said notches and to support said baffle members in a sloping manner therebelow with the lower baffle member of each baffle resting upon a pair of said crossmembers next below, and a plurality of first flat louvers adapted by perforations in their upper portions to be passed over and to be retained upon the outstanding ends of two of said crossmembers and to be positioned in an inclined manner with their lower edges seating against two of said standards and upon the next lower of said crossmembers.

4. In a cooling tower for liquid, the combination with a superstructure having spaced upright standards and a first plurality of vertically alined crossmembers connecting and extending outwardly past said standards and having a second plurality of vertically alined crossmembers connecting and extending outwardly past said standards at right angles to said first crossmembers, of a plurality of plates having spaced notches in their upper edges, said plates attached one each upon each inside face of one group of said crossmembers, a plurality of baffles each comprising two end members supporting therebetween a plurality of inverted V shaped baffle members having their lower edges con-

tinuously serrated, said end members adapted at their upper ends to be removably and selectively secured in said notches and to support said baffle members in a sloping manner therebelow with the lower baffle member of each baffle resting upon a pair of said crossmembers next below, a plurality of first flat louvers adapted by perforations in their upper portions to be passed over and to be retained upon the outstanding ends of two of said crossmembers and to be positioned in an inclined manner with their lower edges seating against two of said standards and upon the next lower of said crossmembers, and a plurality of second flat triangular louvers adapted by a perforation and a slot in their upper base portion to be passed over and to be retained upon the ends of two of said crossmembers outstanding at right angles from a corner standard, said triangular louvers adapted to be positioned in an inclined manner with their lower notched vertexes seating against said corner standard and upon the next lower pair of said cross members.

5. A cooling tower for liquids, having in combination, a superstructure having spaced upright standards and a first plurality of vertically alined crossmembers connecting and extending outwardly past said standards and having a second plurality of vertically alined crossmembers connecting and extending outwardly past said standards at right angles to said first crossmembers, a plurality of plates having spaced notches in their upper edges, said plates attached one each upon each inside face of one group of said crossmembers, a plurality of baffles each comprising two end members supporting therebetween a plurality of inverted V shaped baffle members having their lower edges continuously serrated, said end members adapted at their upper ends to be removably and selectively secured in said notches and to support said baffle members in a sloping manner therebelow with the lower baffle member of each baffle resting upon a pair of said crossmembers next below, a plurality of first flat louvers adapted by perforations in their upper portions to be passed over and to be retained upon the outstanding ends of two of said crossmembers and to be positioned in an inclined manner with their lower edges seating against two of said standards and upon the next lower of said crossmembers, and a plurality of second flat triangular louvers adapted by a perforation and a slot in their upper base portion to be passed over and to be retained upon the ends of two of said crossmembers outstanding at right angles from a corner standard, said triangular louvers adapted to be positioned in an inclined manner with their lower notched vertexes seating against said corner standard, and upon the next lower pair of said crossmembers, and means for distributing a liquid over the upper tier of said baffle.

REXFORD O. ANDERSON.
ULYSSES S. RUDY.
BENJAMIN M. GESSEL.