No. 821,561. PATENTED MAY 22, 1906.

C. H. WHEELER & L. L. PRATT.

COOLING TOWER.

APPLICATION FILED AUG. 4, 1905.

2 SHEETS—SHEET 1.

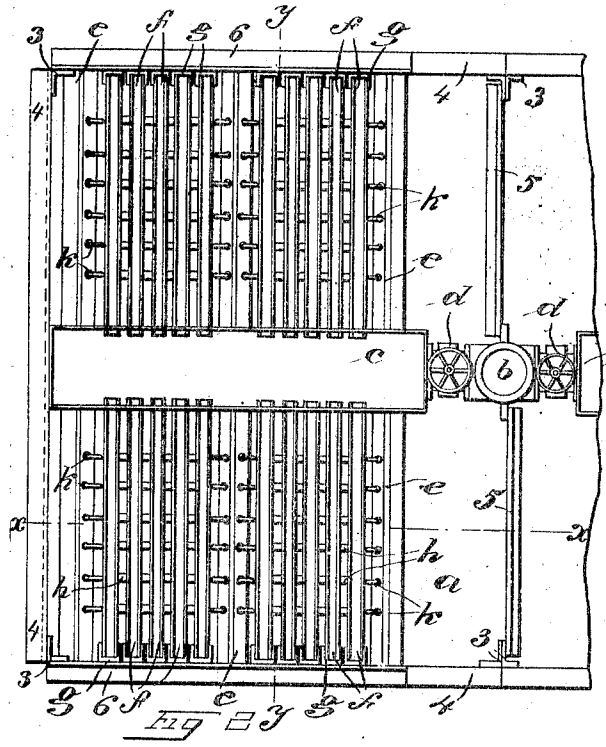


Fig. 1.

Fig. 6.

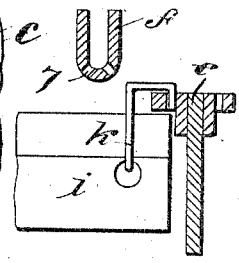


Fig. 7.

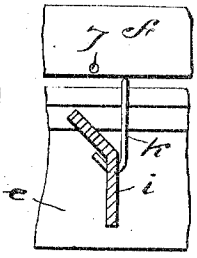
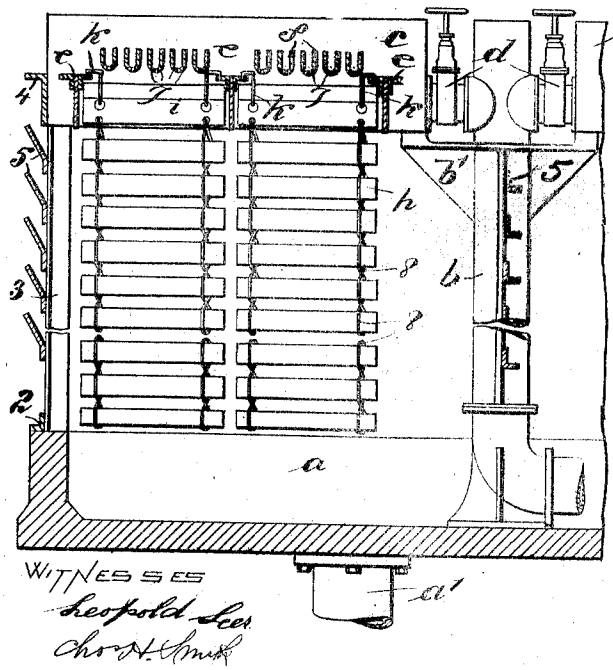
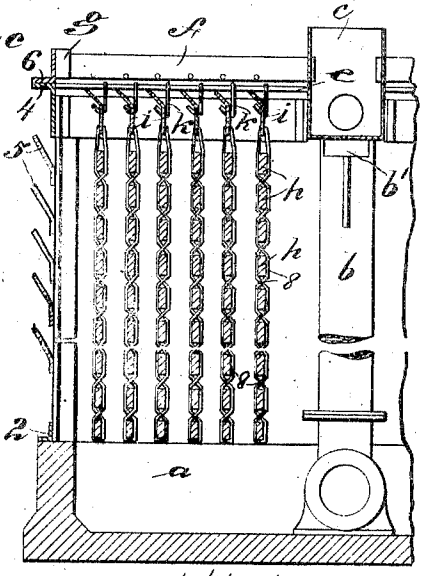


Fig 2

Fig 3





WITNESSES

Leopold Lees

Chas. H. Smith

INVENTORS.

Clifton H. Wheeler

Louis L. Pratt

PER Harold Serrell

ATT'Y

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2 SHEETS—SHEET 2.

Fig. 4.

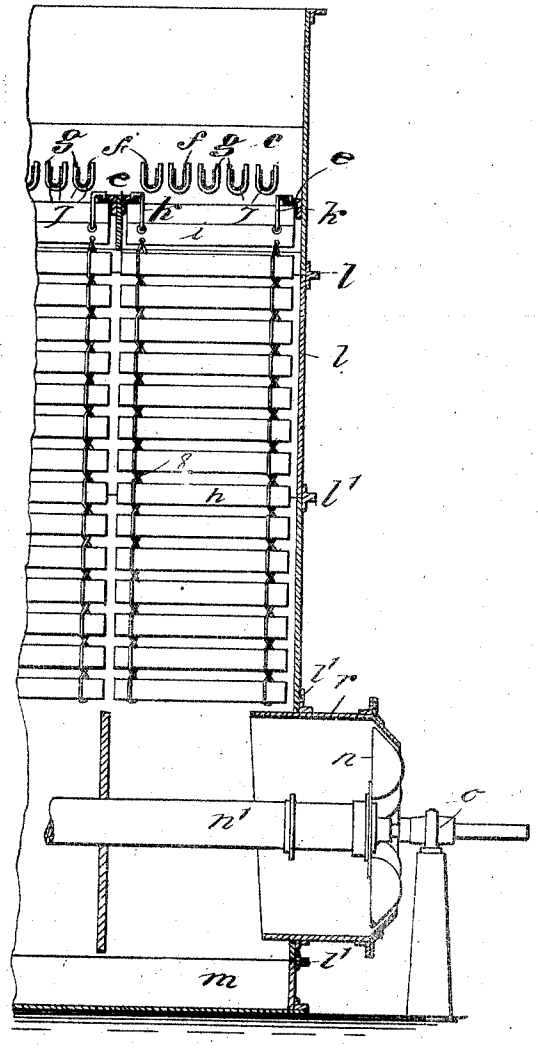
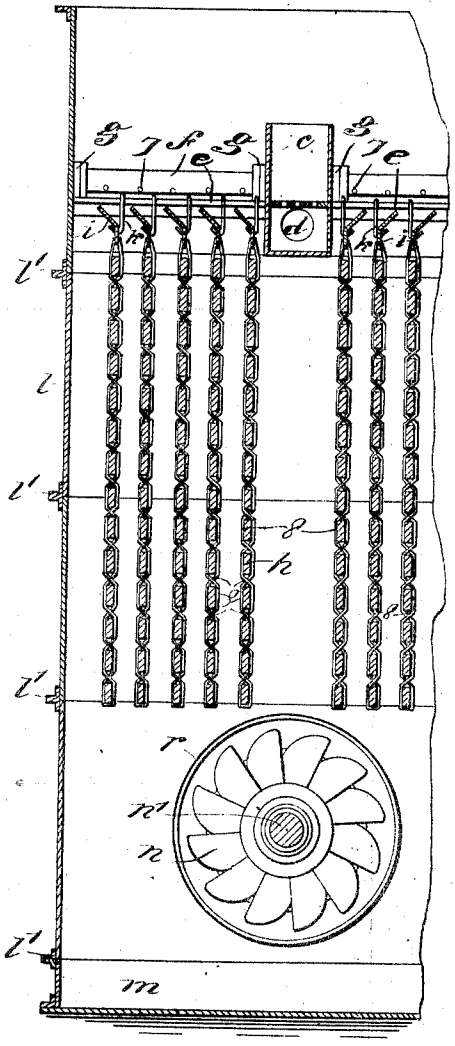


Fig. 5.



WITNESSES

Leopold Lee

Chas. H. Smith

INVENTORS

Clifton H. Wheeler

Louis L. Pratt.

PER Harold Terrell

ATTY

UNITED STATES PATENT OFFICE.

CLIFTON H. WHEELER, OF PHILADELPHIA, PENNSYLVANIA, AND LOUIS L. PRATT, OF MILFORD, DELAWARE, ASSIGNORS, BY MESNE ASSIGNMENTS, TO C. H. WHEELER MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

COOLING-TOWER.

No. 821,561. Specification of Letters Patent. Patented May 22, 1906.

Application filed August 4, 1905. Serial No. 272,052.

To all whom it may concern:

Be it known that we, CLIFTON H. WHEELER, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, and LOUIS L. PRATT, residing at Milford, in the county of Kent and State of Delaware, citizens of the United States of America, have invented an Improvement in Cooling-Towers, of which the following is a specification.

Our invention relates to improvements in cooling-towers which are applicable to both the natural-draft form of tower and the forced-draft form of tower.

Our invention relates particularly to the devices employed for cooling the water received in such towers from condensers and to the devices for conveying the water thereto. Heretofore in these towers the water to be cooled descended by gravity over the surfaces of series of mats hung vertically in the tower and the cooling was not as effectual as desired, mainly because air could only act on one side or surface of the films of water at a time and could not move across through the parts of the mats of the series.

In the device of our invention the cooling means comprise vertical series of spaced-apart suspended slats, preferably of wood, onto which the water falls successively. Between the slats the water falls through the air, which has a cooling influence upon all sides of the drops, and as the water strikes the upper edges of the slats it spreads over both surfaces in thin films and leaves the under edges in drops to the upper edges of the next slats, and so on progressively.

We provide novel devices for conveying the water to be cooled from the reservoir and for receiving the same prior to its delivery to the series of vertically-hung slats and means for suspending the series of slats in the desired position. The slats of the series are connected together and suspended by crossing wires that are twisted between the slats, and the slats of the series hang in vertical planes.

The details of the foregoing and that of the construction of the towers is hereinafter more particularly set forth.

In the drawings, Figure 1 is a plan of part of a tower made according to our improvement. Fig. 2 is a vertical section and partial elevation of the same on the dotted line *x x* of Fig. 1. Fig. 3 is a vertical cross-section and partial elevation on the dotted line *y y* of Fig. 1. Figs. 1, 2, 3 relate to a natural-draft tower. Fig. 4 is a vertical section and partial elevation representing our improvements as applied to a forced-draft tower, and Fig. 5 is a vertical section and partial elevation of the parts shown in Fig. 4 and at right angles thereto. Fig. 6 is a vertical section and partial elevation of details of the structure of both forms of towers, and Fig. 7 is a vertical section and partial elevation at right angles to Fig. 6.

The frame of the tower of Figs. 1, 2, and 3 is composed of horizontal angle-iron plates 2, the vertical corner and intermediate upright angle-plates 3 mounted upon a suitable foundation and connected together and at the upper ends of the corner and intermediate uprights connected by angle-iron plates 4, and we employ angle iron slats 5, secured to the corner and intermediate uprights 3 and inclosing the space occupied by the tower.

The masonry foundation *a* forms a liquid-receptacle, from which extends a delivery-pipe *a'*. We prefer to make these towers double and to continue the series of slats 5 between the parts, as shown in Figs. 1 and 2, both portions of the tower being supplied with water to be cooled by a single stand-pipe *b*, although we do not limit ourselves to this double structure. The stand-pipe *b* is advantageously made with brackets *b'*, extending in opposite directions and adapted to support the tanks *c* at one end, the opposite ends being supported by the angle-iron members 4 of the frame. Between the stand-pipe and the tanks we employ valve and pipe connections *d*, while between the sides of the tanks and the distant and parallel walls of the inclosure or frame we employ blade and angle-iron support members *e*, the ends of which are respectively connected to the members 4 and the tanks *c* and in turn serve as supports for the vertical hanging series of slats.

We employ angle-iron members 6, secured to and rising above the members 4 (see Figs. 1 and 3) and U-shaped troughs *f* at one end connected to the tank, preferably by passing through openings in the wall of the tank and

at the other ends resting in sockets *g*, secured to the angle-iron members 6. These U-shaped troughs *f* are provided with series of perforations 7 in the under curved surface and at opposite sides of a central vertical plane. The slats *h* are preferably of wood, as the same are light in weight and strong. These slats are connected by crossing loops of wire 8. The slats of wood are supported by obtuse angle-iron plates *i* and wire-hook devices *k*. These angle-iron plates *i* are so placed that the center of their upper members comes directly below the perforations 7 in the bottom of the troughs *f*, the hooks *k* passing through eyes of said plates *i* at their lower ends for supporting the plates and at their upper ends into holes formed in the blade and angle-iron support members *e*. Figs. 6 and 7 show in details in enlarged size the construction and relation of these parts.

In the tower of the forced-draft form (shown in Figs. 4 and 5) the shell *l* is formed of plates riveted together and horizontally connected by angle-irons *l'*, and the tower may be of any desired outline in plan, preferably rectangular. The base of the tower is formed as a liquid-receptacle *m*, and at one or both sides there is provided a fan *n*, mounted upon a shaft *n'* in suitable bearings *o*, the fan being surrounded by a cylindrical casing *r*, united to the shell of the tower. This tower, like the tower of natural-draft form, is provided with one or more tanks *c*, with pipe and valve connections *d*, with blade and angle-iron support members *e*, with U-shaped troughs *f*, having perforations 7, said troughs extending from the tank to the opposite walls of the tower and supported by sockets *g* at one or both ends. The same form of cooling devices is employed, consisting of the slats *h*, connected by crossing loops of wire 8 and hung in vertical planes from the obtuse angle-plates *i* by wire hooks *k*, which are connected to the members *e*, and, as in the tower of natural draft, in this tower the water to be cooled is supplied to the tanks *c* and therefrom passes into the U-shaped troughs *f* and out of the perforations 7 onto the angle-plates *i* at the upper ends of the series of slats, falling therefrom to the upper edges of the slats, spreading and passing over both surfaces of the slats, and from the lower edges dropping through the air to the upper edges of the slats beneath, and so on progressively and finally dropping into the liquid-receptacle at the base of the tower, from whence the cooled water may be conveyed away in any desired manner.

We claim as our invention—

1. In a cooling-tower, the combination with devices for receiving and distributing water to be cooled, of vertical series of vertically-placed spaced-apart suspended slats, obtuse angle-plates of metal to which the series of slats are connected for receiving the liquid and distributing the same to the slats and means for suspending the said obtuse angle-plates and series of slats beneath and at right angles to the said distributing devices.

2. In a cooling-tower, the combination with devices for receiving and distributing water to be cooled, of parallel flanged beam-supports provided with suitable perforations, obtuse angle-plates having perforations near their ends, hooks connected with the perforations of said obtuse angle-plates and received in the perforations of said beam-supports for suspending said plates between the said beam-supports, and vertical series of spaced-apart suspended slats connected to and supported by said obtuse angle-plates.

3. In a cooling-tower, the combination with a device for receiving water to be cooled of troughs extending from the said device and provided with spaced-apart perforations in their under surfaces, obtuse angle-plates, means for suspending the same at right angles to the troughs so that one part of the said plates is inclined and the other part vertical, the inclined part being located beneath the said perforations in the troughs and receiving the water thereform, and vertical series of spaced-apart vertical slats suspended from the obtuse angle-plates and parallel therewith, whereby the water to be cooled is delivered from the vertical portions of said obtuse angle-plates directly onto the slats of the series.

4. In a cooling-tower, the combination with a tank for receiving water to be cooled, of series of U-shaped troughs entering the said tank and extending out at right angles thereto, and supports for the opposite ends of said troughs, said troughs being provided with pairs of spaced-apart perforations in their curved under portions, obtuse angle-plates and means for suspending the same at right angles to the U-shaped troughs and so that the one part of said plates is inclined and the other vertical, and the inclined portions located beneath the pairs of perforations in the troughs, and vertical series of spaced-apart slats suspended from said obtuse angle-plates and parallel therewith whereby the water to be cooled is delivered from the vertical portions of said obtuse angle-plates directly onto the slats of the series.

Signed by us this 26th day of July, 1905.

CLIFTON H. WHEELER.
LOUIS L. PRATT.

Witnesses:
RODNEY MORRISON,
WM. B. SOUDER.