No. 670,486. Patented Mar. 26, 1901.

L. L. SUMMERS.

WATER COOLING DEVICE.

(Application filed Dec. 9, 1899.)

(No Model.)

Fig. 1.

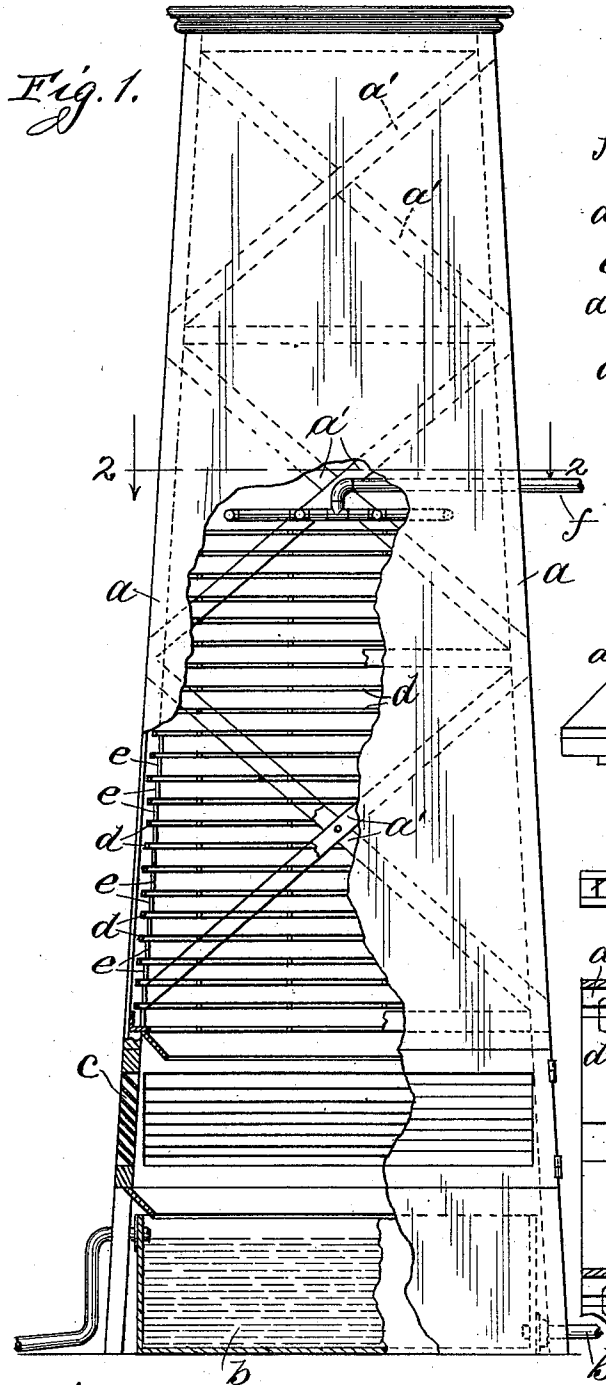


Fig. 2.

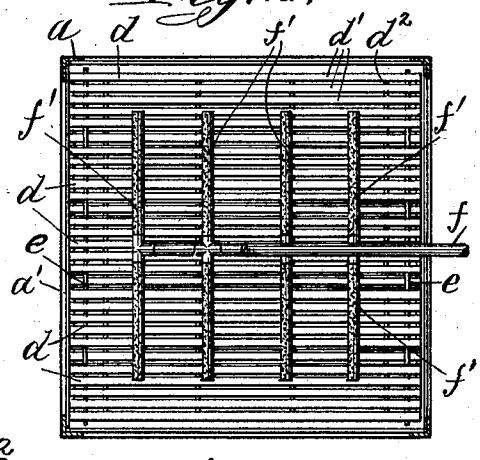


Fig. 3.

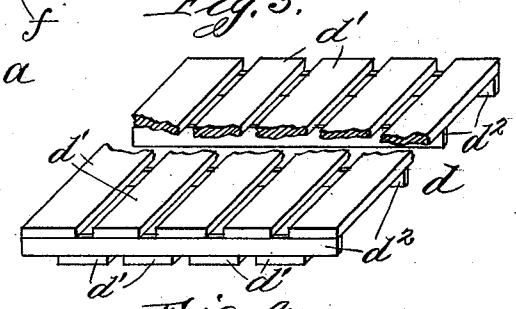


Fig. 4.

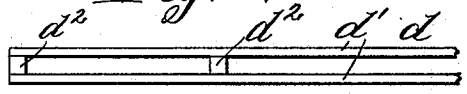
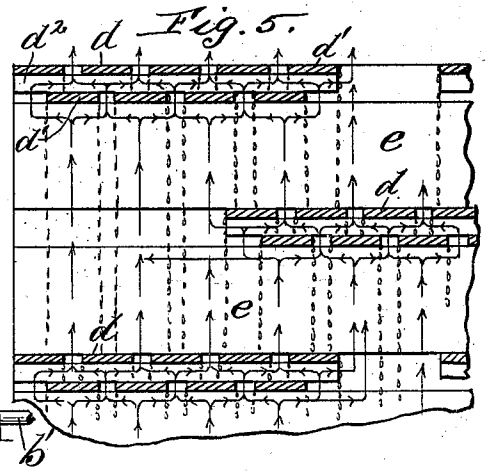


Fig. 5.



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UNITED STATES PATENT OFFICE.

LELAND L. SUMMERS, OF CHICAGO, ILLINOIS.

WATER-COOLING DEVICE.

SPECIFICATION forming part of Letters Patent No. 670,486, dated March 26, 1901.

Application filed December 9, 1899. Serial No. 739,791. (No model.)

To all whom it may concern:

Be it known that I, LELAND L. SUMMERS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Water-Cooling Devices, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to a water-cooling device, my object being to provide an improved form of tower for cooling water employed with condensing-engines, refrigeration plants, and the like.

I have illustrated my invention in the accompanying drawings, in which—

Figure 1 is a view in elevation, partially in section, of the cooling tower or chimney of my invention. Fig. 2 is a sectional view thereof on line 2 2, Fig. 1. Fig. 3 is a view of one of the composite planks which I employ for building up the distributing-surfaces. Fig. 4 is a partial view thereof along the edge. Fig. 5 is a sectional view of a portion of the distributing structure, showing the paths of the water in dotted lines and the paths of the air in full lines.

Like letters refer to like parts in the several figures.

The tower or chimney may be built up in any preferred manner, and I have illustrated the framework of the tower as consisting of upright posts *a a*, braced at intervals by the diagonal braces *a' a'*. At the bottom of the tower is provided a tank *b*, having an exit-pipe *b'*, through which the water may be drawn from the tank. In the sides of the tower just above the position of the tank are provided air-inlets for the entrance of the cool air, these inlets being preferably formed by the spaces between the slats *c c*, situated in oblique positions. Above the air-inlets the structure for distributing and subdividing the water is provided, and this structure I preferably construct in practice from a plurality of composite planks *d d*, which are of a length corresponding to the width of the tower and which rest at the ends upon stringers *e e*, the structure being built up by placing a plurality of the planks side by side upon the lower stringers *e e*, after which another pair of stringers are placed in position and another layer of the composite planks placed thereon, the system of planks thus being built up to any desired height. The composite plank *d* is formed in practice of a number of thin strips of wood *d' d'*, placed side by side and with their edges a short distance apart and separated by the transverse separators d^2 d^2 from a similar layer of thin strips *d' d'*, placed beneath the same. The two layers of thin strips and their separators are secured together to form a composite plank, usually a foot and a half in width and of a length corresponding to the width of the tower. For the strips *d'* I preferably employ thin pieces of wood—say three inches wide and about a quarter-inch thick. The strips *d' d'* of the upper and lower layers are situated in position to break joints—that is, staggered—so that a strip of the lower layer lies directly beneath the slot or opening between the edges of two strips of the upper layer. Likewise in building the structure the planks *d* are placed in position, as shown in Fig. 5, so that they break joints—that is, staggered—so that the plank of a lower layer will lie just beneath the space between two planks of the layer immediately above.

The water to be cooled is admitted through pipe *f* to the top of the cooling structure, and I have illustrated in the present instance the pipe *f* as connected with a plurality of distributing-pipes *f' f'*, which have holes in the lower walls to project the water upon the top of the cooling structure in a plurality of small streams, whereby the water is distributed over the structure. The water being thus admitted at the top of the distributing and cooling structure, it flows along the upper surfaces of the strips *d'* and falls in thin vertical streams to the upper surfaces of the strips *d'* just beneath, thence along the horizontal surfaces of these strips to the edges thereof, when it again falls to the surfaces beneath. By the time the water reaches the lower end of the cooling structure it has been thoroughly subdivided and during its course has been thoroughly and repeatedly intermingled with the air passing upward through the chimney and subjected to the cooling effect thereof. The air in passing upward, due to the natural draft caused by the heat of the water, partakes of a sinuous course in passing from one

space to another and in doing so is caused to traverse the thin streams of falling water at right angles thereto. Thus in Fig. 5 the falling streams of water passing over the edges of the strips are indicated in dotted lines, while the path of the air is illustrated by the full lines carrying arrow-heads. It will be noted that the air is repeatedly passed at right angles to the falling streams of water and is thus caused to traverse the same and is thereby intimately intermingled with the water to extract the heat therefrom. Moreover, the air is caused to pass along the surfaces of the strips, causing a further mingling of the air and water. The construction is such that the surface thus exposed to the air is a maximum. By the time the water has reached the lower end of the cooling structure and falls into the tank at the bottom of the tower it has been thoroughly subjected to the cooling effect of the air. The extent to which the water is subjected to the cooling effect of the air may be regulated by regulating the quantity of water supplied to the tower or by varying the size and extent of the cooling structure, and my invention may thus be adapted to any particular plant.

The spaces between the edges of the strips are of sufficient width to permit the passage of the water over the edges and to also permit the upward movement of the air. As the cooling effect depends upon the quantity of air circulated in a given time, the size of the spaces may be varied to secure the necessary draft to meet the particular conditions of use. If the spaces are small as compared with the quantity of air demanded, artificial means may be required to produce the necessary draft through the cooling structure. This draft may be produced by artificial pressure supplied from beneath the cooling structure or by suction from above. It is preferable, however, when space will permit to make the cooling structure of ample size, with the spaces large enough to secure the required draft by the heat within the chimney and without the necessity of employing mechanical means for producing a draft.

It will be noted that in accordance with the present invention the water to be cooled passes downward, while the cooling-air passes upward, and that both the air and the water are repeatedly in their passage subdivided and deflected, so as to insure a complete intermingling of both. The streams of water in passing over the edge of a strip are not permitted to fall unhindered through the cooling structure, but are intercepted by other strips, which deflect the water and cause a further subdivision. Likewise the air in its upward passage is not permitted to rise unhindered, but repeatedly strikes the under faces of the strips and is deflected and subdivided. In this manner the most complete intermingling of the air and water results.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A distributing-surface for cooling-towers for condensers built up of a plurality of composite planks, each plank comprising two separated layers of strips, the strips of each layer being separated laterally to leave passages between the edges thereof, and the strips of the upper and lower layers being staggered as described, the several composite planks comprising the tower being also staggered, substantially as described.

2. In a composite plank for coolers for liquids, the combination with two intersticed layers of strips d' d' laid parallel to each other and staggered with respect to each other, of a plurality of transverse stringers or separators d^2 arranged between said layers for the purpose of separating them and secured directly to the opposed faces of the strips of the two layers whereby a unified structure is produced, substantially as described.

In witness whereof I have hereunto subscribed my name in the presence of two witnesses.

LELAND L. SUMMERS.

Witnesses:
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M. R. ROCHFORD.