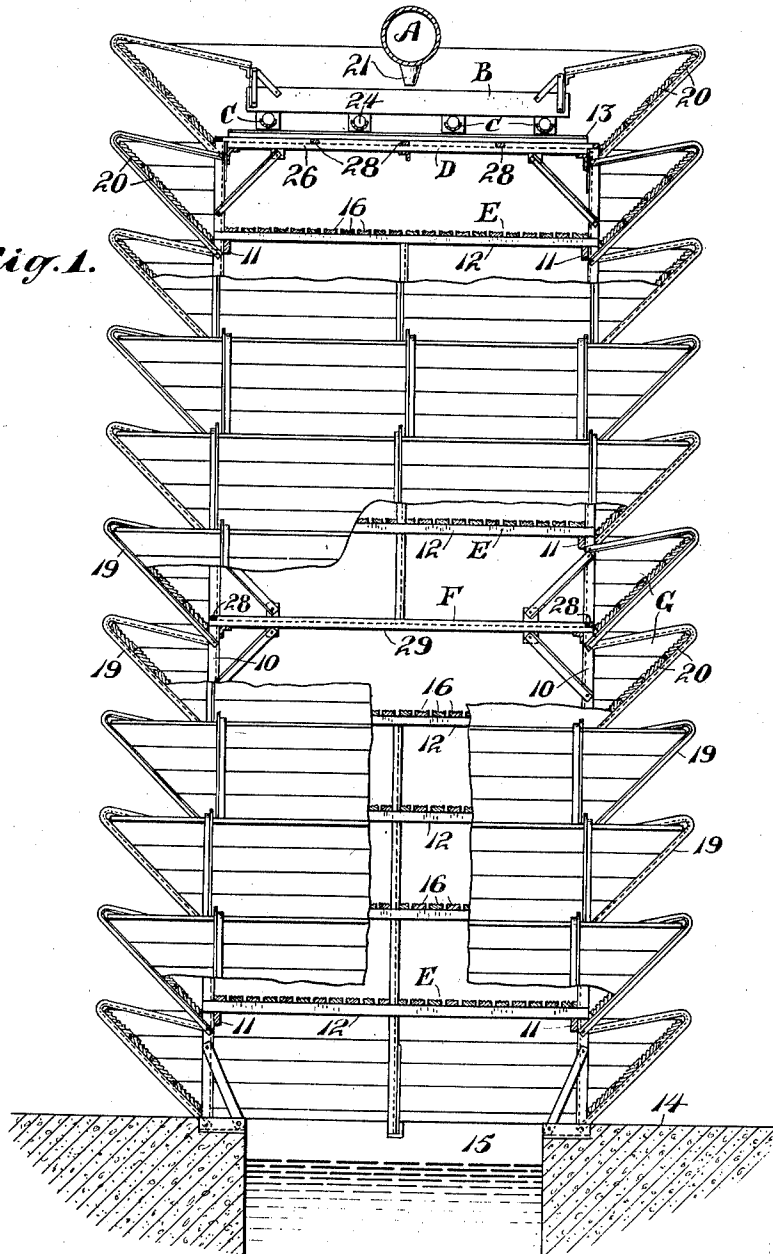


1,334,515.

C. F. BRAUN.
WATER COOLING TOWER.
APPLICATION FILED JAN. 18, 1918.

Patented Mar. 23, 1920.
3 SHEETS—SHEET 1.

Fig. 1.



WITNESS:

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INVENTOR.

Carl F. Braun

BY

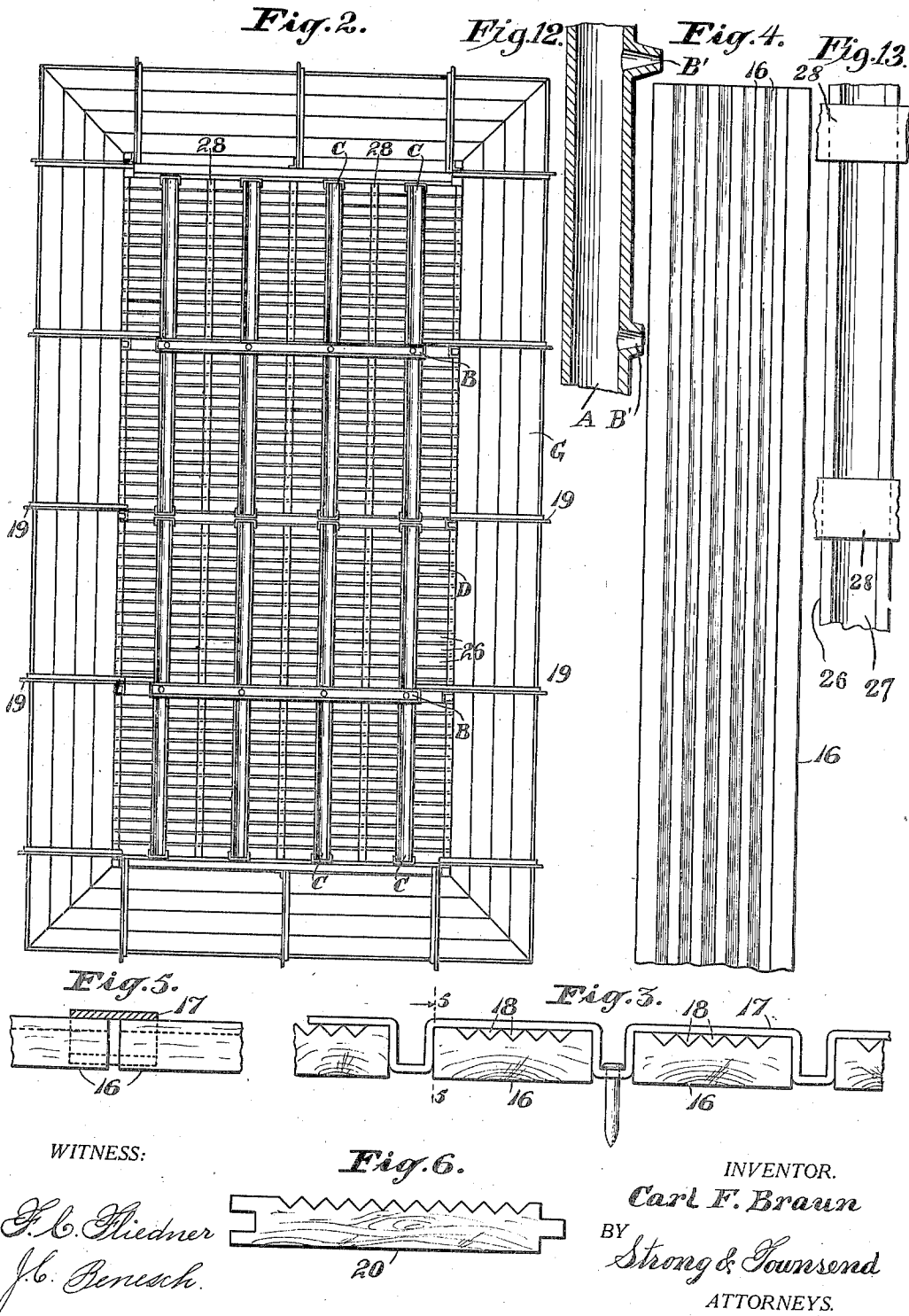
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3 SHEETS—SHEET 2.



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Fig. 6.



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Patented Mar. 23, 1920.
3 SHEETS—SHEET 3.

Fig. 7.

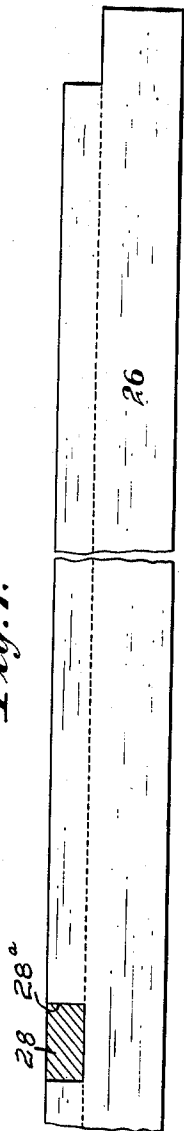
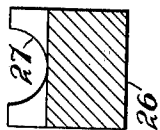


Fig. 8.



WITNESS:

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Fig. 9.

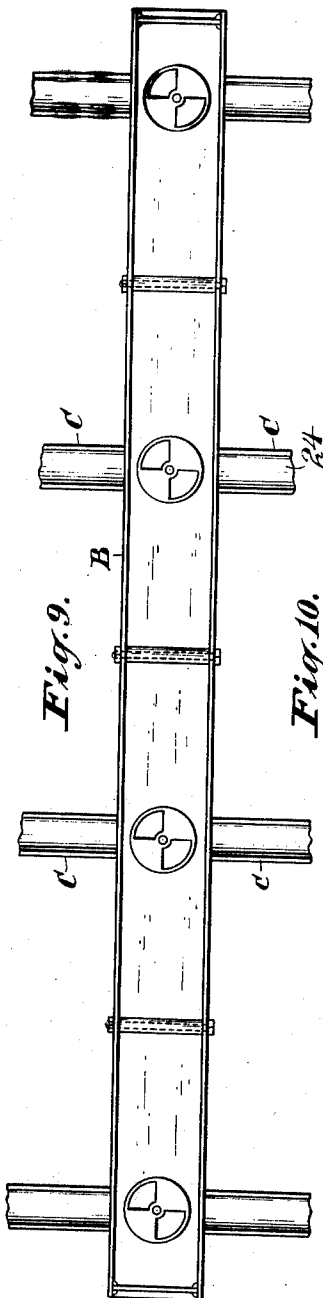


Fig. 10.

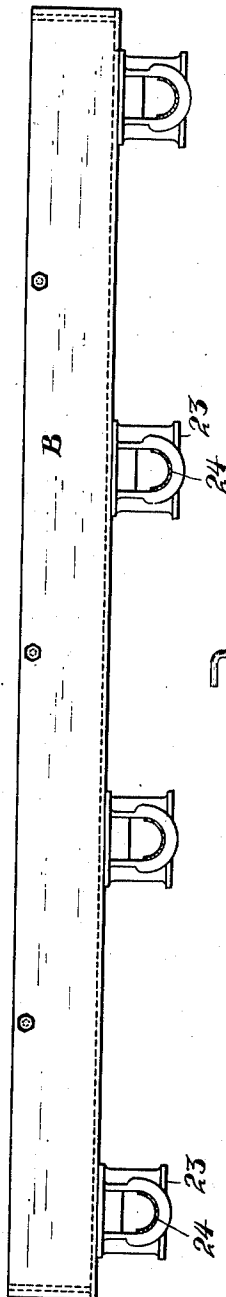
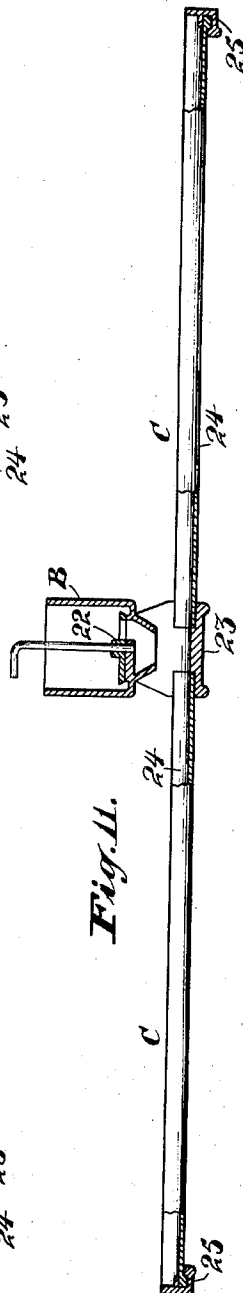


Fig. 11.



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UNITED STATES PATENT OFFICE.

CARL F. BRAUN, OF SAN FRANCISCO, CALIFORNIA.

WATER-COOLING TOWER.

1,334,515.

Specification of Letters Patent. Patented Mar. 23, 1920.

Application filed January 18, 1918. Serial No. 212,410.

To all whom it may concern:

Be it known that I, CARL F. BRAUN, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Water-Cooling Towers, of which the following is a specification.

This invention relates to cooling towers of the open atmosphere type; and has for its object to simplify and improve the construction and operation of such devices.

One form which my invention may assume is exemplified in the following description and illustrated in the accompanying drawings, in which—

Figure 1 shows an end elevation, partly in section, of a device embodying my invention.

Fig. 2 shows a plan view of the same.

Fig. 3 shows an end view of a portion of one of the cooling decks.

Fig. 4 shows a plan view of one of the slats entering into the construction of the cooling deck.

Fig. 5 shows a section on the line 5—5 of Fig. 3.

Fig. 6 shows an end view of one of the boards entering into the construction of the louvers.

Figs. 7 and 8 show detail views of the secondary distributing deck.

Figs. 9 and 10 show plan and side elevations, respectively, of the launders and primary distributing troughs.

Fig. 11 shows a sectional view of the same.

Fig. 12 is a detail longitudinal sectional view of the feed pipe.

Fig. 13 is a detail plan view of a portion of one of the troughs of the secondary distributor.

The present system includes one or more units each embodying a tower, rectangular in plan, placed with its length across the prevailing wind so as to intercept as much air as possible. At the top of the tower is a feed pipe A discharging into launders B running transversely of the tower, the said launders emptying into primary distributing troughs C, extending at right angles thereto.

Beneath the primary distributors is a secondary distributing deck D overflowing onto a series of superimposed cooling decks E through which the falling water successively passes and is exposed to the action of the air. Since the wind may tend to move

the water to one side of the tower in passing downwardly over the cooling decks, I interpose about halfway between the upper and lowermost cooling decks a redistributing deck F which serves to re-apportion the water uniformly over the succeeding cooling decks. Louvers G extend around each cooling deck to prevent loss of water from the action of the wind.

For purposes of strength it is desirable to construct the tower with a steel frame, and I show the same as being made up of vertical steel posts 10 with suitable cross and brace members also of steel. However it is not practical to have the supports for the cooling decks made of steel for the reason that their inaccessibility would make it difficult to paint them. Accordingly I provide horizontal supports 11 of wood extending longitudinally of the tower and similar supports 12 extending transversely for supporting each of the cooling decks E. Therefore, the wooden deck supports enter into the construction of the tower and form tie members for the vertical steel posts. The upper ends of the posts are preferably cross connected by means of I-beams 13 and a base 14 is provided for the tower, preferably of masonry and having a reservoir therein to collect the water from the tower.

Each of the cooling decks is made up of a series of spaced wooden slats 16 extending longitudinally of the tower and secured in place on the transverse supports 12 by means of metal bars 17 crimped to provide slat-embracing loops and connecting, spacing and attaching portions, as shown in Fig. 3, said metal bars being fastened in place by nails driven through the portion thereof lying between adjacent slats and entering the supports 12. Therefore I do not have to drive nails, lag screws or similar devices through the light slats 16 which might split them and, furthermore, the failure of even a number of nails in holding down the strips 17 would not cause the loosening of any of the slats. There is an additional advantage in the use of the crimped metal bars when installing due to the fact that it is not necessary to measure off and space the slats since the said crimped bar will act as a templet. Furthermore, some woods have longitudinal expansion which may be accommodated as the slats are not fixed rigidly to their supports, thus preventing buckling. Each of the slats 16

is provided with longitudinally extending grooves or serrations 18 on its upper face to form trough members to cause the water to spread evenly thereover.

5 The louvers G, which surround each of the cooling decks, are made up of supporting bars 19 bent into a sort of V shape, with their ends secured to the vertical posts 10. The lowermost arms of the V-shaped bars incline at an angle of about 45°. Secured in place to the lower arms are tongue and groove boards 20 forming upwardly diverging sides to confine the water to the cooling decks and prevent loss thereof through the action of the wind. The upper 15 faces of the boards 20 are preferably serrated or grooved longitudinally, as shown in Fig. 6. The appearance of the tower and the strength of the louver supports are greatly increased by having the bars 19 in one piece.

The feed pipe A extends longitudinally at the center of the tower and has a plurality of discharge vents 21, exposed beneath each of which is a launder B in the form of a channel shaped trough extending transversely of the tower. The walls of the launders B are braced at intervals by spacing sleeves B¹ extending across the space 30 between the walls of the launders and secured in position by rods or bolts B² extending through the sleeves and piercing the walls of the launders. As shown in Figs. 9, 10 and 11, each launder has a series of discharge apertures in its bottom, four 35 in the present instance, each equipped with a disk valve 22 for controlling the same. Said launders are supported upon the I-beams 13 by means of chairs 23 forming also a seat and casing for the valves 22. These chairs are also arranged to form seats for the troughs 24 of the primary distributor C. There are four troughs 24 each in cross section in the form of a semicircle 40 made from a longitudinal half section of a standard pipe. The apertures in the opposite launders are alined and a trough extends at right angles thereto beneath each row of apertures. The ends of the troughs have castings 25 closing the same and forming supports to engage the I-beams 13. The troughs can be leveled by means of shims placed between the castings 25 and the I-beams which is a far more satisfactory 50 method than by leveling by means of screws or similar devices liable to fail in operation because of rust.

Water overflows the sides of the primary distributing troughs 24 and falls upon the 60 secondary distributor D which is made up of a series of closely arranged slats 26 extending at right angles to the troughs 24 and each formed with a longitudinally extending groove 27. The slats 26 are held spaced apart and the grooves are dammed

by means of cross strips 28 seated in notches 28^a formed in said slats. The water overflows the sides of the grooves 27 and thus escapes in sheets transverse to the plane of the sheets descending from the primary distributing troughs. The water in passing through the cooling decks is exposed to the air and cooling is effected by evaporation and by direct contact. 70

In the case of high winds the water gradually recedes from one side of the tower until near the bottom it is nearly all coming down on the lee side. By reason of the re-distributing deck F it is possible to re-distribute the water evenly over the horizontal cross section of the tower. This re-distributing deck is in detail similar to the secondary distributing deck D, being made up of grooved trough members 29 arranged transversely of the tower and held spaced apart and dammed by end splines 28, the intermediate splines being omitted. 80 85

Various changes in the construction and arrangement of the several parts herein shown and described may be made without departing from the spirit of my invention as disclosed by the appended claims. 90

Having thus described my invention, what I claim and desire to secure by Letters Patent is— 95

1. In a water cooling tower, a series of superimposed, perforated decks through which water is passed successively, and a re-distributing deck interposed between said cooling decks to receive all of the water from an overlying cooling deck and provided with dammed channels to discharge the same evenly over the surface of an underlying cooling deck. 100

2. In a water cooling tower, a series of superimposed, perforated decks through which water is passed successively, and a re-distributing deck interposed between said cooling decks to receive all of the water from an overlying cooling deck and discharge the same evenly over the surface of an underlying cooling deck, said cooling decks comprising each a series of closely spaced, parallel trough members and said re-distributing deck comprising a series of closely spaced troughs extending at right angles to the direction of the slats in the cooling decks. 105 110 115

3. In a water cooling tower a tubular feed device at the top thereof provided at the bottom with a plurality of depending outlets, a plurality of launders located below the outlets and into which the feed device discharges, overflow distributing troughs extending at right angles to the launders, and a series of perforated cooling decks through which the water from the distributing troughs passes in succession. 120 125

4. In a water cooling tower a feed device at the top thereof, a plurality of 130

launders into which the feed device discharges, said launders being provided at the bottom with depending valved outlets, a series of overflow distributing troughs located below the said outlets and extending at right angles to the launders and receiving water therefrom, and a series of superimposed perforated cooling decks through which the water passes in succession.

5. In a water cooling tower a central tubular feed device at the top thereof provided at its bottom with depending outlets, a plurality of launders arranged at right angles to the feed device and located at intervals beneath the said outlets and receiving water therefrom, said launders being provided with depending valved outlets, a series of overflow distributing troughs extending at right angles to the launders and located beneath and receiving the water from the outlets of said launders, a secondary distributor beneath the said troughs and a series of superimposed perforated cooling decks through which the water from the secondary distributor passes in succession, said secondary distributor comprising a series of closely spaced parallel troughs and said cooling decks comprising a series of closely spaced parallel trough members, the trough members of the cooling decks extending at right angles to the troughs of the secondary distributor.

6. In a cooling tower, a feed device at the top thereof, a plurality of launders into which the feed device discharges, each of said launders being provided with a series of apertures in its bottom, the apertures of opposite launders being alined, a series of distributing troughs extending beneath the launders at right angles thereto in position to receive the water therefrom, and a valve for controlling each discharge aperture in the launders.

7. In a cooling tower, a feed device at the top thereof, a plurality of launders into which the feed device discharges, each of said launders being provided with a series of apertures in its bottom, the apertures of opposite launders being alined, a series of distributing troughs extending beneath the launders at right angles thereto in position to receive the water therefrom, and chairs for supporting the launders upon the tower, said chairs also forming seats for the distributing troughs.

8. In a water cooling tower, a central feed device at the top thereof provided at intervals with outlets, a plurality of launders located beneath the outlets and into which the feed device discharges, a series of overflow distributing troughs extending at right angles to the launders be-

neath the same and receiving water therefrom, each of said troughs being formed of a longitudinal half section of a pipe and closed at its ends, and chairs supporting the launders and provided with seats receiving the overflow distributing troughs.

9. In a water cooling tower, spaced perforated decks through which water is passed successively; and a re-distributing deck interposed between the cooling decks and composed of spaced members provided with longitudinal grooves and having means for damming the grooves.

10. A water cooling device comprising a tower made up of vertical posts, a series of superimposed, perforated cooling decks arranged thereon, and a louver surrounding each deck to shield the same from the action of the wind and to prevent loss of water therefrom, each louver comprising a series of V-shaped frame bars secured at their ends to the posts and having one leg extending upwardly and outwardly at an angle of approximately 45°, and an imperforate deck arranged upon said upwardly and outwardly extending arms.

11. In a water cooling tower, a series of decks arranged at intervals and composed of spaced trough members, and crimped straps spacing and securing the trough members in position.

12. A water cooling tower provided with a deck composed of spaced trough members having longitudinal grooves, and crimped straps provided at intervals with loops embracing the trough members and spacing the same and extending across the tops of the grooves to permit water to flow under the said loops.

13. A water cooling tower including a deck composed of spaced members, and straps crimped to provide slat embracing loops and connecting spacing and attaching portions, said loops permitting longitudinal expansion of the members without warping or buckling.

14. A water cooling tower including a deck composed of spaced trough members, crimped straps composed of loops embracing the trough members and spacing the same, and connecting portions extending between the loops, and fastening means piercing the connecting portions beyond the trough members and securing the said straps and the trough members in position.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CARL F. BRAUN.

Witnesses:

EMORY G. SINGLETARY,
G. B. DUFFY.