Oct. 12, 1926. 1,602,844

E. BURHORN

COOLING TOWER

Filed March 1, 1924

Fig. 1.

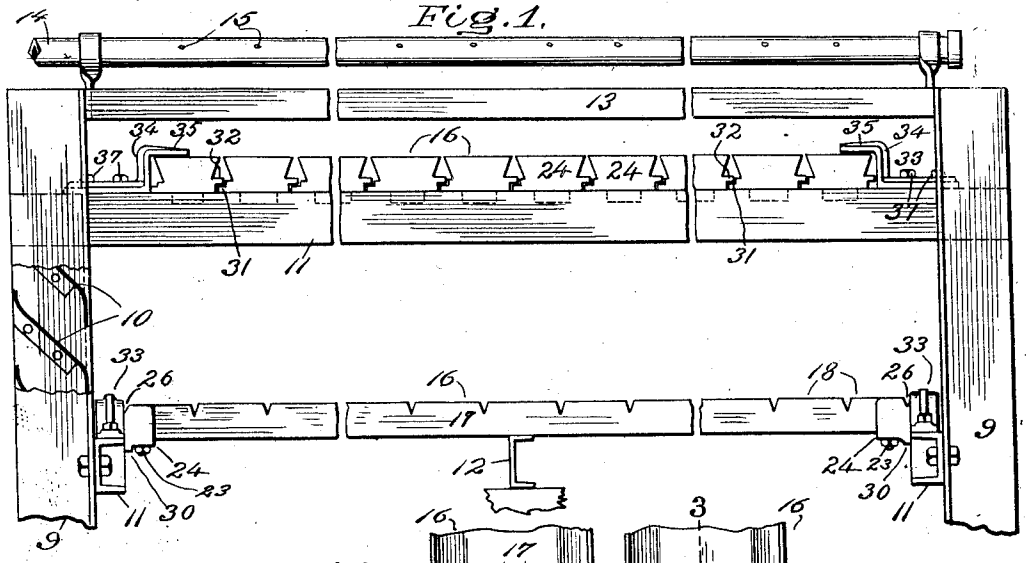


Fig. 2.

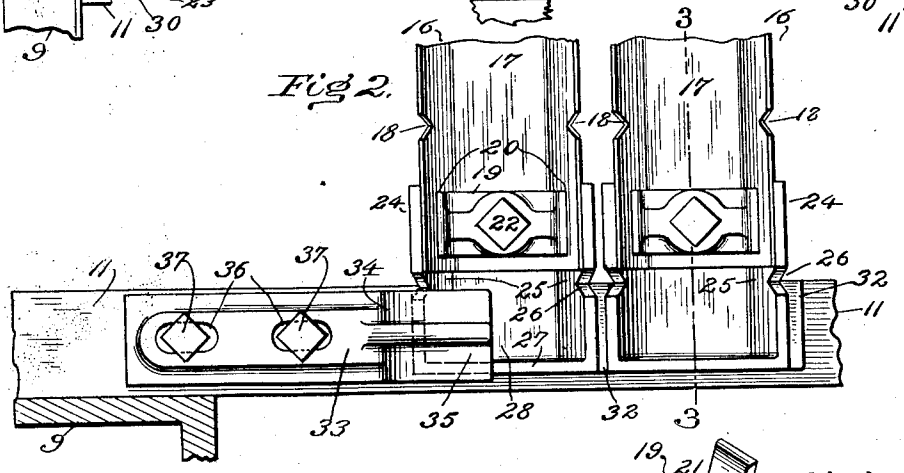


Fig. 3.

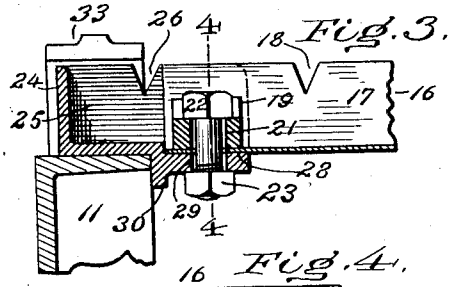


Fig. 4.

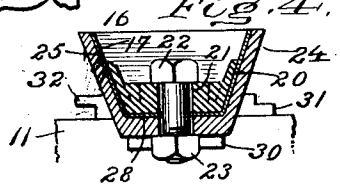


Fig. 5.

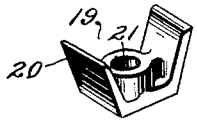


Fig. 6.

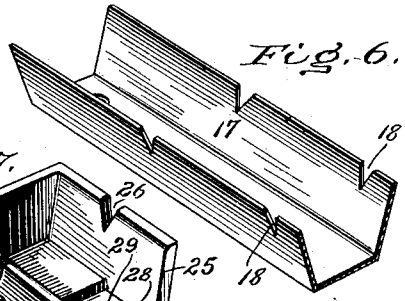
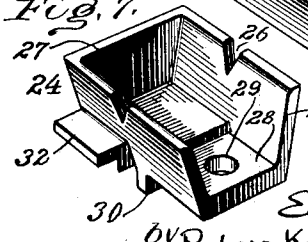


Fig. 7.



Inventor
Edwin Burhorn,
by Rogers, Kennedy & Campbell,
Attys.

Patented Oct. 12, 1926. 1,602,844

UNITED STATES PATENT OFFICE.

EDWIN BURHORN, OF HOBOKEN, NEW JERSEY.

COOLING TOWER.

Application filed March 1, 1924. Serial No. 696,259.

This invention relates to cooling towers, or structures arranged for the cooling of water by the action of natural air currents as the water descends in distributed condition through the tower. An instance of such a tower is my prior Patent No. 1,443,974 of February 6, 1923.

With such towers it is customary to delay the gravity descent of the water, for example by means of a series of so-called cooling decks, each of which may comprise a number of water vessels or troughs arranged to receive the distributed drops falling from above and to redistribute the water, allowing it to descend or overflow at suitable points to the next cooling deck beneath. These deck troughs or distributing members are required to be properly positioned at each level and securely held against displacement. No entirely satisfactory means has heretofore been employed for mounting the distributing members at each deck and the main object of this invention is to afford an improved mounting for this purpose which will be permanent. Another object is to provide an improved structure of deck trough and means for mounting the same which will not only be durable in use but will be inexpensive in manufacture and easily applied. Other and further objects and advantages of the invention will be hereinafter explained or will be apparent to those skilled in the art.

To the attainment of such objects and advantages the present invention consists in the novel cooling tower, and the novel features of structure, arrangement and detail herein described or illustrated.

In the accompanying drawings Fig. 1 is a side elevation of the upper portion of a cooling tower embodying this invention, partly broken away at the left to show the use of louvers, and the louvers being omitted at the remaining sides.

Fig. 2 is a partial plan view, for example, of the topmost trough deck near the left end and front side thereof.

Fig. 3 is a vertical section taken on the line 3—3 of Fig. 2.

Fig. 4 is a vertical section taken on the line 4—4 of Fig. 3.

Fig. 5 is a perspective view of the inner clamp member. Fig. 6 is a perspective view of the body of the trough. Fig. 7 is a perspective view of the outer clamp member.

The invention generally comprises a number of novel elements and combinations. In one aspect it consists of the series of overflow trough members supported on the transverse beams of the frame at each deck, each trough consisting of a sheet material body shaped like a trough and an exterior member to which the body is fitted or secured and which also serves to close the end of the trough. Preferably this is combined with an interior clamp member cooperating with the exterior member to hold firmly the body of the trough. Preferably also the exterior members are formed with positioning and interlocking devices.

The illustrated structure may be described in detail as follows. The cooling tower frame may consist of upright frame members, 9, between which may extend a system of louvers 10, serving well known purposes. At the level of each cooling deck the frame may have cross members or structural channels 11, constituting transverse beams supporting the overflow troughs to be referred to, and if the span is long there may be intermediate cross channels 12. Above the topmost deck are cross frame members 13. The particular spacing between the decks is of no importance and may be greater or less than that shown, and the number of decks may be increased at will.

The warm water to be cooled may be brought up by a supply pipe 14 which extends across the top of the tower and is provided with a system of discharge apertures 15. There may be apertures at both sides and they may correspond in position with the troughs of the topmost deck beneath. It will be understood that after the water has been cooled through its progressive passage to the bottom of the tower it may there be received in a tank or pan in the usual way and drawn off for use.

At each cooling deck are a series of troughs 16. These may be arranged in parallel relation, substantially contacting, but with spaces between for the purpose of discharge from deck to deck. While the structure of the trough may be varied it is shown as comprising a sheet metal body 17, shown separately in Fig. 6. This is cheaply manufactured, being simply a strip of metal bent to form the sloping sides. In order that each trough may overflow at designated points, above the troughs of the deck be-

neath, their edges are formed with overflow notches 18. The troughs of the topmost deck are shown arranged at right angles to the distributing pipe 14, each trough receiving water at both ends from the apertures 15. The troughs of the second deck are arranged at right angles to those of the first deck and the notches 18 of the first deck are located directly above the troughs beneath so as to discharge thereinto. In this way the body of water is caused to descend in the form of small overflow streams or series of drops at a great number of points in each deck, each portion of descending water passing into a trough of the next lower deck. With ten troughs in each deck there would be two hundred overflow points, which can be increased at will.

As a means of positioning and securing each end of each trough 16 to the tower frame, the trough body 17 is supplemented with clamping means preferably comprising both inner and outer clamp members 19 and 24, one of which is so shaped as to close the end of the trough so that it will hold water. The inner clamp member 19 is shown separately in Fig. 5. It is arranged to fit inside the trough body and has sloping sides 20 bearing against the trough sides, and a vertical hole 21. A securing bolt 22 is passed through the hole 21 and a corresponding hole in the trough body and through the exterior clamp member, the entirety being tighened up and secured by nut 23 on the bolt.

The outer clamp member 24 is shown separately in Fig. 7 in its preferred form. It has sloping sides 25 corresponding with the slope of the trough-body sides and may have overflow notches 26, in continuation of the series of notches 18. The outer clamp member 24 constitutes an exterior end member and is preferably a casting, and is formed with an end wall 27, closing the end of the trough. The bottom of the casting 24 has a dropped portion or seat 28 which receives the end of the trough body 17, and is provided with a bolt hole 29 to receive the bolt 22 already mentioned.

For positioning each trough against endwise movement the outer clamp member 24 is shown provided with a transverse flange 30 extending downwardly and arranged to engage the channel member 11 of the tower frame, as seen in Fig. 3. Also the several troughs may be positioned by inter-contact of their end castings or clamp members. Thus each outer casting 24 has a side flange 31 at one side and a similar flange 32 at the opposite side but slightly higher, so that they overlap, shown in Fig. 1. It is best to assemble the troughs with a slight degree of looseness, indicated by the spacing in Fig. 1.

To position the series of troughs against lateral displacement a positioning member 33 is shown at each end of each supporting channel member 11. This positioning member 33 abuts against the side flange of the extreme trough end castings, and thus holds the series in position. Also the positioner is shown as having an upright extension 34 and a horizontal finger 35 extending therefrom directly above the end casting of the trough, thus preventing the trough being dislodged in any manner. Each positioner may be held down upon the channel through slots 36 formed in it, engaged by bolts 37 passing through and secured to the channel.

The extreme troughs in each deck may be spaced somewhat away from the tower sides, as indicated in the topmost deck in Fig. 1. Obviously, however, the positioning member 33 might be moved one space further out and an additional trough added at each end. The second and third decks may be considered as so arranged. This is indicated by the notch 26 in the end castings of the troughs of the second deck. To receive the overflow from these notches the third deck should contain the additional trough.

It will thus be seen that there has been described a cooling tower embodying the principles and attaining the advantages of the present invention. Since many matters of combination, arrangement, design and detail may be variously modified without departing from the principles involved it is not intended to limit the invention to such matters except so far as set forth in the appended claims.

What is claimed is:—

1. In a cooling tower a distributing deck comprising supporting frame members as transverse beams, and a series of overflow troughs supported by such frame members, each consisting of a sheet material body shaped to constitute a trough, and an exterior end member comprising an end wall and sides within which the trough body is fitted and which closes the trough in a water tight manner.

2. In a cooling tower a distributing deck comprising supporting frame members as transverse beams, and a series of overflow troughs supported by such frame members, each consisting of a sheet material body shaped to constitute a trough, and an exterior end member to which the trough body is fitted interiorly and which closes the trough end, consisting of a hollow casting formed with an interior seat for the trough body.

3. In a cooling tower a distributing deck supported by the tower frame and comprising a series of distributing troughs each consisting of an elongated open ended sheet metal body and inner and outer end clamping members shaped to the contour of the body and between which the end of the body is clamped and one of which members is

shaped to close the end of the trough in a water tight manner, and means clamping together said members.

4. A cooling tower as in claim 3 and wherein the outer clamp member closes the trough end and gives support to the trough at the end and is supported from the tower frame.

5. A cooling tower as in claim 3 and wherein the outer clamp member is a hollow casting shaped to close the trough end and the inner clamp member is shaped to clamp the body to the outer member, with a securing means engaging the same.

6. In a cooling tower a distributing deck supported by the tower frame and comprising a series of distributing troughs each consisting of an elongated open ended body and inner and outer end clamping members between which the end of the body is clamped and one of which members is shaped to close the end of the trough, and means clamping together said members, the several outer clamp members being formed with laterally extending projections having mutual engagement so as to position relatively the several members and troughs.

7. A cooling tower as in claim 6 and wherein the endmost troughs are provided with separate positioning members attached to the tower frame.

8. In a cooling tower a distributing deck comprising a series of adjacent troughs inter-engaged at their ends, and positioning and hold-down means for both ends of both the first and last troughs of such series.

In testimony whereof, I have affixed my signature hereto.

EDWIN BURHORN.