

Feb. 6, 1951

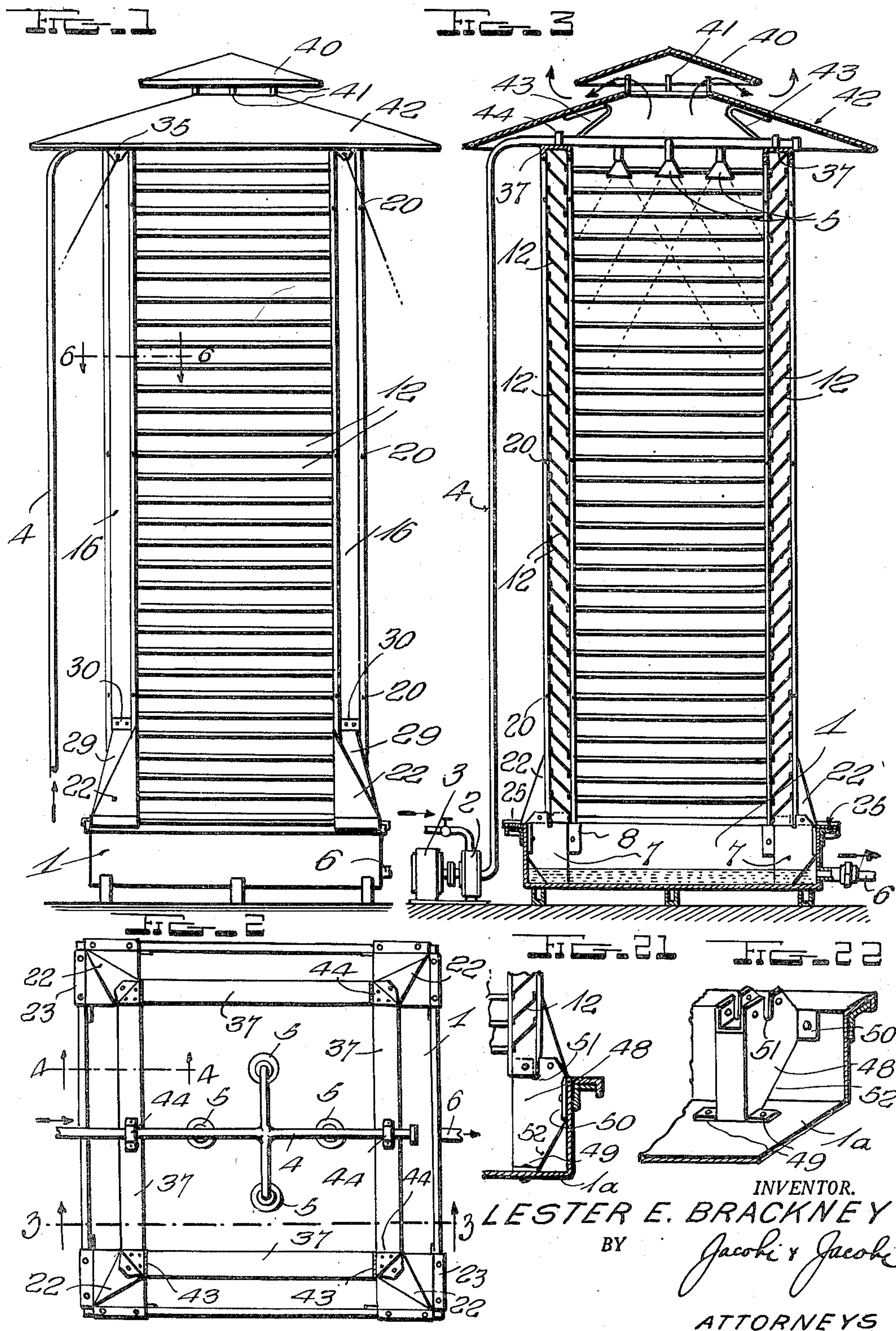
L. E. BRACKNEY

2,540,091

WATER COOLING TOWER

Filed June 16, 1947

4 Sheets-Sheet 1



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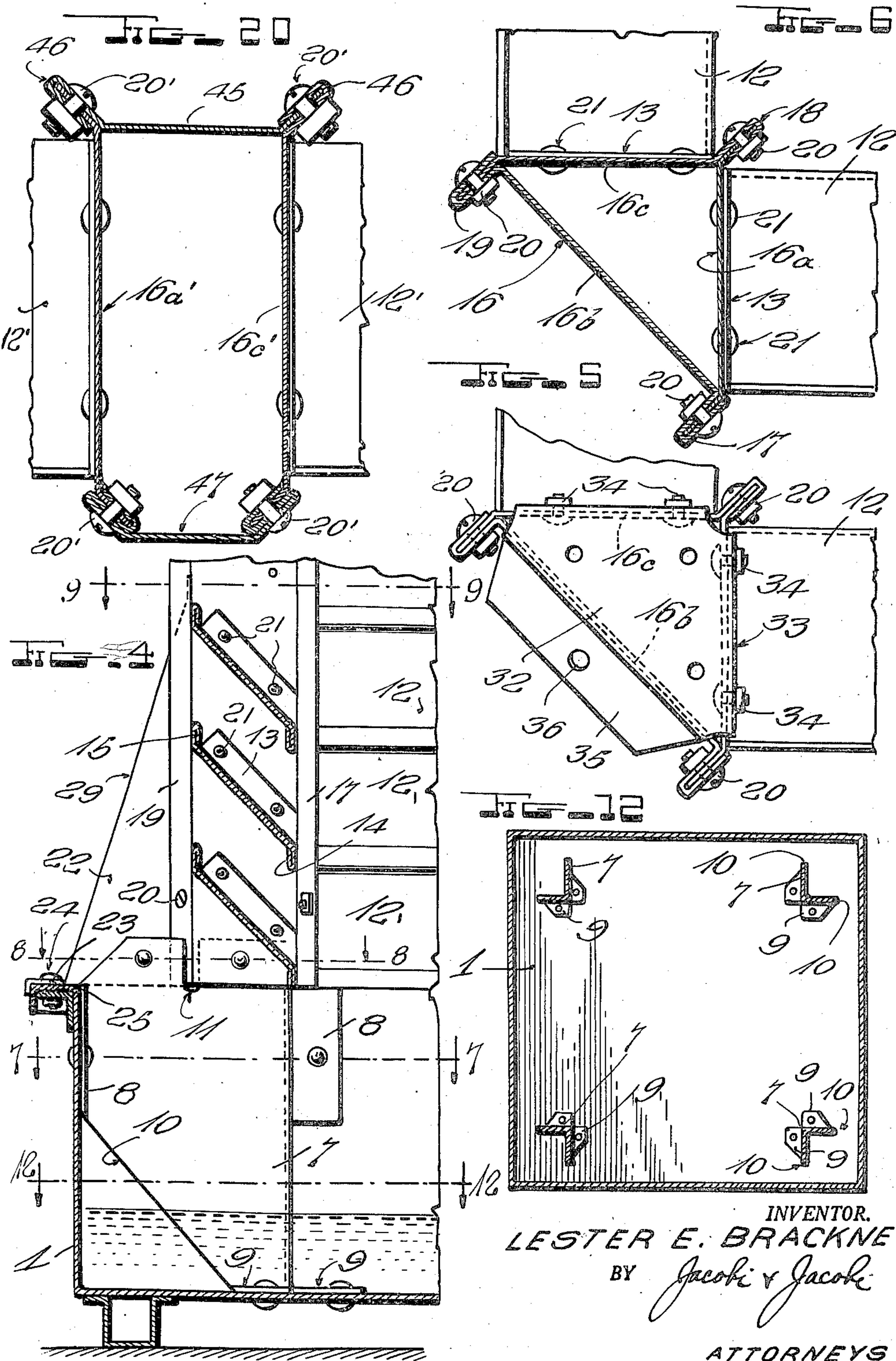
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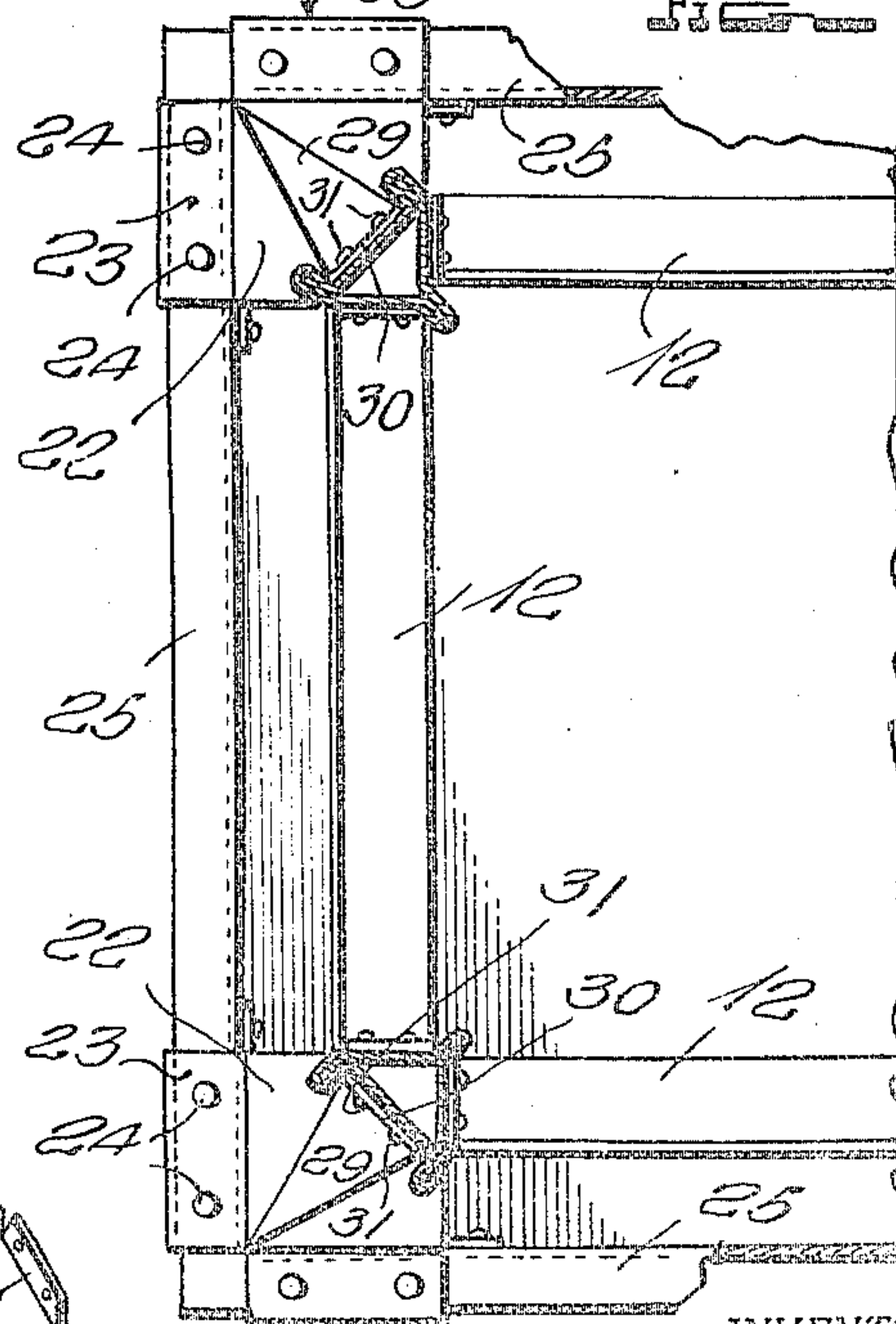
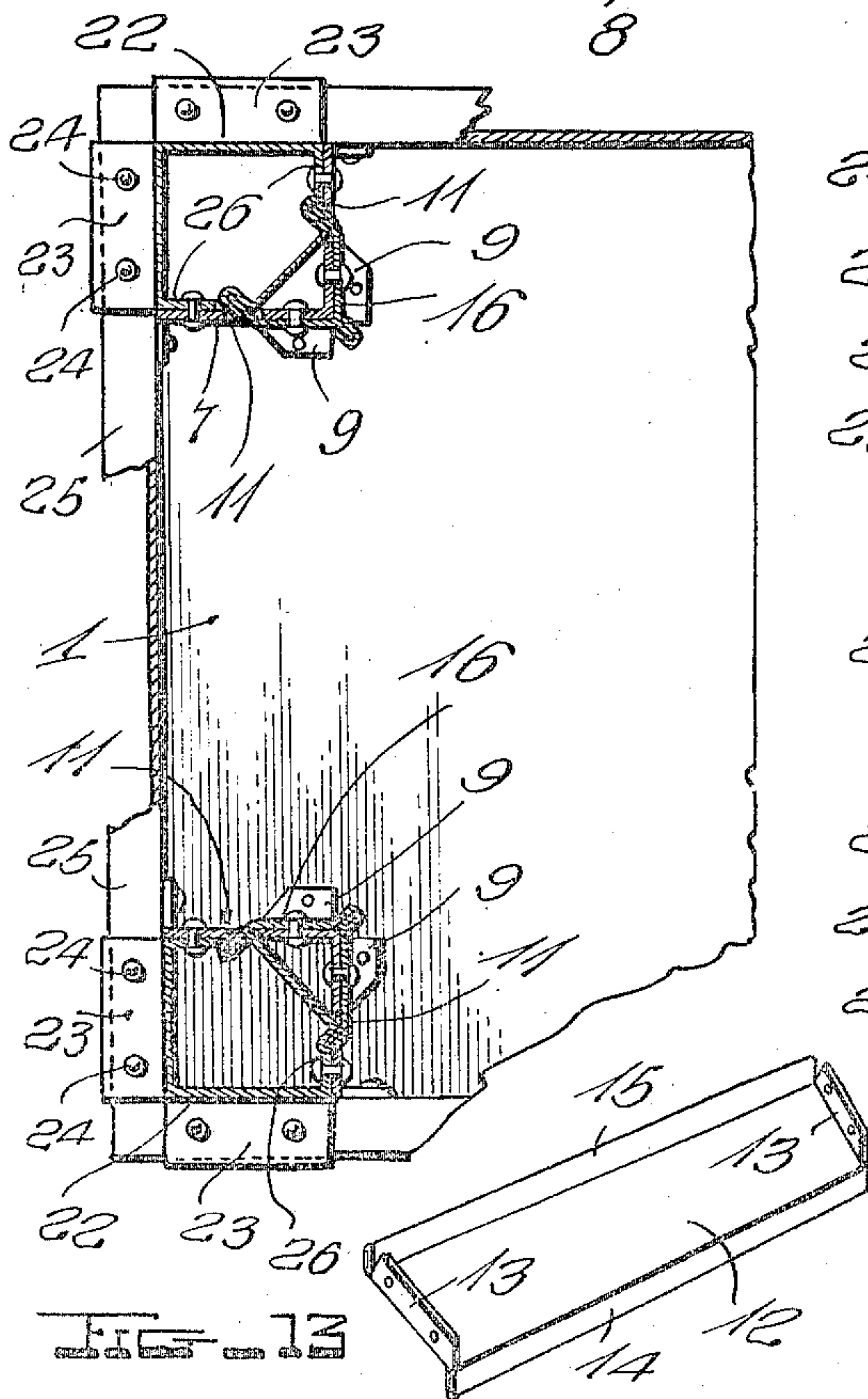
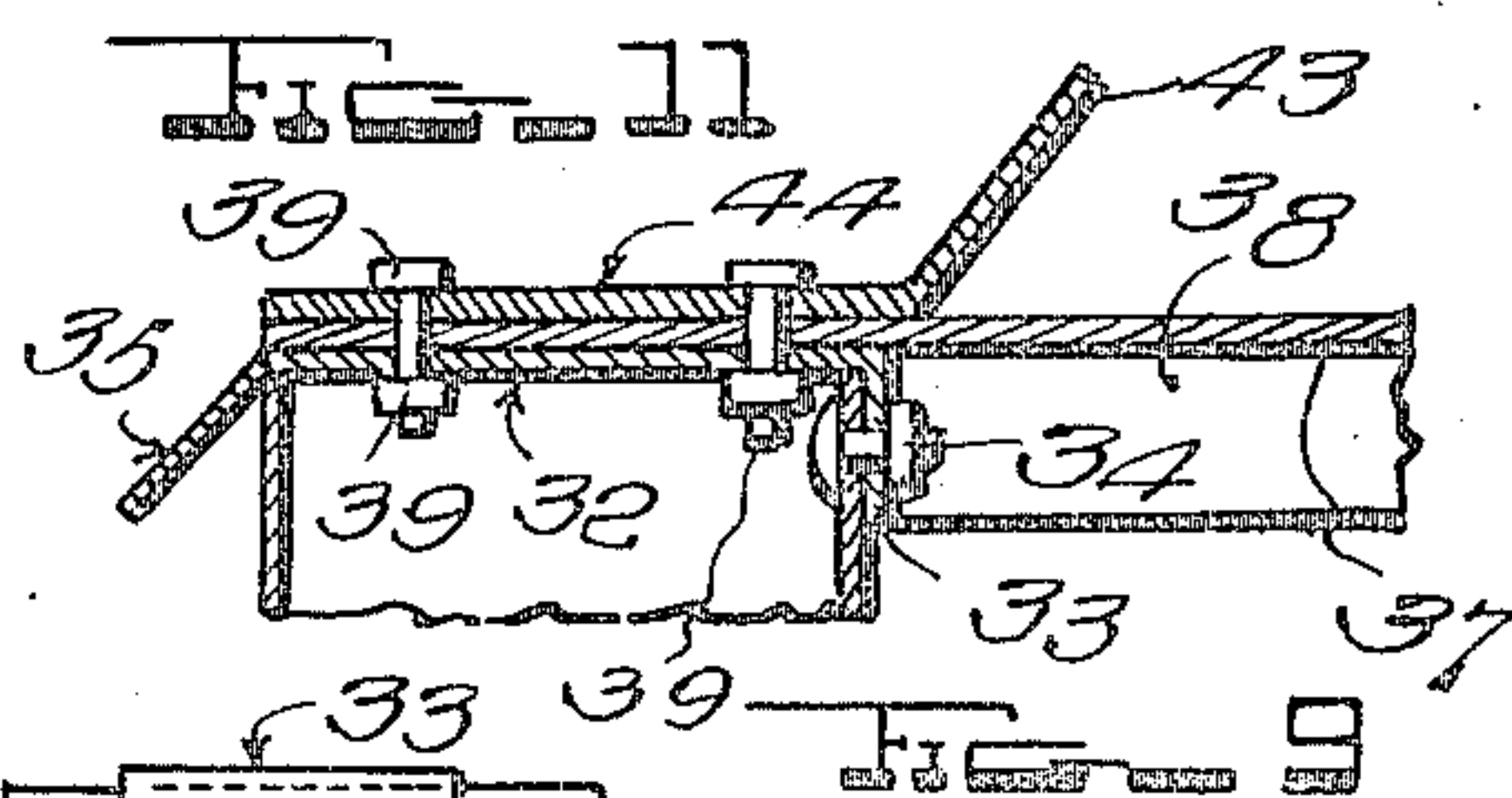
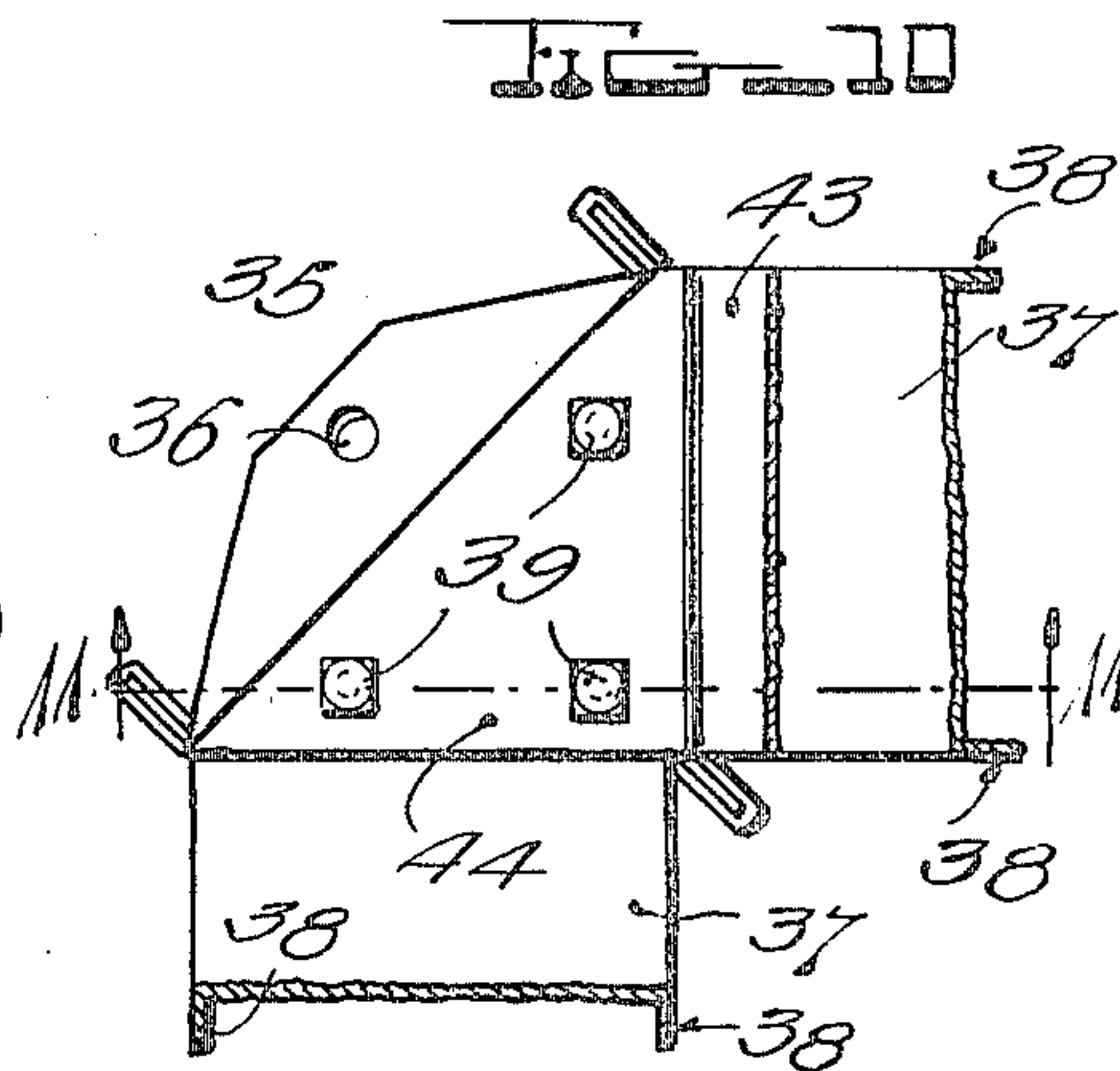
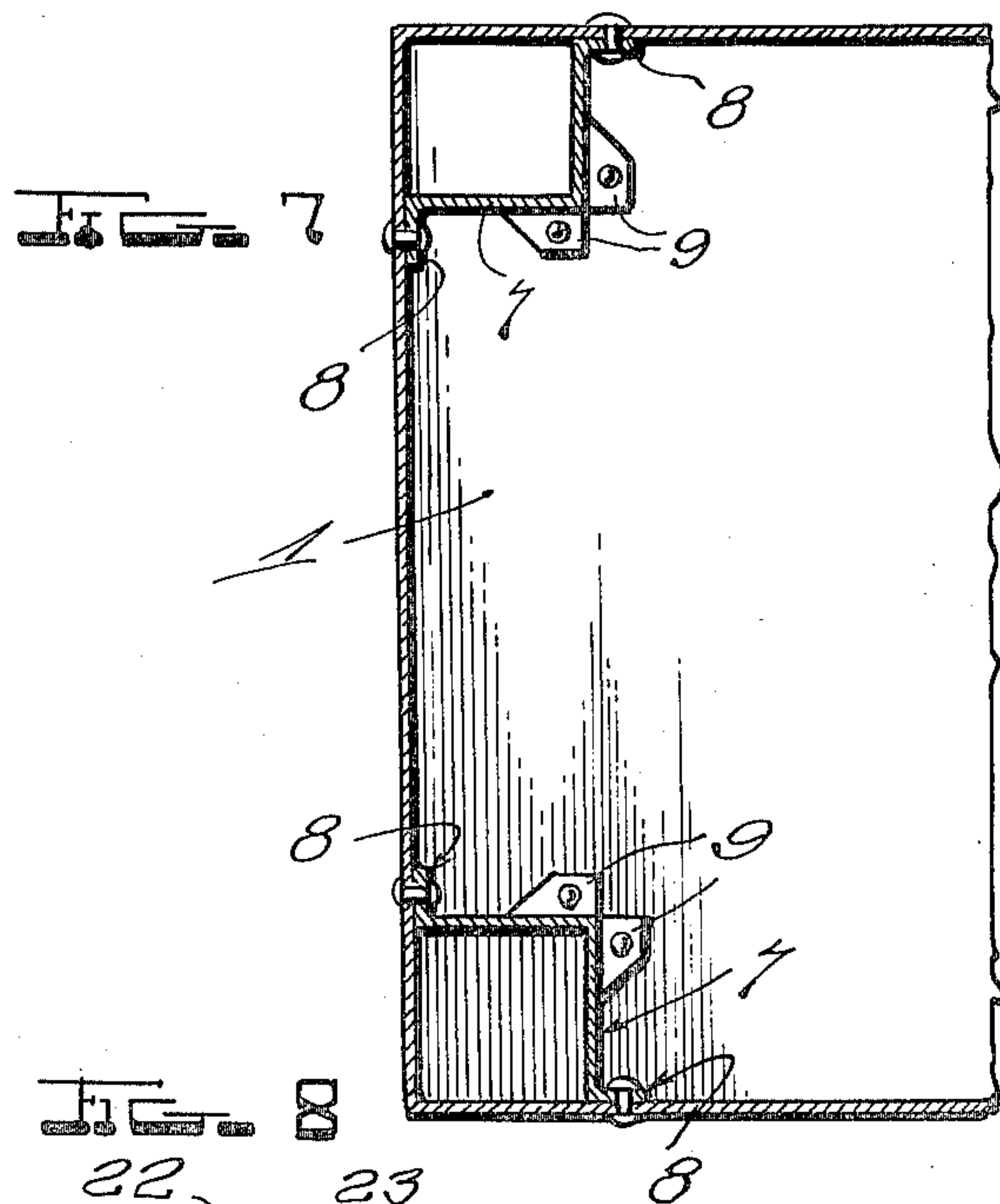
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4 Sheets-Sheet 3



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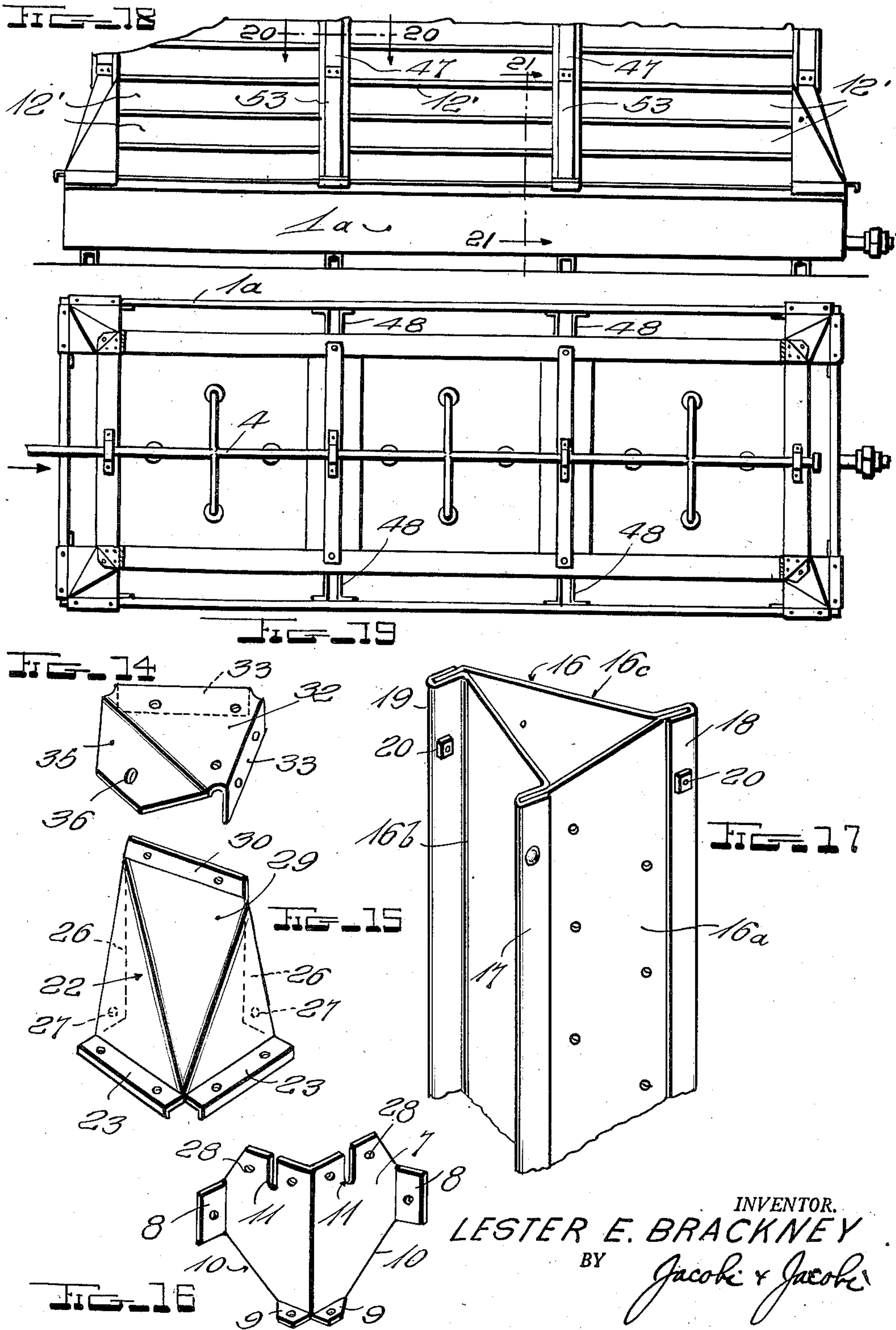
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4 Sheets-Sheet 4



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## UNITED STATES PATENT OFFICE

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## WATER-COOLING TOWER

Lester E. Brackney, Baton Rouge, La.

Application June 16, 1947, Serial No. 754,860

3 Claims. (Cl. 261—108)

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My invention relates to new and useful improvements in cooling towers, and more particularly to a cooling tower for use in connection with air conditioning apparatus, refrigeration, Diesel engines, or in other connections where the use of circulation of water is desirable, and the primary object of the invention is to provide a device of this character which is formed of parts which may be quickly and readily assembled or disassembled and which may be made in mass production so that parts are available for replacement at all times.

A further object of the invention resides in the production of an improved corner post for the support of a plurality of louvers.

Still another object resides in the provision of an improved anchoring means for the corner posts in a tank.

A still further object of the invention resides in the provision of an improved cap construction applicable to the upper end of the corner post to give rigidity thereto and also form an anchoring means for a guy-wire.

A further object resides in the provision of a device of the character mentioned which is comparatively simple and durable in construction, inexpensive to manufacture and one which will prove very efficient and useful in operation.

With these and numerous other objects in view, my invention consists of the novel features of construction, combination and arrangement of parts as will be hereinafter referred to and more particularly pointed out in the specification and claims.

In the accompanying drawings, forming a part of this application,

Figure 1 is a side elevation of a cooling tower constructed in accordance with my invention;

Figure 2 is a top plan view thereof, with the roof construction removed;

Figure 3 is a vertical transverse section there-through as seen on the line 3—3 of Figure 2;

Figure 4 is a fragmentary vertical section as seen on the line 4—4 of Figure 2, taken on an enlarged scale;

Figure 5 is a fragmentary plan view showing the corner posts with the cap in place thereon;

Figure 6 is an enlarged fragmentary horizontal section as seen on the line 6—6 of Figure 1, showing more particularly the construction of the corner posts;

Figure 7 is a horizontal section through the tank, as seen on line 7—7 of Figure 4;

Figure 8 is a similar view, taken substantially on the line 8—8 of Figure 4 and showing more particularly the mounting of the lower end of

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the corner posts in the supporting brackets in the tank;

Figure 9 is a fragmentary horizontal section as seen on the line 9—9 of Figure 4;

5 Figure 10 is a plan view disclosing the cap and the roof supporting bracket, partly in section, applied to the upper end of the corner posts;

Figure 11 is a detailed transverse section there-through, as seen on the line 11—11 of Figure 10;

10 Figure 12 is a horizontal section as seen on the line 12—12 of Figure 4;

Figure 13 is a perspective view of one of the louvers removed;

15 Figure 14 is a perspective view of one of the cap members removed;

Figure 15 is a similar view of one of the supporting brackets for the corner posts removed;

Figure 16 is a similar view of one of the posts anchoring brackets removed;

20 Figure 17 is a fragmentary perspective view of one of the corner posts removed;

Figure 18 is a fragmentary side elevation of a slight modification of the invention wherein a multiplicity of cooling tower units are shown;

25 Figure 19 is a plan view thereof with parts of the roof removed and parts in section;

Figure 20 is a horizontal section as seen on the line 20—20 of Figure 18;

30 Figure 21 is a vertical section as seen on the line 21—21 of Figure 18; and

Figure 22 is a fragmentary perspective view, partly in section, showing the bottom support for center posts in the form shown in Figure 18.

35 In describing the invention, I shall refer to the drawings in which similar reference characters designate corresponding parts throughout the several views and in which the numeral 1

designates a tank of substantially rectangular design such as is usually provided in cooling towers of this character. As also customary, I

40 contemplate providing a construction in which corner posts are supported within the corners of the tank which posts support the conventional type of louvers and, of course, it is contemplated that water is sprayed over the louvers

and to be collected within the tank and then passed or circulated to the cooling apparatus in a structure. In the drawings, I have shown a

45 pump designated by the numeral 2 and operated by the motor 3 which causes water to be passed through the pipe or conduit 4 and sprayed downwardly through the nozzles 5. Water from the

50 tank 1 is conveyed to the cooling apparatus through the outlet pipe 6. As aforesaid, this is more or less conventional.

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In the present known cooling towers, considerable difficulty has been encountered therewith, due to improper construction, inadequate support or anchorage for the corner posts, insufficient bracing means between said corner posts and other deficiencies. My invention contemplates a construction which will overcome the difficulties heretofore encountered and which will, as aforementioned, permit of parts to be individually replaced when and if necessary and which is so constructed as to enable the entire apparatus to be disassembled for repair, when and if necessary. Furthermore, my invention contemplates the addition of various units so that the cooling tower may be constructed at its inception or at a later date to accommodate tanks of various sizes according to the capacity of the cooling apparatus with which it is connected.

In the corners of the tank 1, I provide anchoring brackets 7 which are substantially right angular in formation having the end wings or the like 8 formed thereon through the medium of which same may be bolted to the side walls of the tank, as shown in Figure 7 of the drawings, and also provided with the lower feet or the like 9 through the medium of which these brackets are bolted or otherwise secured to the base of the tank. The lower edges of these brackets 7 between the wings 8 and the feet 9 are cut away or offset to provide angular edges, as shown at 10. This permits the water within the tank 1 to circulate through these brackets. The angular faces of these brackets 7 are recessed or slotted at their upper ends as shown at 11, providing means for the introduction therein of portions of the corner posts to be hereinafter and more particularly described.

As heretofore mentioned, louvers are supported by corner posts and the louvers used in this device are more or less conventional, one being illustrated particularly in Figure 13 of the drawings which I have designated by the numeral 12. These louvers are formed of one piece of metal, the ends thereof being bent angularly, as shown at 13 to be secured between the posts. The side edges of the louvers are also bent angularly, one side edge being directed downwardly as shown at 14 and the other upwardly as shown at 15, this being for strengthening purposes. In a single unit tower, such as illustrated in the preferred form of my invention herein, four corner posts are utilized to support louvers such as that designated by the numeral 12. The construction of the corner posts constitutes an essential feature of my invention.

For convenience, I have designated my corner posts by the numeral 16 and each corner post comprises three strips or plates designated by the numerals 16a, 16b and 16c. The strip 16a has its side edges set in opposite directions at angles of 45° and these side edges are fitted between the looped side edges 17 and 18, respectively, of the strips 16b and 16c. The opposite side edge of the strip 16c is also bent angularly at approximately 45° and fits into a looped side edge 19 of the strip 16b. Thus, it will be seen that the plates 16a, 16b and 16c are more or less interlocked one with the other at their side edges and the interlocked side edges are bolted together as shown at 20 so that each corner post forms substantially a right triangle with a center rib or the like projecting inwardly and a pair of ribs or the like extending outwardly, the latter two ribs being parallel. These latter ribs which are best represented by the numerals 17 and 19 are adapted, when positioning the corner posts in

place, to be received in the vertical recesses or slots 11 of the anchor brackets 7 in the tank, as heretofore described. The anchoring of the corner posts in the anchor brackets 7 is best illustrated in Figure 8 of the drawings wherein the ribs of the corner posts are shown clearly anchored within the slots or recesses 11 of said anchoring brackets.

In the single unit cooling tower as shown in Figures 1 and 3, four corner posts support therebetween four series of louvers, the end flanges 13 of the louvers 12 being riveted as shown at 21 to the walls or plates 16a and 16c of said corner posts.

As best illustrated in Figure 4 of the drawings, the upper end of the corner posts anchoring bracket 7, when riveted or otherwise secured in place in the tank 1, extends slightly above the upper edge of said tank, permitting the lower ends of the projecting ribs 17 and 19 of the corner posts to fit therein. Thus, the corner posts are substantially supported at their lower ends on the same horizontal plane with the upper edge of said tank. I have found it desirable, therefore, to provide a support for the lower end of the corner posts and to this end I have provided the posts supporting brackets 22. These posts supporting brackets are angular in cross section and the lower edges thereof are provided with the horizontal flanges 23 which rest upon and are bolted, as shown at 24, to flanges 25 projecting outwardly from the upper edge of the tank 1. The side edges of the walls of the brackets 22 are provided with the angular bent wings 26, the lower ends of which are bolted to the upper ends of the walls of the anchoring bracket 7. Openings 27 in the wings 26 are adapted to register with the openings 28 in the brackets 7 for the bolting of the brackets 22 to the latter.

The outer face of the supporting bracket 22 is beveled or inclined inwardly from the face toward the upper end as shown at 29 and the upper edge of said face 29 is angularly bent to form the vertical flange 30 which is bolted, as shown at 31, to the lower end of the plate or wall 16b of the corner posts. It will thus be seen that while the lower end of the corner post is anchored to the plate 7, each corner post is also securely supported externally of the tank by means of these supports 22. Thus, a rigid support for each post at its face is provided.

I have also provided means for rigidly supporting the posts at their upper ends and secure the same against torsional movement. To this end, I provide for each corner post a cap member 32 which is substantially triangular in design, two side edges of which have depending right angular flanges 33 formed thereon, which are bolted, as shown at 34, to the upper ends of the faces or walls 16a and 16c of each corner post. The other side edge of the cap 32 is provided or formed with an angularly bent flange 35, extending downwardly at substantially a 45° angle, this latter flange having an opening 36 therein through the medium of which the cap may be anchored by guy-wires (not shown) to a stationary support.

In order to further support the upper ends of the corner bars one to the other, I provide the bracing strips 37, the side edges of which are bent downwardly as shown at 38 for strengthening purposes. These reinforcing strips 37 are bolted at their ends to the caps 32 as shown at 39, the ends of said strips being overlapped. It will be seen through this medium that upper ends of the corner posts will be securely held in upright po-



sition against casual dismovement or displacement.

In order to protect the device against the heat of the sun, so that the water passing through the tower will not be unduly heated, and also for ornamental purposes, I provide a roof structure for the device. This roof structure comprises a top element 40 which is supported by straps 41 in spaced relation above a lower element 42 which is relatively larger in diameter than the element 40. The member 42 is supported on looped bracket arms 43 which arms are inclined outwardly and terminate in flat horizontal extensions 44 which are bolted to the top face of the reinforcing strip 37 by the same means 39 as secure said strips 37 to the cap members 32. In this manner, it will be seen that the roof structure is securely supported in place by the same means as secures the upper reinforcing structure for the corner posts for the device. The space between the two elements 40 and 42 allows the air to pass freely therebetween, as clearly shown in Figure 3 of the drawings.

As heretofore described, the water from the pump passing through the pipe 4 is sprayed to the louvers 12 through the spray nozzles 5. As shown in Figures 2 and 3 of the drawings, the upper end of the pipe 4 is supported in position over the device by means of the straps 44 secured to the reinforcing strips 37.

In Figures 18 to 22, inclusive, I have shown a slightly modified form of the invention to apply to what may be considered a multiply unit cooling tower. The capacity of the cooling apparatus, of course, determines the size of the cooling tower and whereas the preferred form of the invention shows a single unit tower, I have provided in this modified form for the multiply unit tower.

In this connection, the tank 1a is shown of a size substantially three times that of the preferred form meaning that a triple unit tower is necessary. In such a device, of course, there will still be four corner posts anchored and supported in the same manner as heretofore described in connection with the preferred form. Primarily, the difference resides in the securing of the units or elements together intermediate the corners of the device. In this modified form of the invention, the louvers 12' are secured in place to the corner posts in the same manner described heretofore. Likewise, the same are secured to intermediate posts in the same manner. However, the difference in this modified form over the preferred form resides primarily in the method and means for securing the units together intermediate of the corner posts.

It may be here stated that in building up these units, the louvers are secured to strips, such as 16a and 16c, which constitute elements of the corner posts heretofore described. I utilize this same principle in multiplying the units to form a multiply cooling tower, such as provided in this modified form. Therefore, the intermediate supporting posts, as best illustrated in Figure 20 of the drawings, discloses the louvers 12' in one unit secured to a strip or panel 16a', the latter being the same as the strip or panel 16a of the corner posts heretofore described in the preferred form. The complementary or adjacent unit or section has its louvers 12' secured to a strip or panel 16c' which corresponds to the panel or strip 16c of the corner posts heretofore described in the preferred form. These panels 16a' and 16c' are connected at the one end by a connecting end

strip 45, one end of which is looped as shown at 46 around the extending free or flat end of the panel 16a' and the opposite end of which is straight and fits between the loop of the strip or panel 16c'. The opposite side edges of these panels 16a' and 16c' are connected with an end strip 47, the side edges of which are both looped to receive therein the angularly bent edges of said panels or strips 16a' and 16c'. The interlocking ends of these panels and end strips are bolted together as shown at 20'. Thus, it will be seen that two units may be secured together, each unit, however, utilizing the same end strip or panel that is ordinarily used in setting up the unit for use in a single unit tower.

I have provided in the tank a means for support of the lower ends of the intermediate supporting bars or posts, as shown in Figures 21 and 22 of the drawings. A supporting bracket 48 is provided formed of a single piece of metal having the feet 49 bolted to the base of the tank and the wings 50 bolted to the side wall of the tank. The bracket is provided at its upper ends with slots 51 into which are inserted the lower ends of the posts at the points where the strips 16a and 16c are bent angularly at their edges and connect with the end strip 47. It will be seen, therefore, that the intermediate louver supports have a secure anchorage at their lower ends. These anchoring brackets 48 are also offset or cut away angularly, as shown at 52, to permit the free passage of water therethrough. To further support the intermediate posts, the external supporting brackets 53 are bolted to the strip or plates 47 at their upper ends and rest on the flange of the tank to which they are also bolted. Thus, an external supporting means is provided as well as an anchorage for the intermediate posts of the multiply unit cooling tower. Otherwise, this modified form of the invention is the same as the preferred form heretofore described.

From the foregoing description of the construction of my improved cooling tower, the method of assembly and the application to use thereof will be readily understood and it will be seen that I have provided a comparatively simple, inexpensive and efficient means for carrying out the various objects of the invention.

While I have particularly described the elements best adapted to perform the functions set forth, it is apparent that various changes in form, proportion and in the minor details of construction may be resorted to without departing from the spirit or sacrificing any of the principles of the invention.

Having thus described my invention, what I claim is:

1. In a cooling tower of the class described, a tank, corner posts having ribs formed thereon, louvers connecting pairs of posts, angular brackets secured within said tank at the corners thereof and having portions projecting above the upper edges of said tank, said projecting portions of the brackets having slots therein adapted to receive therethrough the ribs of said corner posts to anchor the latter in position with respect to said tank, and external supporting elements mounted on said tank at the corners thereof and connected with the posts and their respective anchoring means.

2. In a cooling tower of the class described, a tank, corner posts, louvers connecting pairs of posts, anchoring means for the respective posts mounted within the tank at the corners thereof, external base supports for said posts mounted on



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said tank at the corners thereof and having connection with said posts and their respective anchoring means, cap members secured to the upper ends of said posts having means thereon for connection with guy-wires, and upper supporting means for said posts comprising strips extending between pairs of posts and connected to the latter through the same means securing said cap members thereto.

3. In a cooling tower of the class described, a tank, a louver-supporting post formed from a plurality of strips having the side edges thereof interlocked one with the other to form a hollow member, an anchoring means comprising an angular bracket secured within said tank and having portions thereof projecting above the upper edges of said tank, said projecting portions of the bracket being slotted downwardly from the upper edges thereof and adapted to receive therein the lower edges of the strips forming said posts, and an external supporting bracket secured to said tank and also secured to the post and the anchoring means therefor.

LESTER E. BRACKNEY.

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