United States Patent [19]

Furlong et al.

[11] **3,801,076**

[45] **Apr. 2, 1974**

[54] **CONCRETE COOLING TOWER**

[75] Inventors: **Donn B. Furlong**, San Rafael; **Harry W. Gobler**, Santa Rosa, both of Calif.; **Robert Grotheer**, Cincinnati, Ohio

[73] Assignee: **Ecodyne Corporation**, Chicago, Ill.

[22] Filed: **June 30, 1972**

[21] Appl. No.: **267,790**

[52] **U.S. Cl.** **261/111**, 261/DIG. 11

[51] **Int. Cl.** **B01f 3/04**, B01d 47/12

[58] **Field of Search** ..... 261/108, 109, 110, 111, 261/112, DIG. 11

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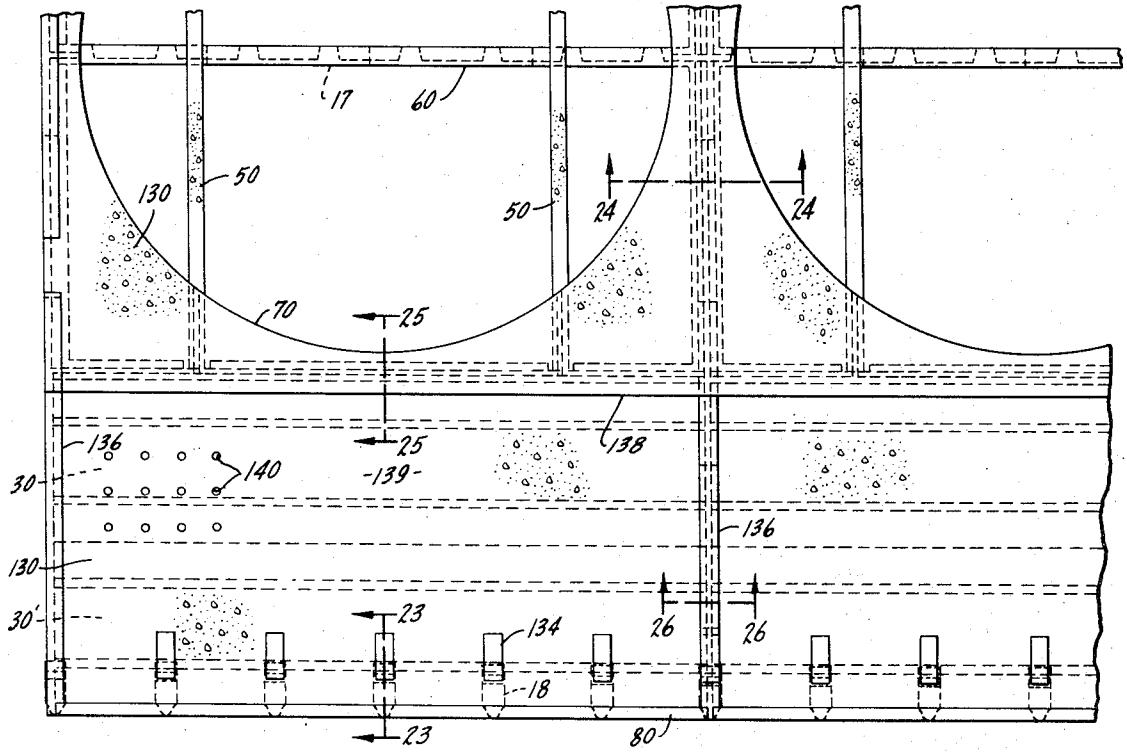
Primary Examiner—Francis S. Husar

Attorney, Agent, or Firm—Joel E. Siegel

[57] **ABSTRACT**

A top deck structure for use in combination with a concrete cooling tower. The top deck includes precast concrete "T" beams extending across the upper ends of the tower transverse wall sections. Precast ledger beams extend longitudinally across the upper ends of the transverse wall sections in a supporting relationship with the innermost longitudinal edges of the "T" beams. Precast concrete connector beams are supported on top of the longitudinal wall sections and a plurality of precast concrete keystone beams extend between the ledger beams associated with facing half cells. Precast fandeck panels are supported between the ledger beams and the connector beams above the keystone beams so as to define a fan stack opening therethrough. A concrete topping is poured-in-place above the "T" beams and fandeck panels in a manner defining a hot water basin thereabove.

13 Claims, 26 Drawing Figures



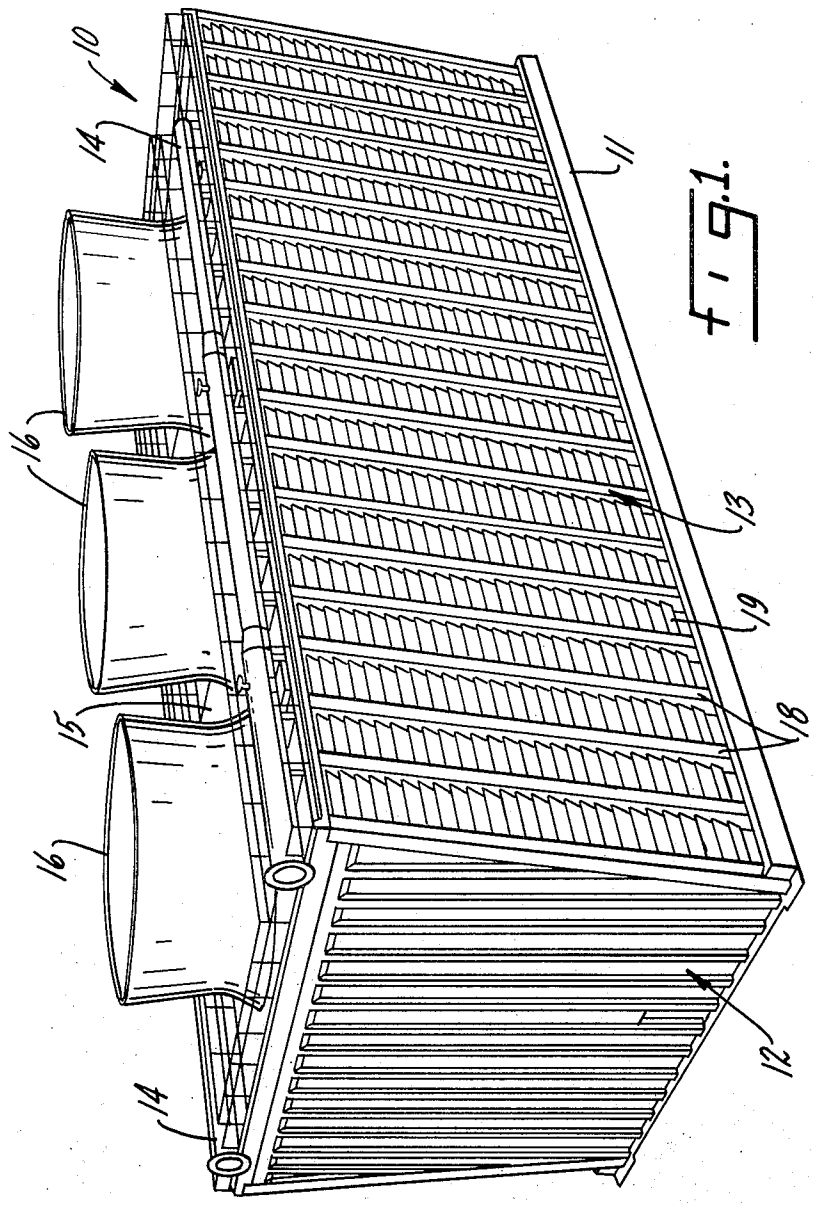
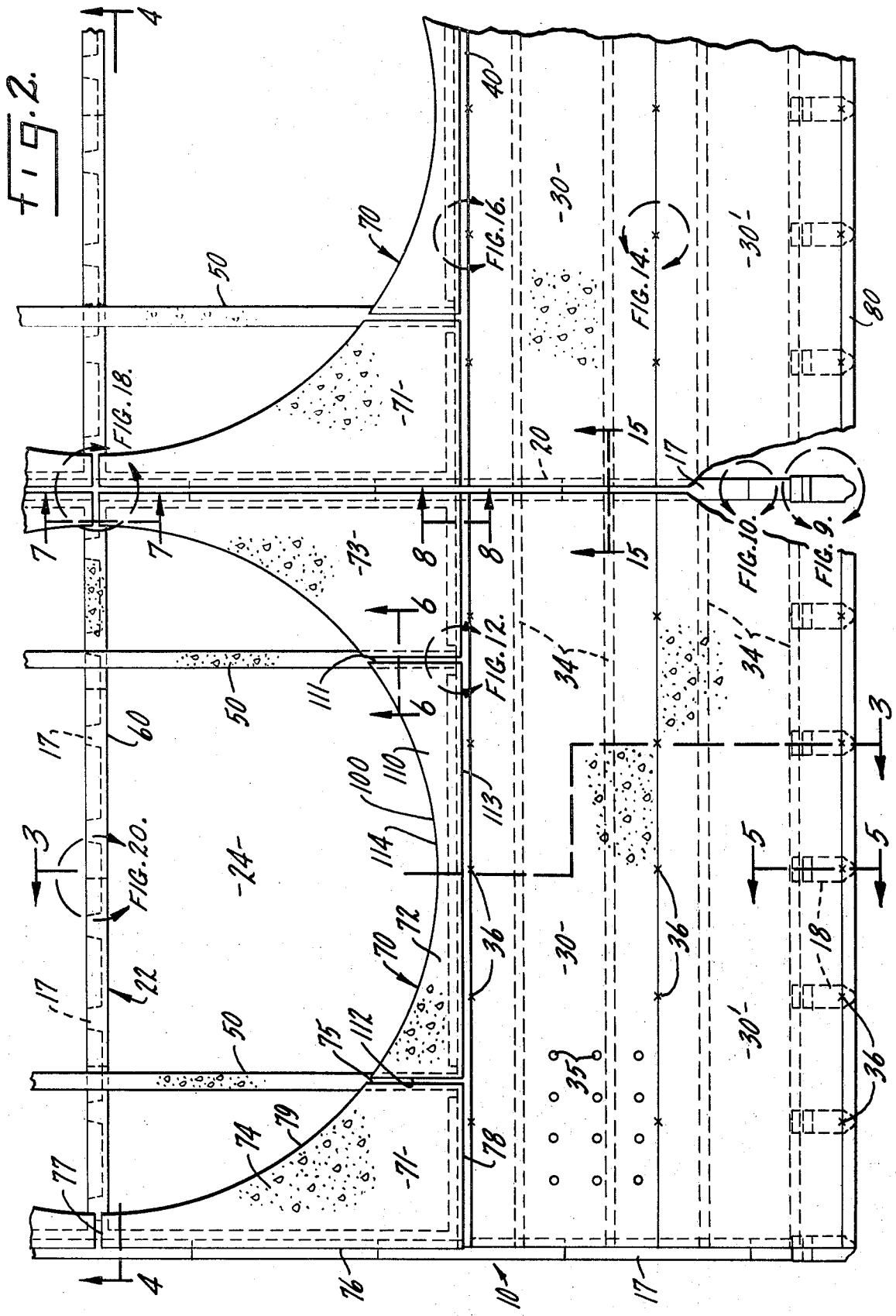


FIG. 1.

FIG. 2.


4
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70
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FIG. 16.
-30-
FIG. 14.
-30'
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FIG. 18.
-71-
-20
15
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7
7
8
8
-73-
15
FIG. 10.
FIG. 9.
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FIG. 12.
34'
34'
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100
110
113
114
3
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FIG. 20.
-24-
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-18-
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-30-
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-30'
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-71-
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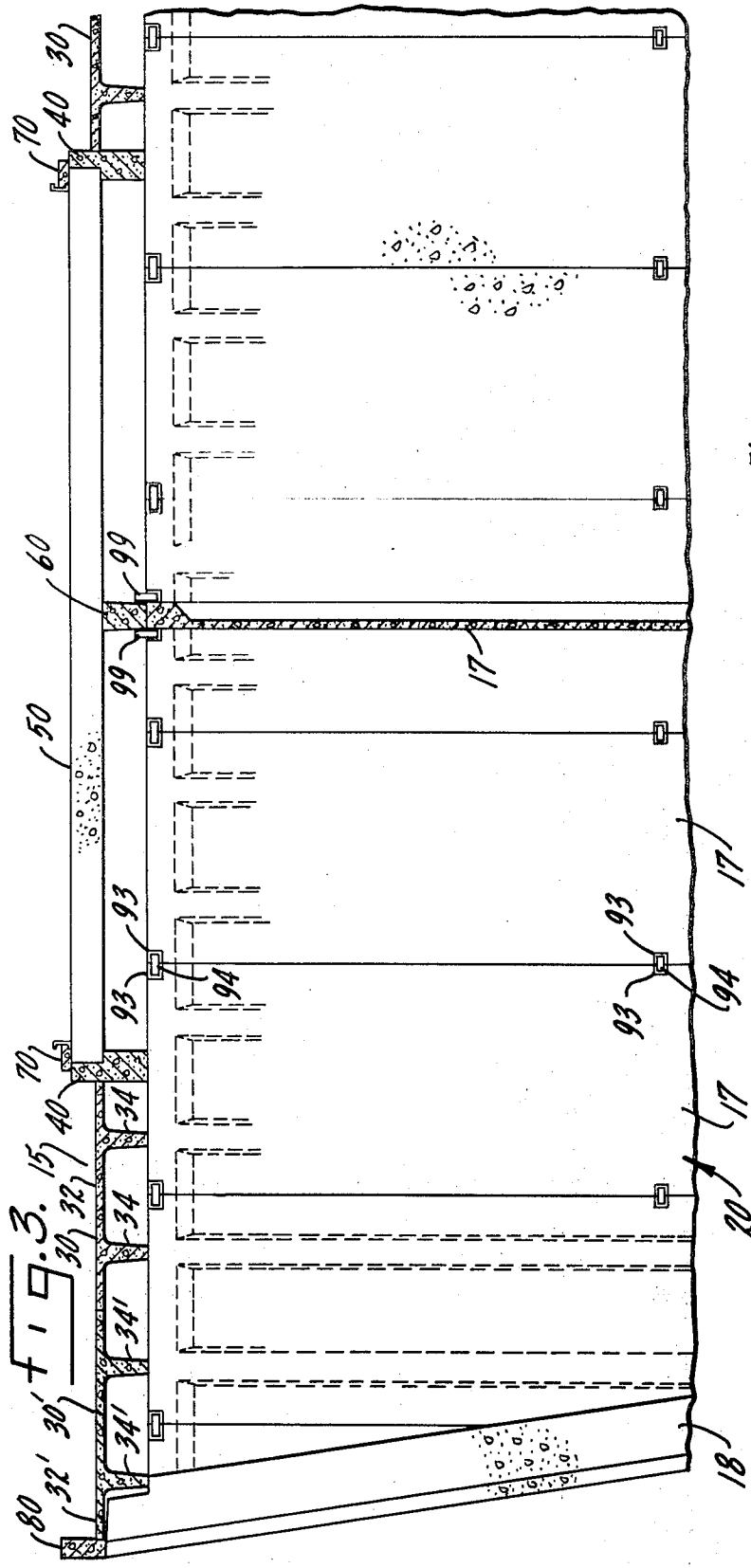
30
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34'
30'
32'
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20
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FIG. 3.

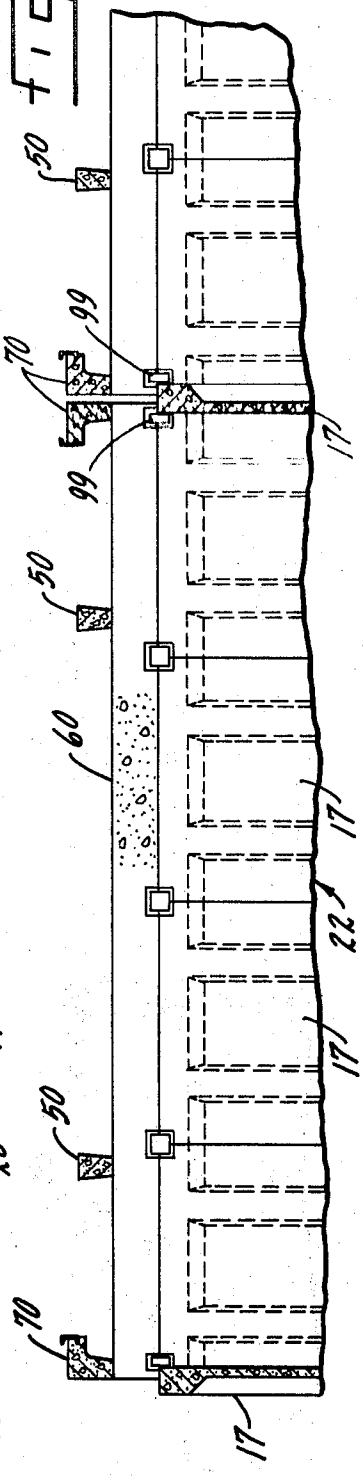
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FIG. 4.

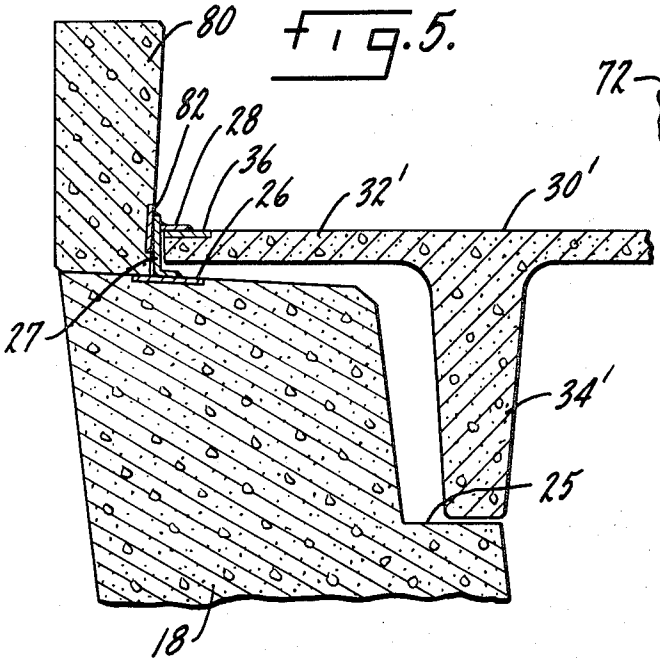


Fig. 5.

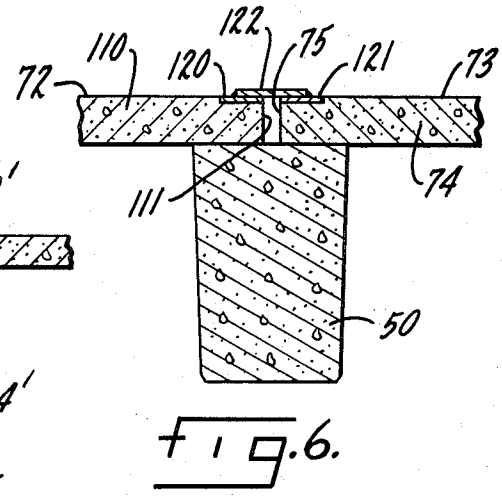


Fig. 6.

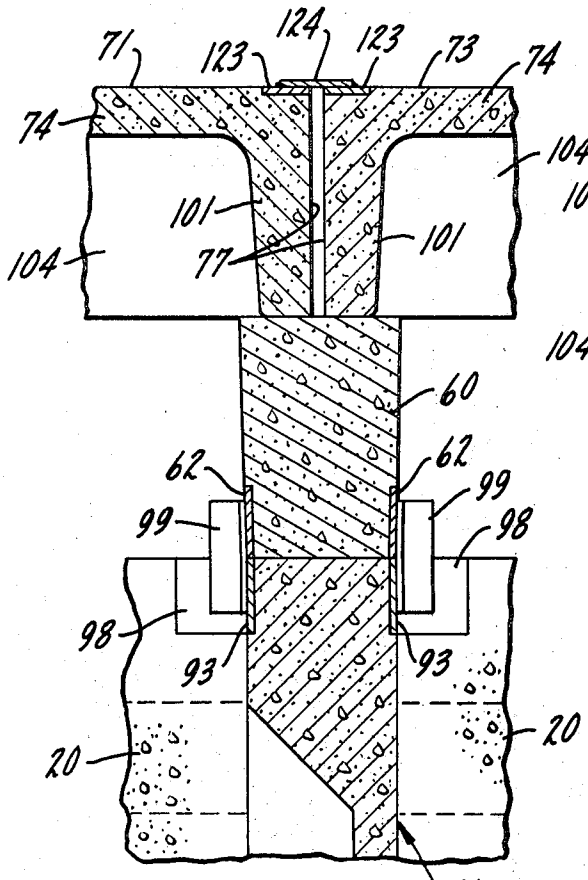


Fig. 7.

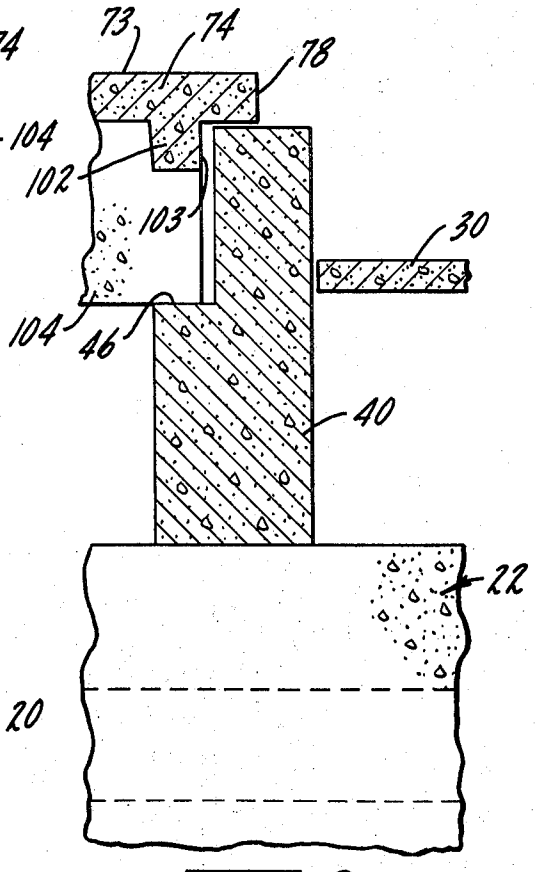


Fig. 8.

Fig. 9.

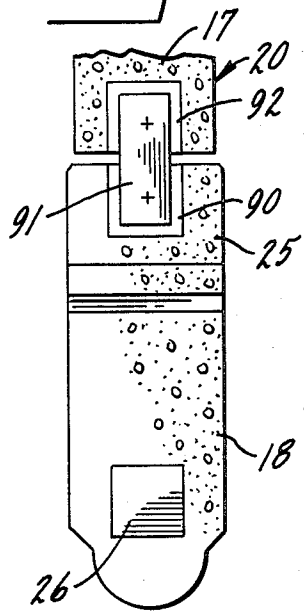


Fig. 10.

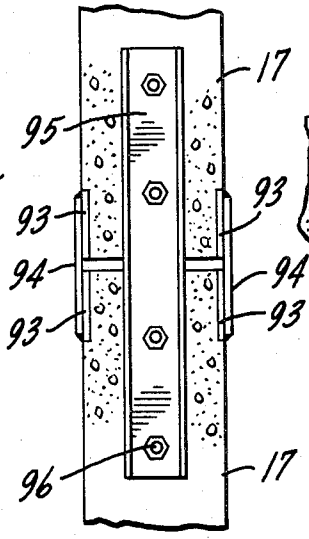
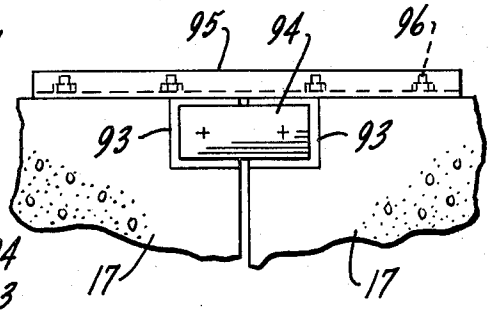


Fig. 11.



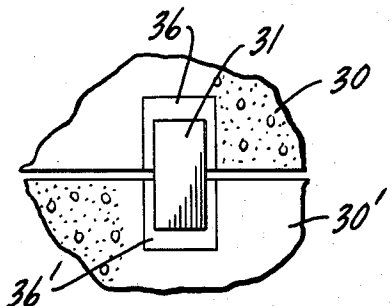


Fig. 14.

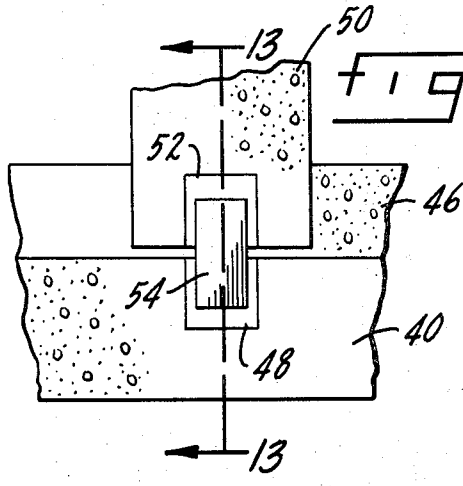


Fig. 12.

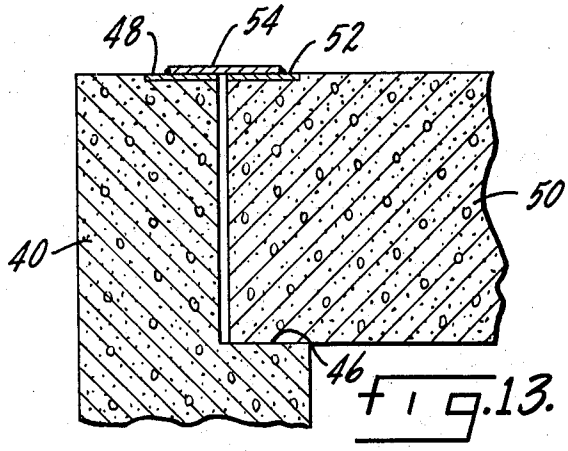


Fig. 13.

Fig. 15.

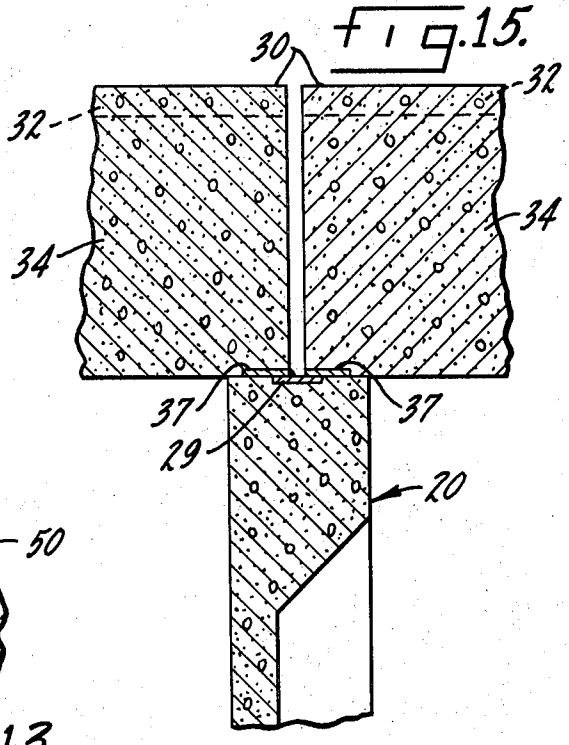


FIG. 16.

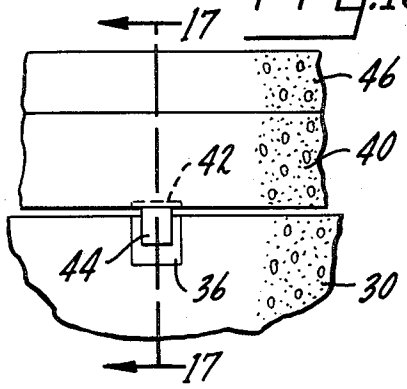


FIG. 18.

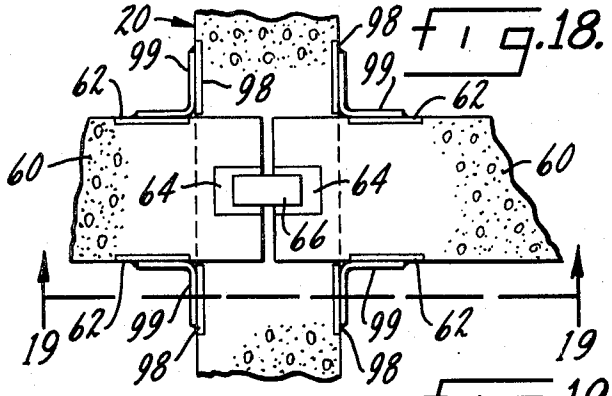


FIG. 19.

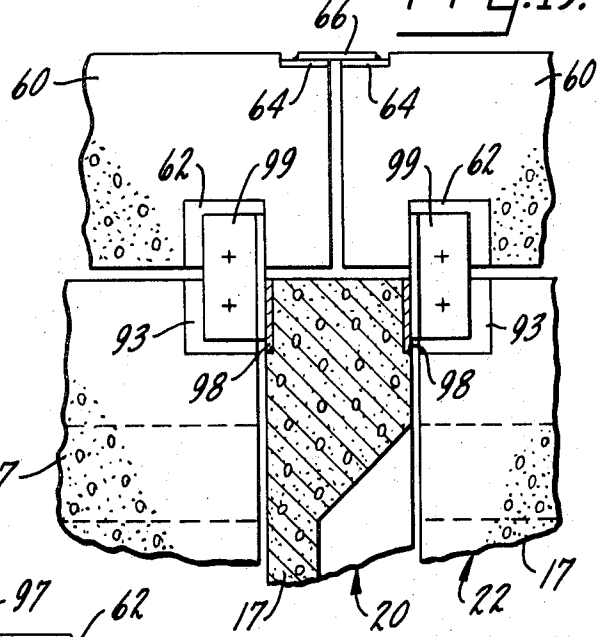


FIG. 17.

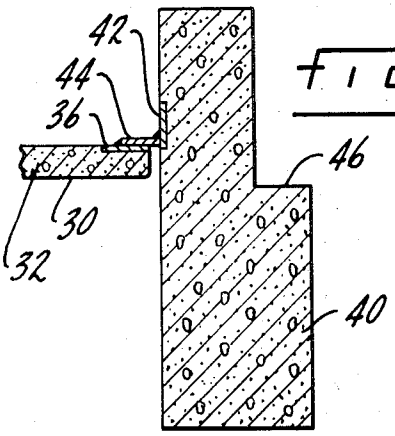


FIG. 20.

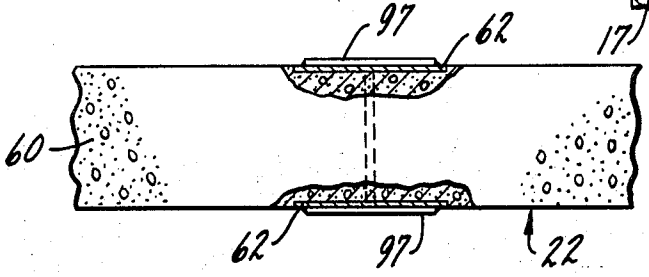


FIG. 21.

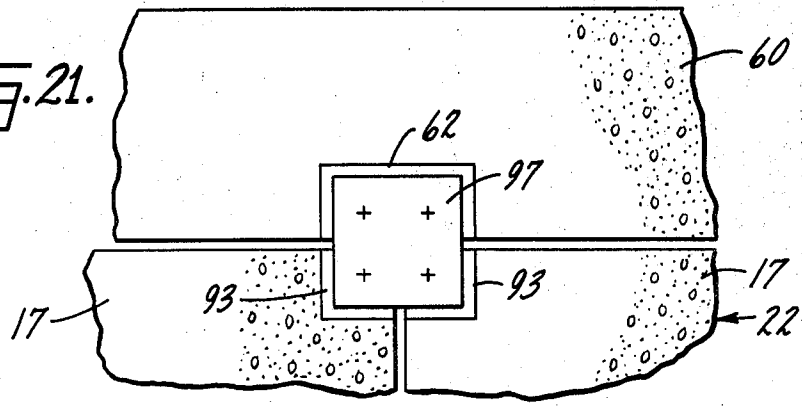
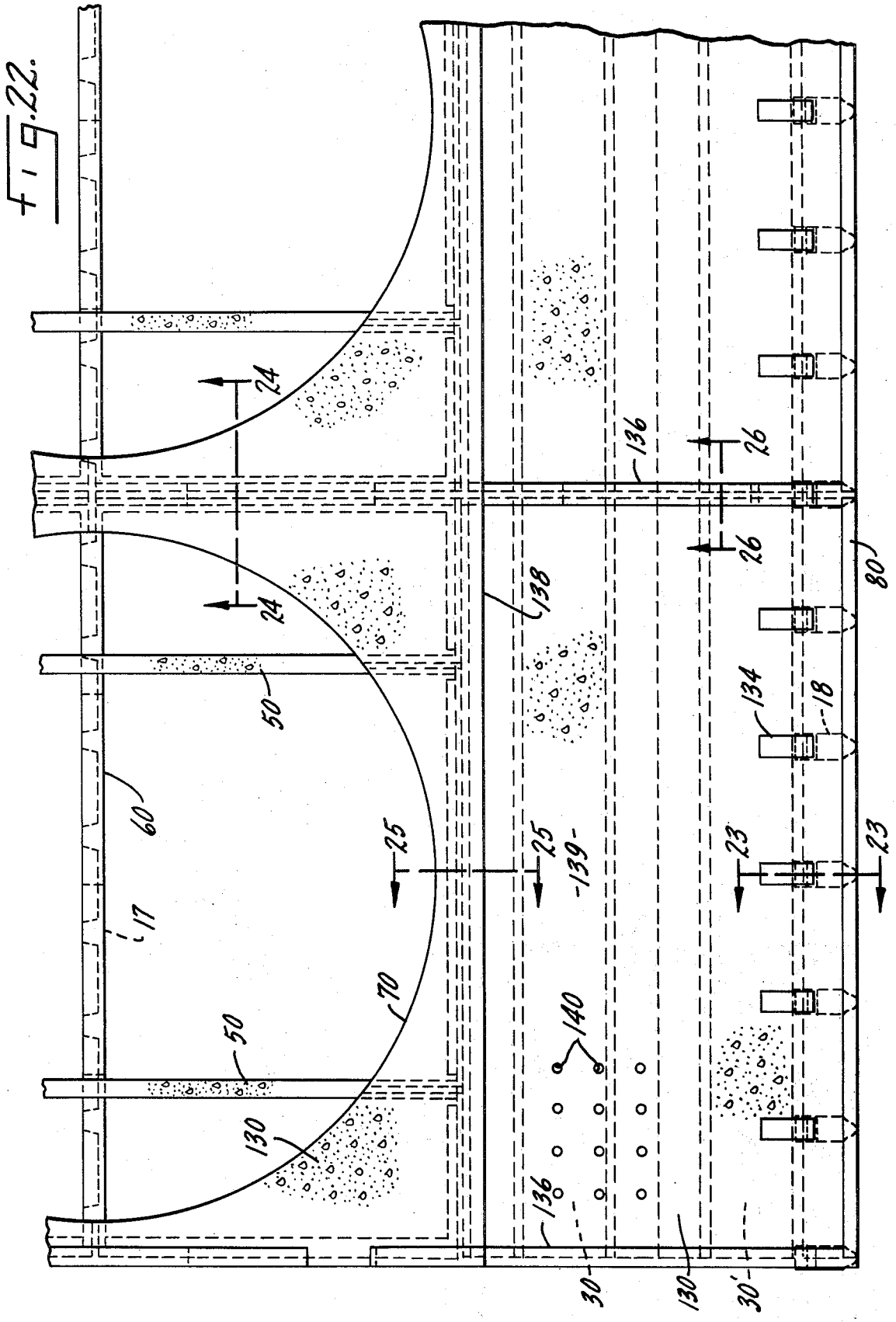


FIG. 22.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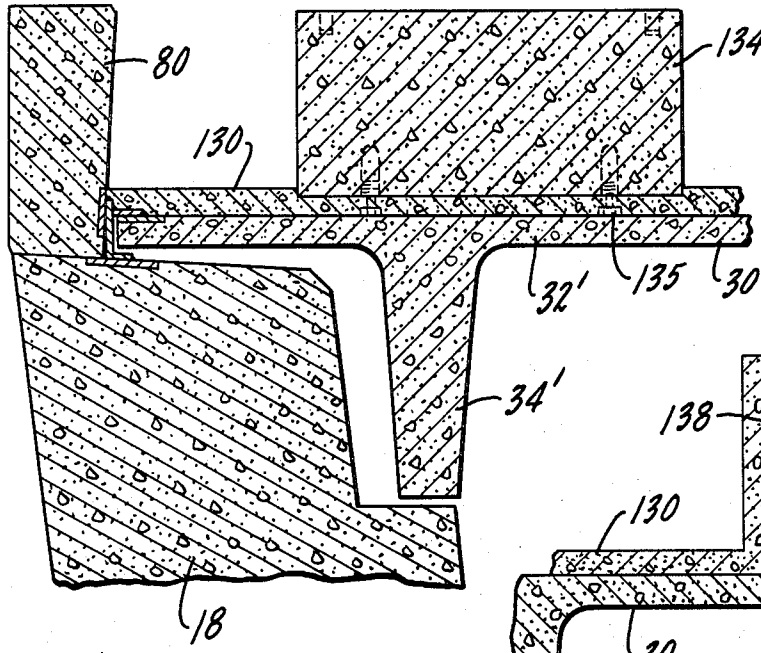
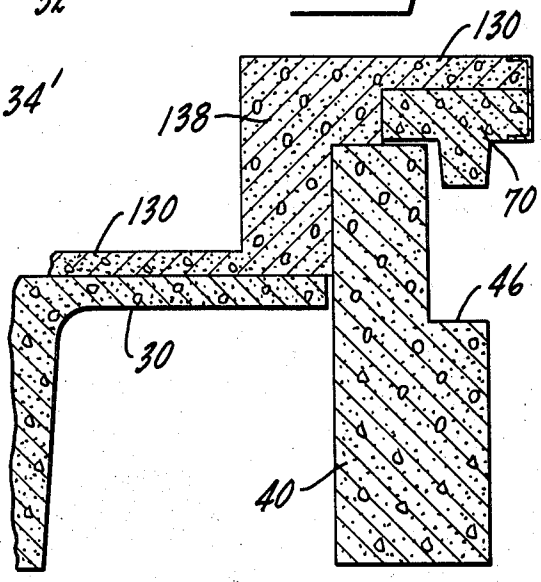


fig.23.

fig.25.



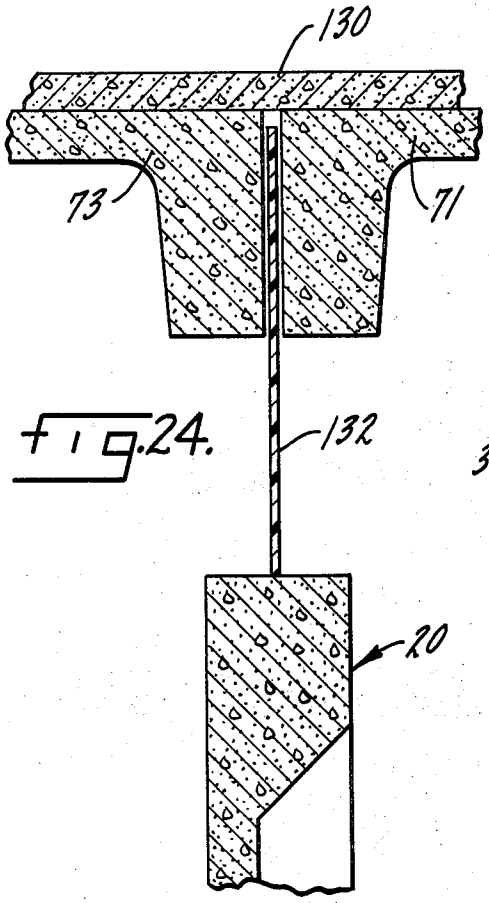


fig.24.

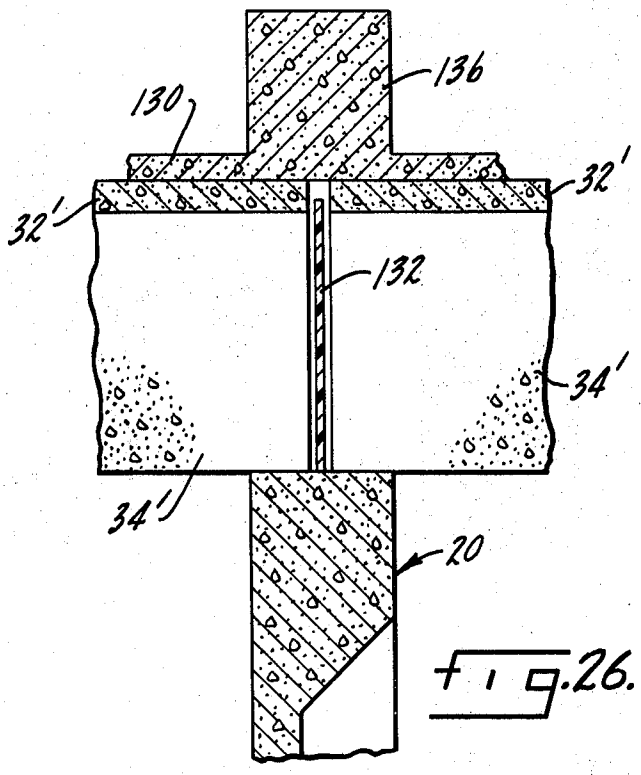


fig.26.

CONCRETE COOLING TOWER

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates generally to the construction of cooling towers, and more partucularly to the construction of an improved top deck structure for use in conjunction with a concrete cooling tower shell design of the type disclosed in U.S. Pat. Application No. 232,830, assigned to the same assignee as the present invention.

The advantages of concrete construction of a cooling tower instead of wood are apparent, primarily due to the increased life of the structure since the concrete structure will not deteriorate as does wood by rotting. Further, the need for an expensive sprinkler system is eliminated and insurance premiums cost less. While cooling towers have heretofore been made of prefabricated concrete parts, these towers have not been able to economically compete with the conventional wooden towers. The heretofore known concrete tower designs have either utilized numerous small light weight precast building elements, facilitating handling but requiring many time consuming steps to erect, or have utilized large cast-in-place elements which have significantly increased the cost of the tower.

The concrete cooling tower disclosed in U.S. Patent Application Ser. No. 232,830 discloses a tower constructed entirely of concrete, metal and plastic parts that is economically competitive with conventional wooden towers. This is accomplished by fabricating the tower from a minimum number of uniquely designed precast prestressed wall panels, "T" beams, and louver posts. These structural elements although relatively large in size, may be readily prefabricated and do not require a large amount of field work during errection because of the unique interrelationship between the elements. The wall panels and the louver posts are precast to the required length and tilted up into position above the tower foundation. The "T" beams are positioned above the louver posts and wall panels to form a portion of the tower top deck. The "T" beams have spray nozzle openings formed therein. Precast fan deck panels are provided above the wall panels adjacent the "T" beams to define a circular fan stack opening. A reinforced concrete topping is poured-in-place above the "T" beams and fan deck panels having curb portions integral therewith for defining a hot water distribution basin. The tower filling is supported from the "T" beams rendering unnecessary any internal structural support for the tower structure or fill assembly that would retard the movement of air and interfere with thermal performance.

The instant invention concerns itself with an improved top deck structure for defining the hot water basin and the fan stack opening of a concrete tower of the type disclosed immediately above. The primary object of the invention is to provide a concrete top deck structure that increases the use of precast concrete members and decreases the use of cast-in-place concrete so as to facilitate the erection thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings, in which like reference numerals designate like parts throughout the figures thereof and wherein:

FIG. 1 is a perspective view of a concrete cooling tower of the type which receives the top deck structure of the present invention;

FIG. 2 is a top plan view of a portion of the top deck structure constructed in accordance with the present invention prior to pouring the concrete topping;

FIG. 3 is a transverse sectional view taken along line 3—3 in FIG. 2;

FIG. 4 is a longitudinal sectional view taken along line 4—4 in FIG. 2;

FIG. 5 is a sectional view taken along line 5—5 in FIG. 2 showing the connection between the louver post, "T" beam, and spandrel beam;

FIG. 6 is a sectional view taken along line 6—6 in FIG. 2 showing the connection between the keystone beam and the fandeck panels;

FIG. 7 is a sectional view taken along line 7—7 in FIG. 2 showing the relationship and connection between the wall panels, connector beam and fandeck panels;

FIG. 8 is a sectional view taken along line 8—8 in FIG. 2 showing the relationship and connection between the wall panel, ledger beam, "T" beam, and fandeck panel;

FIG. 9 is an enlarged plan view of the area encircled by line 9 in FIG. 2 showing the connection between the louver post and the adjacent wall panel;

FIG. 10 is an enlarged plan view of the area encircled by line 10 in FIG. 2 showing the connection between adjacent wall panels;

FIG. 11 is an enlarged elevational view of the connection between the adjacent wall panels shown in FIG. 10;

FIG. 12 is an enlarged plan view of the area encircled by line 12 in FIG. 2 showing the connection between the ledger beam and the keystone beam;

FIG. 13 is a sectional view taken along line 13—13 in FIG. 12;

FIG. 14 is an enlarged plan view of the area encircled by line 14 in FIG. 2 showing the connection between transversely adjacent "T" beams;

FIG. 15 is a sectional view taken along line 15—15 in FIG. 2 showing the connection between the "T" beams of adjacent cells and the separating wall panel;

FIG. 16 is an enlarged plan view of the area encircled by line 16—16 in FIG. 2 showing the connection between the inside "T" beam and the ledger beam;

FIG. 17 is a sectional view taken along line 17—17 in FIG. 16;

FIG. 18 is an enlarged plan view of the area encircled by line 18 in FIG. 2 showing the interconnection between the transverse and longitudinal partition wall panels and the connector beams thereabove;

FIG. 19 is a sectional view taken along line 19—19 in FIG. 18;

FIG. 20 is an enlarged plan view of the area encircled by line 20 in FIG. 2 showing the connection between adjacent longitudinal wall panels;

FIG. 21 is an enlarged elevational view showing the connection between the longitudinal wall panels and the connector beam;

FIG. 22 is a top plan view of a portion of the top deck structure as in FIG. 2 with addition of the poured-in-place concrete topping;

FIG. 23 is a sectional view taken along line 23—23 in FIG. 22;

FIG. 24 is a sectional view taken along line 24—24 in FIG. 22;

FIG. 25 is a sectional view taken along line 25—25 in FIG. 22; and

FIG. 26 is a sectional view taken along line 26—26 in FIG. 22.

DESCRIPTION OF A PREFERRED EMBODIMENT

Since the present invention relates specifically to a novel top deck structure for a concrete cooling tower, and the method of construction thereof, this disclosure will not concern itself with the specific structural details of the remainder of the tower outer shell and the interior cooling details such as the hanging fill assembly, drift eliminator assembly, or the fan drive assembly. These assemblies are well known in the art and are of the general type disclosed in co-pending U.S. Patent Application Ser. No. 63,150 filed on Aug. 12, 1970, and assigned to the same assignee as the present invention.

Referring to FIG. 1, the exterior shell of a three cell crossflow concrete cooling tower 10 includes a foundation 11, wall sections 12, louver blade assembly 13, distribution pipes 14, top deck structure 15 and fan stacks 16. As seen in FIG. 3, wall sections 12 are constructed from a plurality of precast concrete wall panels 17, positioned above foundation 11, and louver blade assembly 13 is constructed from precast concrete louver posts 18, positioned above foundation 11 for receipt of louver blades 19. Reference is made to the hereinabove discussed U.S. Patent Application Ser. No. 232,830 for a detailed disclosure of the specific construction of wall sections 12 and louver blade assembly 13 and their connection to foundation 11. The description which follows discloses a preferred emboidment of an improved top deck 15 for use in combination with a shell design of the type mentioned hereinabove. In order to simplify the disclosure the drawings and disclosure are drawn to the top deck structure of half of one cell. It should be understood that the other half of the cell is the mirror image of the disclosed half and that the other cells of the tower are substantially identical thereto.

Referring to FIGS. 2–4, there is shown a portion of tower 10 including transverse wall sections 20 and longitudinal wall sections 22, constructed from a plurality of precast concrete wall panels 17, dividing the tower into individual cooling cells 24. Precast concrete louver posts 18, and the louver blades 19 positioned therebetween, form the longitudinal outside walls of each cell 24. Positioned above panels 17 and posts 18 is the top deck structure 15 of the present invention including "T" beams 30, ledger beams 40, keystone beams 50, connector beams 60, fandeck panels 70 and spandrel beams 80.

As seen in FIGS. 2 and 3, a pair of precast prestressed concrete double "T" beams 30 and 30', of substantially identical construction are positioned above wall sections 20, the corresponding parts of beam 30' being indicated by the same numeral as the part in beam 30 with the addition of a prime sign. Each "T" beam 30 is integrally cast to include a horizontal flange portion 32 and a pair of spaced apart longitudinally extending vertical rib portions 34 extending downwardly therefrom. Flange portion 32 includes a plurality of spray nozzle openings 35 formed therethrough for receipt of suitable spray nozzles (not shown). Reference is made to U.S. Patent Application Ser. No. 232,668, assigned to the same assignee as the present application, for a disclosure of the method and apparatus used to precast beams 30. Embedded along both longitudinal edges of flange portion 32 are a plurality of spaced apart metal weld plates 36 formed therein, indicated by "X" marks in FIG. 2. Embedded within the bottom of ribs, 34, at the outside edges thereof, are metal weld plates 37.

Referring to FIG. 5 the bottom surface of outer rib 34' of beam 30' is supported on a notched surface 25 of posts 18 and the outer edge of flange 32' extends above the top surfaces of posts 18. Plates 36, positioned along the outer edge of flange 32', are in vertical alignment with weld plates 26 embedded in the top surfaces of posts 18. Plates 36 are secured to the corresponding plates 26 by weld plates 27 and 28. Plate 27 includes a horizontal portion welded to plate 26 and a vertical portion which extends upward beyond the top surface of flange 32'. Plates 28 are welded along their inner edges to the corresponding plate 36 and along their outer edges to the corresponding vertical portion of plate 27 so as to effectively secure "T" beam 30' to the posts 18. As seen in FIG. 15, weld plates 37 in ribs 34 are welded to weld plates 29 embedded in the upper surface of wall sections 20 so as to secure the "T" beams to the wall sections 20. Referring to FIG. 14, the inner edges of beam 30' are secured to the outer edges of beams 30 by welding the opposite ends of connecting plates 31 respectively to the transversely adjacent plates 36 associated with the inner edge of beam 30' and the outer edge of beam 30.

Referring to FIG. 9, the posts 18 which are in transverse alignment with a wall section 20 include a weld plate 90 embedded in notched surface 25 thereof which in turn are welded to a corresponding weld plate 92 embedded in the upper surface of the wall panel 17 adjacent thereto through a connecting weld plate 91. As seen in FIGS. 3, 10 and 11, the adjacent wall panels 17 are secured together to form the transverse wall sections 20. Each vertical edge of each wall panel 17 includes a pair of embedded weld plates 93 positioned one at the upper end thereof and the other at the middle thereof. Weld plates 94 are welded at their respective ends to the corresponding plates 93 of adjacent wall panels so as to secure the wall panels together. To hold the panels 17 in place to facilitate the welding of plates 94 to the corresponding plates 93 a temporary support channel 95 is bolted to anchoring bolts 96 cast in the upper surfaces of panels 17. After plates 94 are welded to plates 93 the support channel is removed and the anchoring bolts 96 are burned off flush with the upper surfaces of panels 17. Referring to FIGS. 20 and 21, the adjacent wall panels 17 are secured together to form the longitudinal wall sections 22. Each vertical edge of each wall panel 17 includes the same weld plates 93 embedded therein as the panels 17 which make up the transverse wall sections 20. The weld adjacent plates 93 located in the middle of panels 17 are similarly secured together via weld plates 94. The adjacent weld plates 93 located at the upper ends of panels 17 are secured together by weld plates 97 which extend

above the top surfaces of panels 17, as seen in FIG. 21.

FIGS. 18 and 19 illustrate the connections between the intersecting panels 17 at the intersection between the transverse wall sections 20 and the longitudinal wall sections 22. The panel 17 of transverse wall section 20 at the intersection with longitudinal wall section 22 includes weld plates 98 embedded therein at the four intersection corners at right angles to the weld plate 93 of the panels 17 of longitudinal wall section 22. The adjacent plates 93 and 98 are secured together by right angle weld plates 99 welded respectively thereto along their vertical edges. Plates 99 extend above the top surfaces of wall sections 20 and 22.

Referring to FIGS. 2, 3, 8, 16 and 17, a precast prestressed concrete ledger beam 40 longitudinally extends between adjacent transverse wall sections 20 and is supported thereon along the inner edge of "T" beam 30. The outer vertical surface of ledger beam 40 has weld plates embedded therein which are connected to the transversely aligned weld plates 36 along the inner edge of "T" beam 30 by connecting plates 44, welded at opposite ends respectively thereto, as seen in FIGS. 16 and 17. Supported on surface 46, notched from beam 40, are a pair of transversely extending spaced apart precast prestressed concrete keystone beams 50 which extend to the ledger beam 40 associated with the other half of the cell, as seen in FIG. 3. FIGS. 12 and 13 show a weld plate 48 embedded within the top surface of beam 40 in transverse alignment with a weld plate 52 embedded within the top surface of keystone beam 50. Connecting plate 54 is welded at its opposite ends respectively to weld plates 48 and 52.

A precast prestressed concrete connector beam 60 is positioned above longitudinal wall section 22 between adjacent wall sections 20, as seen in FIG. 4. Connector beam 60 includes weld plates 62 embedded along its lower horizontal edges in transverse alignment with the plates 97 connecting the panels 17 of wall section 20 together and is welded thereto, as seen in FIGS. 20 and 21. The weld plates 62 at the intersection with wall sections 20 are welded to plates 99, as seen in FIGS. 7, 18 and 19. The upper transverse edges at the ends of connector beams 60 have a weld plate 64 embedded therein. A connector plate 66 is welded at its opposite ends to adjacent plates 64 to connect adjacent connector beams 60 together. A precast prestressed concrete spandrel beam 80 is positioned at the outer edge of louver posts 18 above the top surface thereof and extends between adjacent wall sections 20. Embedded within the inside horizontal surface of beam 80 near the lower edge thereof are weld plates 82 in transverse alignment with plates 27. Plates 82 are welded to the vertical portion of plates 27 so as to effectively secure beam 80 to the posts 18 and the adjacent "T" beam 30'.

Referring to FIGS. 2 and 6–8, a set of precast prestressed concrete fandeck panels 70 are positioned on top of ledger beam 40, keystone beams 50, and connector beam 60. The set of panels 70 includes three panels 71, 72 and 73, which when positioned in place define a semi-circular fan stack opening 100. Since end panel 71 is the mirror image of end panel 73 only a discussion of the structure of panel 71 is made hereinbelow. Panel 71 includes a flat horizontal portion 74 which defines transverse edges 75 and 76. Longitudinal edges 77 and 78, and curved edge 79. Edge 77 includes a downwardly extending web portion 101 integral therewith which is supported on top of connector beam 60, as seen in FIG. 7. A web portion 102 extends downward from portion 74, and is integral therewith parallel to edge 78 and spaced a short distance therefrom. Web portion 102 and portion 74 define a longitudinally extending notch 103 which receives the upper inside corner of ledger beam 40, as seen in FIG. 8. Edge 75 is positioned to rest on top of keystone beam 50, as seen in FIG. 6. Edge 76 includes a downwardly extending web portion 104 integral therewith having its ends supported respectively on top of connector beam 60 and surface 46 of ledger beam 40, as seen respectively in FIGS. 7 and 8. Center panel 72 includes a flat horizontal portion 110 which defines transverse edges 111 and 112, longitudinal edge 113, and curved edge 114. Edges 111 and 112 are positioned to rest on the keystone beams 50, as seen in FIG. 6. A web portion 115 extends downward from portion 110, and is integral therewith, parallel to edge 113 and spaced a short distance therefrom. Web portion 115 and portion 110 define a longitudinally extending notch which receives the upper inside corner of beam 40 in the same manner as notch 103 of fandeck panel 71. A pair of weld plates 120 are embedded within portion 110 respectively at edges 111 and 112 in longitudinal alignment with weld plates 121 embedded within portions 74 of panels 71 and 73 at their edges 75. Connecting weld plates 122 are welded at their opposite ends to adjacent plates 120 and 121 so as to secure center panel 72 to end panels 71 and 73, as seen in FIG. 6. Portions 74 at edges 77 of panels 71 and 73 include weld plates 123 embedded therein. Connecting weld plates 124 are welded at their opposite ends to the transversely adjacent plates 123 of panels 71 and 73 so as to secure the panel 71 of one half of each cell to the panel 73 of the other half of the cell, as seen in FIG. 7.

Referring to FIGS. 22–26, a poured-in-place reinforced concrete topping 130 covers "T" beams 30 and 30', and fan deck panels 70. As seen in FIGS. 24 and 25, C.A.B. airseal sheets 132 are positioned above each transverse wall section 20 to effectively seal off air movement between adjacent cooling cells 24. Precast concrete manifold support blocks 134 are positioned above "T" beams 30' in transverse alignment with each louver post 18 for support of distribution pipes 14. Each block 134 includes leveling bolts 135 cast into the bottom surface thereof at its respective corners to permit leveling of blocks 134 above "T" beams 30'. Topping 130 is formed to define a plurality of transverse basin defining curbs 136 and a longitudinal basin defining curb 138. Curbs 136 and 138 and spandrel beam 80 define a separate hot water distribution basin 139 therebetween for each cell 24. Curbs 136 are in vertical alignment with each transverse wall section 20, as seen in FIG. 26. The curbs 136 which are in vertical alignment with end wall sections 20 extend the entire span between the spandrel beams 80 to form an outside curb, as seen in FIG. 22. Curb 138 is in vertical alignment with the inner edges of "T" beams 30, ledger beam 40 and fan deck panels 70, as seen in FIG. 25. The portion of topping 130 which covers fan deck panels 70 is at the same elevation as the upper surface of curb 138. The portion of topping 130 which covers "T" beams 30 and 30' includes openings 140 formed therein in vertical alignment with openings 35 in "T" beams 30 and 30' in a manner as disclosed in U.S. Pat. Application Ser. No. 232,668, assigned to the same as-

signee as the present invention. Suitable concrete holding forms are used in accordance with conventional practice to form topping **130**. The pouring of topping **130** requires a relatively small volume of concrete, allowing the pour to be completed in a few hours.

In the process of erection of the shell structure of tower **10**, the foundation **11** is initially poured-in-place at the jobsite. The transverse wall sections **20** and longitudinal wall sections **22** are secured in place above foundation **11**. Connector beams **60** are secured in place above wall sections **22** and ledger beams **40** are secured in place across wall sections **20**. Keystone beams **50** are then secured in place at their respective ends to the beams **40** of the corresponding half cells and supported at their midpoints above beams **60**. "T" beams **30** are positioned in place and secured to ledger beams **40** and transverse wall sections **20**. The louver posts **18** are then secured in place above foundation **11** and "T" beams **30'** are secured to transverse wall sections **20**, louver posts **18** and "T" beams **30**. Fan deck panels **70** are secured in place above ledger beams **40**, keystone beams **50**, and connector beams **60**. The spandrel beams **80** are secured in place above louver posts **18** at the outer edge of "T" beams **30'**. Air seal sheets **132** are positioned above transverse wall panels **20** and support blocks **134** are leveled in place above "T" beams **30'**. The pouring of topping **130**, defining openings **140** therethrough and curb portions **136** and **138** therein, completes construction of the tower shell.

Various modifications are contemplated and may obviously be resorted to by those skilled in the art without departing from the spirit and scope of the invention, as hereinafter defined by the appended claims, as only a preferred embodiment thereof has been disclosed.

What is claimed is:

1. In a cooling tower structure including a plurality of precast concrete wall panels positioned above a concrete foundation so as to form a plurality of transverse wall sections defining cooling cells therebetween and a plurality of longitudinal wall sections dividing said cells in half, and a plurality of precast concrete louver posts positioned above said foundation spaced along the outside longitudinal extent of each half cell; an improved top deck structure comprising:

a. precast concrete "T" beams extending across the upper ends of said transverse wall sections of each half cell having spray nozzle openings formed therein, the outermost longitudinal edge of said "T" beams being positioned adjacent said louver posts,

b. precast concrete ledger beams extending longitudinally across the upper ends of said transverse wall sections of each half cell positioned between said longitudinal wall sections and said louver posts such that the innermost longitudinal edges of said "T" beams are supported thereon;

c. precast concrete connector beams supported on top of said longitudinal wall sections;

d. a plurality of precast concrete keystone beams extending between the ledger beams associated with facing half cells; and

e. a plurality of precast fandeck panels supported between said ledger beam and said connector beam of each half cell above said keystone beams, shaped so as to define a fan stack opening therethrough.

2. The invention as defined in claim **1** wherein said top deck structure further includes longitudinally extending precast concrete spandrel beams secured to the upper ends of said louver posts.

3. The invention as defined in claim **1** wherein said top deck structure further includes a poured-in-place reinforced concrete topping above said "T" beams and said fandeck panels have openings formed therein in communication with the openings in said "T" beams.

4. The invention as defined in claim **3** wherein said topping includes upstanding transversely extending curb portions integral therewith for defining separate water distribution basins for each cell.

5. The invention as defined in claim **1** wherein said ledger beams include a horizontal surface notched from the inside upper longitudinal edge thereof, said keystone beams being supported at their respective ends on said horizontal surface of one of said ledger beams.

6. The invention as defined in claim **1** wherein each half cell includes a pair of said keystone beams dividing the area between said connector beam into two end and one center open area, each of said end open areas being partially closed off by an end fandeck panel and said center open area being partially closed off by a center fandeck panel, said end fandeck panels and said center fandeck panel defining a semi-circular fan stack opening therebetween.

7. The invention as defined in claim **6** wherein said end fandeck panels include a flat horizontal portion which defines an inside transverse edge, an outside transverse edge, an inside longitudinal edge, an outside longitudinal edge, and a curved edge between said inside longitudinal edge and said inside transverse edge, said inside transverse edge being supported above said keystone beam, said inside longitudinal edge having a flange portion depending downward therefrom for support above said connector beam, said outside longitudinal edge being supported on top of said ledger beam, said outside transverse edge having a flange portion depending downward therefrom for support at its opposite ends respectively on top of said connector beam and said ledger beam, and said curved edge being effective to define a portion of said fan stack opening.

8. The invention as defined in claim **6** wherein said center fandeck panel includes a flat horizontal portion which defines a pair of transverse edges, an outside longitudinal edge, and a curved inner edge between the inner ends of said transverse edges, said transverse edges being respectively supported on top of one of said keystone beams, said outside longitudinal edge being supported on top of said ledger beam, and said curved edge being effective to define a portion of said fan stack opening.

9. The invention as defined in claim **5** wherein each half cell includes: a pair of said keystone beams dividing the area between said ledger beam and said connector beam into two end and one center open area; each of said end open areas being partially closed off by an end fandeck panel and said center open area being partially closed off by a center fandeck panel; said end fandeck panels and said center fandeck panel defining a semi-circular fan stack opening therebetween; said end fandeck panels include a flat horizontal portion which defines an inside transverse edge, an outside transverse edge, an inside longitudinal edge, an outside longitudi-

nal edge, and a curved edge between said inside longitudinal edge and said inside transverse edge; said inside transverse edge being supported above said keystone beam, said inside longitudinal edge having a flange portion depending downward therefrom for support above said connector beam, said outside longitudinal edge being supported on said horizontal surface notched from said ledger beam, said outside transverse edge having a flange portion depending downward therefrom for support at its opposite ends respectively on said connector beam and said ledger beam, and said curved edge being effective to define a portion of said fan stack opening; and said center fandeck panel includes a flat horizontal portion which defines a pair of transverse edges, an outside longitudinal edge, and a curved inner edge between the inner ends of said transverse edges; said transverse edges being respectively supported on top of one of said keystone beams, said outside longitudinal edge being supported on said horizontal surface notched from said ledger beam, and said curved edge being effective to co-operate with the curved edges of said end fandeck panels so as to define said fan stack openings.

10. The invention as defined in claim **9** wherein said horizontal portions of said end and center panels include flange portions depending downward therefrom positioned parallel to and spaced from the respective outer longitudinal edges thereof, said flange portions being positioned within the area notched from said ledger beams.

11. The invention as defined in claim **10** wherein said top deck structure further includes a poured-in-place reinforced concrete topping above said "T" beams and said fandeck panels having curb portions integral therewith for defining separate water distribution basins for each cell.

12. The invention as defined in claim **4** wherein air-seal means is provided above said transverse wall section for preventing air movement between adjacent cooling cells.

13. The invention as defined in claim **1** further including a plurality of precast concrete manifold support blocks spaced adjacent each of said louver posts above said "T" beams, said blocks having leveling means associated therewith for leveling said blocks above said "T" beams.

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