

Oct. 5, 1943.

L. T. MART

2,330,901

SPLASH DECK ASSEMBLY FOR COOLING TOWERS

Filed Nov. 21, 1941

3 Sheets-Sheet 1

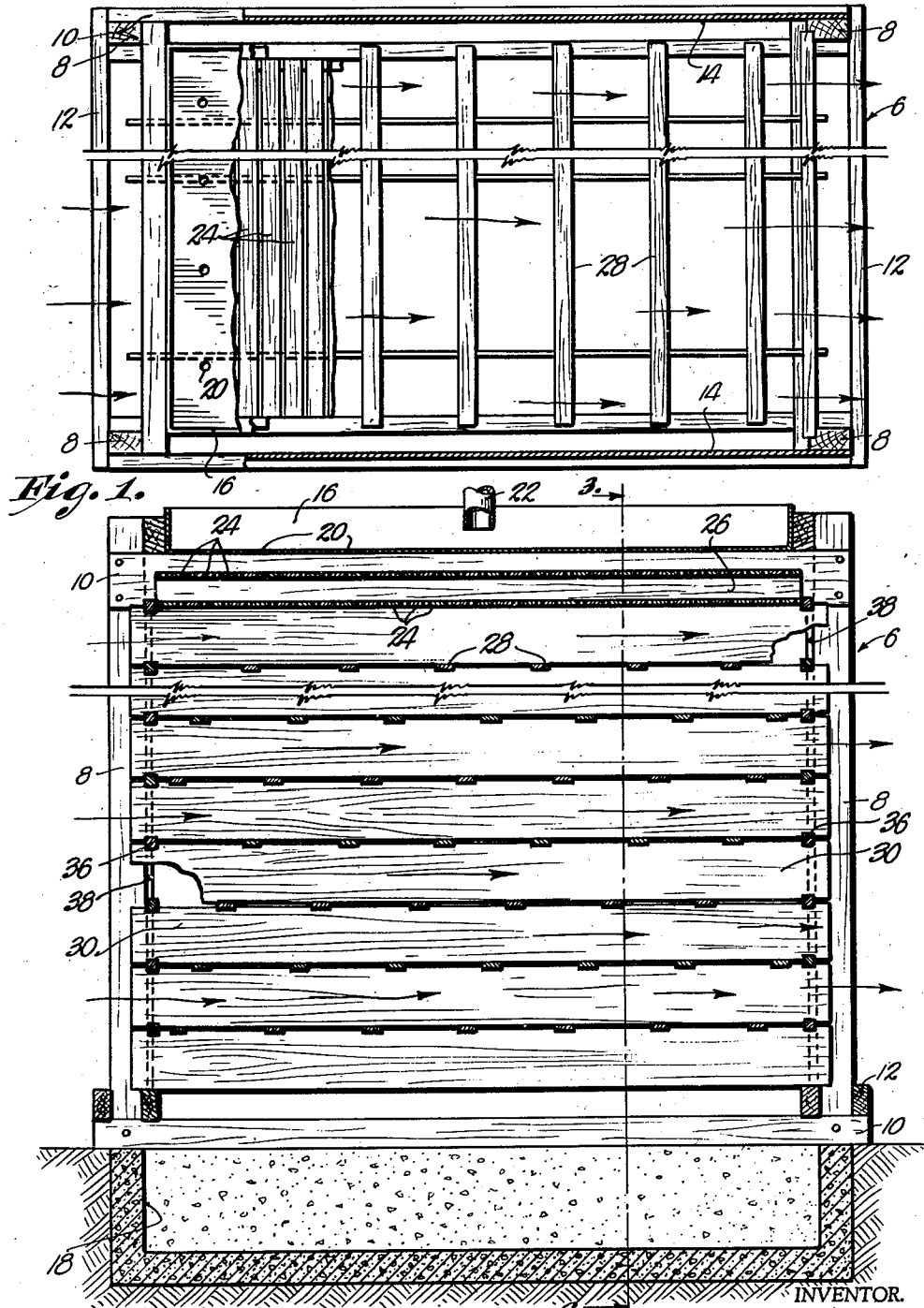


Fig. 1.

Fig. 2.

INVENTOR.
L. T. Mart
BY
[Signature]
ATTORNEY.

Oct. 5, 1943.

L. T. MART

2,330,901

SPLASH DECK ASSEMBLY FOR COOLING TOWERS

Filed Nov. 21, 1941

3 Sheets-Sheet 2

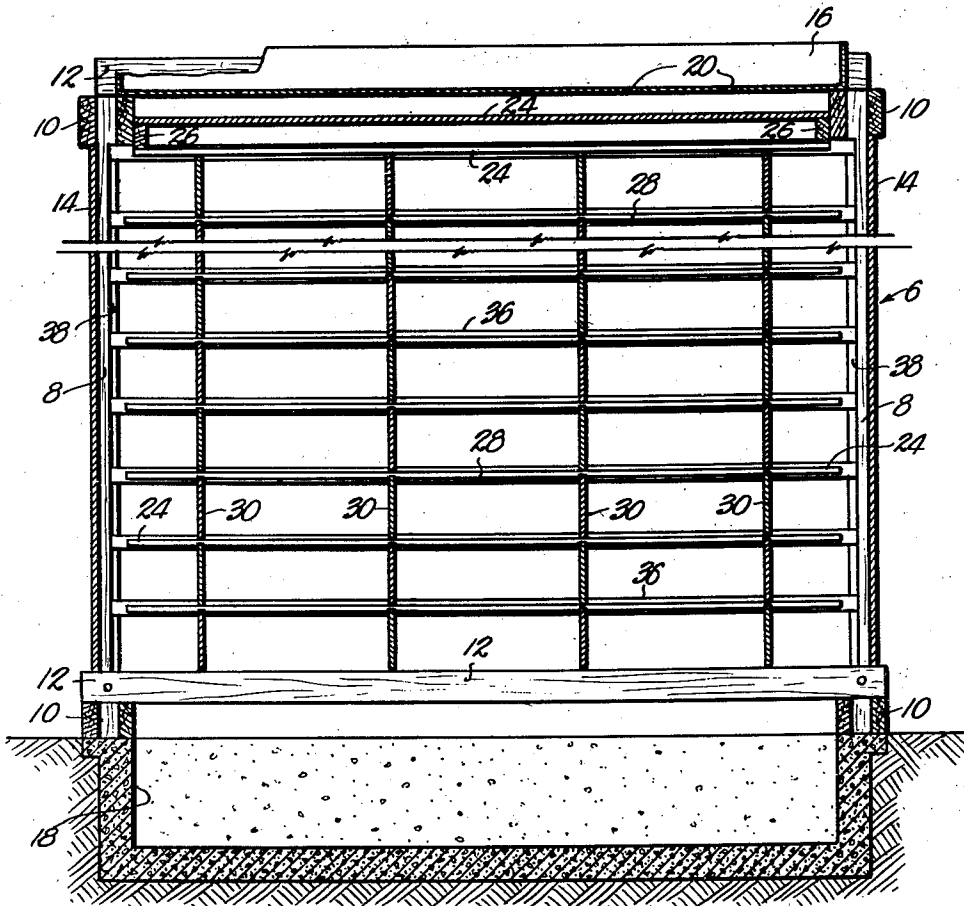


Fig. 3.

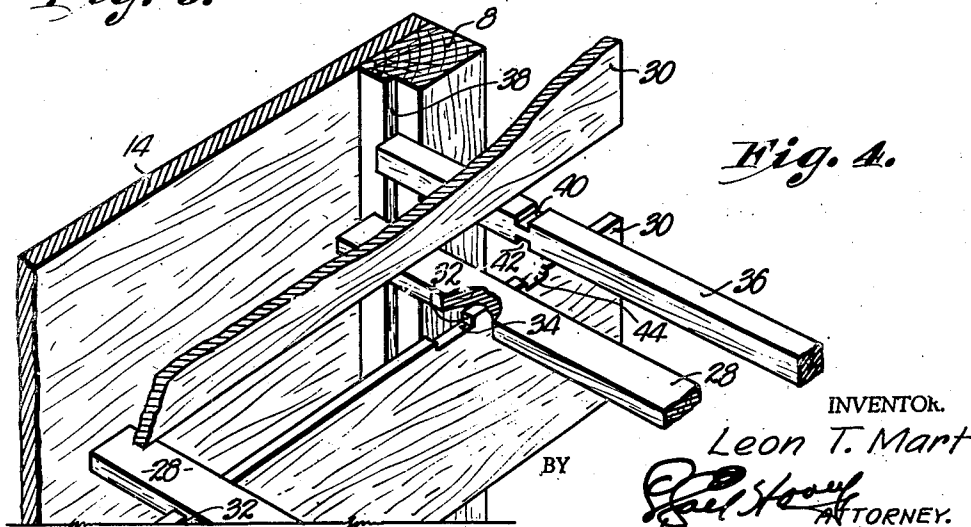


Fig. 4.

INVENTOR.

Leon T. Mart

BY

Paul Hooper
ATTORNEY.

Oct. 5, 1943.

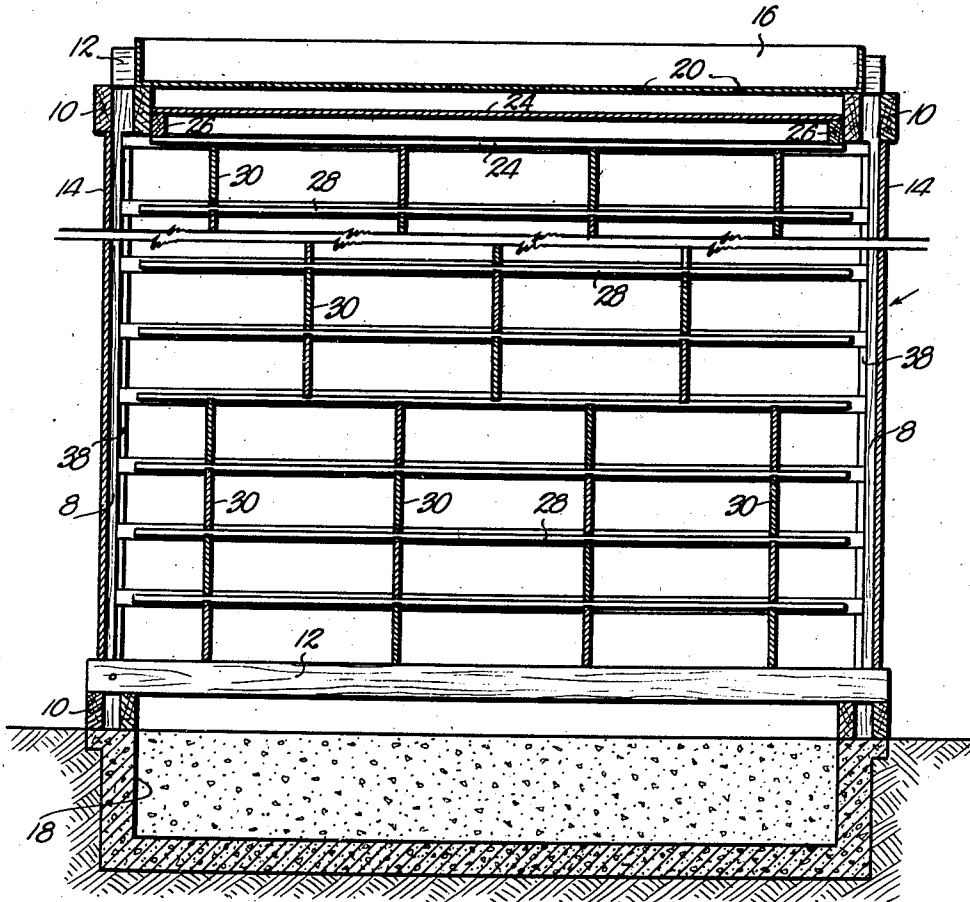
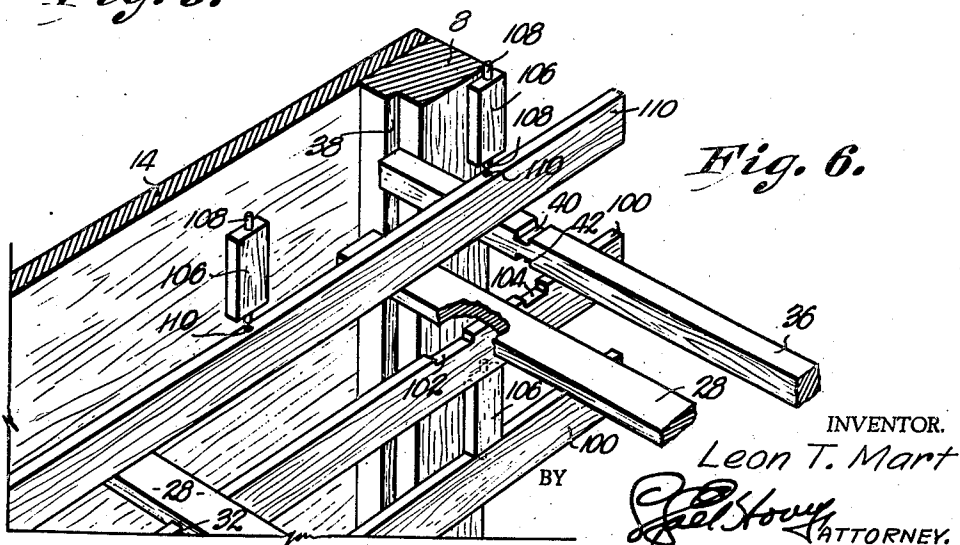
L. T. MART

2,330,901

SPLASH DECK ASSEMBLY FOR COOLING TOWERS

Filed Nov. 21, 1941

3 Sheets-Sheet 3



INVENTOR.

Leon T. Mart

BY

Paul Young
ATTORNEY.

UNITED STATES PATENT OFFICE

2,330,901

SPLASH DECK ASSEMBLY FOR COOLING TOWERS

Leon T. Mart, Mission Township, Johnson County,
 Kans., assignor to The Marley Company, Inc.,
 Kansas City, Kans., a corporation of Kansas

Application November 21, 1941, Serial No. 419,922

13 Claims. (Cl. 261-111)

This invention relates to heat exchanging equipment and particularly apparatus wherein water is cooled by breaking the same into a myriad of particles or globules and allowed to drop by gravity upon a number of spill slats arranged in a current of air that customarily travels in a direction different than that of the falling water.

The primary object of this invention is the provision of a cooling tower of the aforementioned character wherein the entire splash deck assembly is comprised of interlocking parts, capable of maintaining themselves in operative position without the employment of screws, nails, bolts or other fastening means that must be placed with special tools when the deck is assembled at the point of use.

A yet further aim of this invention is the provision of a splash deck assembly for cooling towers, the spill slats, spill slat supports and tie bars of which are all provided with shoulders disposed to preclude accidental displacement, after the said parts have been erected within a frame provided for the reception of the splash deck.

This invention has for an even further aim the provision of a portable splash deck assembly, the parts of which are interlocked to maintain rigidity wherein a number of spill slats are horizontally placed upon supports, the latter being in stacked relation and disposed in vertical planes, and a portion of which are offset to create a number of longitudinal ducts, one above the other, and in staggered relation.

A large number of minor objects of this invention must of necessity appear during the course of the following specification, because the way of fabricating the component parts of the splash deck assembly is important and will be recognized as contributing to the above broad objects of my invention.

In the accompanying drawings:

Fig. 1 is a top plan view of a cooling tower having splash deck assembly made in accordance with the present invention.

Fig. 2 is a vertical longitudinal sectional view through the same.

Fig. 3 is a vertical transverse sectional view taken on line 3-3 of Fig. 2.

Fig. 4 is an enlarged detail fragmentary perspective view of a portion of the splash deck assembly, illustrating the manner of interlocking the units thereof.

Fig. 5 is a vertical transverse cross sectional view through a cooling tower having the splash deck assembly made in accordance with a modified form of the invention; and

Fig. 6 is an enlarged fragmentary perspective stretch-out view of a portion of a splash deck assembly made to embody a still further modified form of the invention and illustrating the manner of interlocking the component parts thereof.

It is well-known in the art that water being cooled must be broken into a large number of droplets or streams and that the finer the water is broken during its gravitation from the top to the bottom of the cooling tower, the greater the heat exchange that might occur, and therefore, the higher the efficiency of the equipment.

Cooling towers and splash decks, therefore, have conventionally employed a number of spill slats arranged in groups one above the other and in offset relation, but the construction of the splash deck has always involved the utilization of expensive nails, bolts or screws made of non-corrosive metal. Not only is the material expensive but the time involved in assembly is objectionable. The splash deck assembly made in accordance with this invention may be erected quickly after prefabrication at a point of manufacture, and thereafter disassembled without injury to the component parts thereof and re-erected as desired.

Referring now to Figs. 1 to 4 inclusive, the numeral 6 generally designates a frame comprising standards 8 at each corner thereof, and the upper and lower horizontal tie members 10 and 12 extend longitudinally and transversely respectively of the frame 6. Closed walls 14 along each of two opposite longitudinal vertical sides of frame 6, establishes, with tray 16 and sump 18, a passage for the flow of air. Air currents through the splash deck move in the direction of the arrows shown in Figs. 1 and 2, and thereby intersect the finely divided streams or drops of water that gravitate from tray 16 to sump 18. Tray 16 is provided with a number of perforations 20 in the bottom thereof and serve to break the water from supply pipe 22 into streams that may immediately thereafter be further broken by an underlying splash deck composed of transverse slats 24 secured to strip 26 on tie member 10.

The splash deck assembly per se includes a plurality of spill slats 28 at least partially bridging the distance between side walls 14 and resting upon spill slat supports 30. Spill slat supports are flat pieces of material, such as redwood, and rest in stacked relation, one above the other, as illustrated in Fig. 3, when the deck is in place. The upper edge of each support is provided with shoulders 32 formed by notching supports 30 in-

wardly from one longitudinal edge. The depth of these notches 34 is slightly less than the width of spill slats 28, and therefore, the upper edge of support 30 is spaced from the lower edge of the overlying support. Such disposition of supports 30 tends to break the continuity of any sheet of water that might be created through the collection of water particles on the surfaces of supports 30. The manner of more effectively breaking the tendency of the water to form sheets will be more fully hereinafter set down, by reference to the modified form in Fig. 5.

When spill slats 28 are in notches 34, lateral movement thereof is precluded and if the slats tend to move longitudinally, the ends thereof will strike walls 14 and thereby maintain slats 28 in the operative position.

Tie bars 36 extend between standards 8 and the ends thereof engage shoulders 38 thereon. These shoulders 38 may be created by forming the standard as shown in Figs. 1 and 4, or by fastening a strip thereto.

Each tie bar has a notch 40 formed inwardly from its normally upper face and a notch 42 formed inwardly from its normally lower face. These notches receive the proximal edges of spill slat supports 30 and thereby preclude lateral movement thereof. The upper edge of each support 30 has a notch 44 to receive tie bars 36. This notch 44 enters notch 42 and cooperates therewith to form an interlocking structure precluding lateral displacement of either spill slat supports 30 or tie bars 36. Since tie-bars 36 have their ends against shoulders 38 of standards 8, they cannot move longitudinally and therefore, a rigid, interlocked splash deck assembly is created without the use of metallic fastening means, brackets, or means other than the integral structure formed as a part of elements 28, 30 and 36.

In the modified form of the invention shown in Fig. 5, all parts heretofore described are precisely the same with the exception of the disposition of spill slat supports 30. In the preferred embodiment of the invention, these spill slat supports lie in a number of longitudinal spaced apart planes within frame 6 and between walls 14. In some instances the faces of spill slat supports become covered with splashing water and a sheet therefore is formed that is objectionable in that heat exchange with the air does not occur.

In Fig. 5 the plurality of vertically stacked spill slat supports are grouped, and each group is offset with respect to the other to thereby break into relatively small areas, the faces of the walls composed of supports 30. Thus, when water collects on the faces of a group of supports 30, it will run onto the underlying spill slats 28 and be broken into a spray before it reaches sump 18.

A further manner of breaking the sheet of water that has a tendency to collect on the spill slat supports, is illustrated in Fig. 6. All of the parts of the structure shown in this figure are related as hereinabove described.

The specific form of each spill slat support however, is different from the form shown in Figs. 1 to 5 inclusive—in this modification, each spill slat support comprises a pair of spaced apart strips 100, the uppermost of which has notches 102 and 104 for the reception of spill slats 28 and 36 respectively. Spacer blocks 106 provided with dowels 108 hold strips 100 in spaced relation. Each dowel 108 enters a socket 110 formed in-

wardly from the edges of strips 100 and when spacer 106 is positioned, it too is held in operative place without the employment of fixtures of any character other than the integral parts thereof and those formed on strips 100. The continuity of the vertical faces of spill slat supports is thereby broken and in addition, a quantity of material is saved through the use of strips 100 rather than solid spill slat supports 30.

The manner of interlocking the parts illustrated in Fig. 6, is precisely the same as set forth above, and therefore, it will be obvious to one skilled in the art, the manner in which a splash deck assembly, made in accordance with this invention, might be quickly, effectively and conveniently fabricated and erected. Its efficiency is desirable from the standpoint of economy in material and time, and while two forms of splash decks embodying my invention have been illustrated and described, it is desired to be limited only by the spirit of the invention and scope of the appended claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A splash deck assembly for cooling towers comprising a plurality of spill slats; a plurality of spill slat supports having notches formed therein for receiving the spill slats to prevent displacement of the slats in one direction; a series of tie bars positioned at an angle to said supports and having notches therein for receiving said supports to interlock therewith to hold the latter against lateral displacement and a plurality of spaced apart standards positioned to engage the tie-bars to preclude longitudinal movement thereof.

2. A splash deck assembly for cooling towers comprising spaced apart standards; a plurality of spill slats between the standards; a plurality of spill slat supports provided with notches for receiving the spill slats; and a series of tie bars formed to interlock with the said supports to hold the latter against lateral displacement, said tie bars having the ends thereof against the standards to preclude longitudinal movement thereof, said spill slat supports having shoulders thereon in engagement with the tie bars to prevent lateral shifting thereof.

3. A splash deck assembly for cooling towers comprising spaced side walls; a plurality of spill slats bridging a substantial portion of the space between said side walls; a plurality of spill slat supports in stacked relation between the walls; and a series of tie bars having their ends in abutting relation with the walls, intersecting the said supports, the said tie bars and the supports having interlocking integral structure precluding lateral movement of either the tie bars or supports when the same are assembled between the said walls.

4. A splash deck assembly for cooling towers comprising spaced side walls; a plurality of spill slats bridging a substantial portion of the space between said side walls; a plurality of spill slat supports in stacked relation between the walls; and a series of tie bars having their ends in abutting relation with the walls, intersecting the said supports, the said tie bars and the supports having interlocking integral structure precluding lateral movement of either the tie bars or supports when the same are assembled between the said walls, said supports having shoulders inte-

gral therewith for holding the spill slats against lateral movement.

5. A splash deck assembly for cooling towers comprising spaced side walls; a plurality of spill slats bridging a substantial portion of the space between said side walls; a plurality of spill slat supports in stacked relation between the walls; and a series of tie bars having their ends in abutting relation with the walls, intersecting the said supports, the said tie bars and the supports having interlocking integral structure precluding lateral movement of either the tie bars or supports when the same are assembled between the said walls, said supports having notches therein for receiving the spill slats to hold the same against lateral movement.

6. A splash deck assembly for cooling towers comprising spaced side walls; a plurality of spill slats bridging a substantial portion of the space between said side walls; a plurality of spill slat supports in stacked relation between the walls; and a series of tie bars having their ends in abutting relation with the walls, intersecting the said supports, the said tie bars and the supports having interlocking integral structure precluding lateral movement of either the tie bars or supports when the same are assembled between the said walls, said supports having notches therein for receiving the spill slats to hold the same against lateral movement, said spill slats being extended between adjacent supports when in the notches and being sufficiently wide to hold the adjacent supports in spaced apart relation.

7. A splash deck assembly for cooling towers comprising spaced side walls; a plurality of spill slats bridging a substantial portion of the space between said side walls; a plurality of spill slat supports in stacked relation between the walls; and a series of tie bars having their ends in abutting relation with the walls, intersecting the said supports, the said tie bars and the supports having interlocking integral structure precluding lateral movement of either the tie bars or supports when the same are assembled between the said walls, said spill slat supports being disposed in a number of spaced apart vertical planes between the walls to divide the space into ducts.

8. A splash deck assembly for cooling towers comprising spaced side walls; a plurality of spill slats bridging a substantial portion of the space between said side walls; a plurality of spill slat supports in stacked relation between the walls; and a series of tie bars having their ends in abutting relation with the walls, intersecting the said supports, the said tie bars and the supports having interlocking integral structure precluding lateral movement of either the tie bars or supports when the same are assembled between the said walls, said spill slat supports being disposed in a number of spaced apart vertical planes be-

tween the walls to divide the space into ducts, certain of the supports in each plane being offset with respect to the remaining supports in that plane.

9. A splash deck assembly for cooling towers comprising a plurality of spill slats; a plurality of spill slat supports having shoulders formed thereon engaging the spill slats to prevent transverse displacement thereof; and a series of tie bars formed to interlock with the said supports to hold the latter against lateral displacement, each of the supports comprising a pair of strips and a plurality of spacers therebetween.

10. A splash deck assembly for cooling towers comprising a plurality of spill slats; a plurality of spill slat supports having shoulders formed thereon engaging the spill slats to prevent transverse displacement thereof; and a series of tie bars formed to interlock with the said supports to hold the latter against lateral displacement, each of the supports comprising a pair of strips and a plurality of spacers therebetween, said strips and the spacers having integral, interlocking parts formed thereon.

11. In a splash deck assembly, a plurality of transverse spill slats; a plurality of spill slat supports each having notches in the upper edge thereof for receiving the spill slats to preclude lateral displacement thereof, the lower edges of said supports being straight and unbroken to rest upon the underlying spill slats; and a series of tie bars having notches in the upper and lower edges thereof to receive the edges of the spill slat supports to prevent lateral displacement thereof.

12. In a splash deck assembly, a plurality of transverse spill slats; a plurality of spill slat supports each having notches in the upper edge thereof for receiving the spill slats to preclude lateral displacement thereof, the lower edges of said supports being straight and unbroken to rest upon the underlying spill slats; and a series of tie bars having notches in the upper and lower edges thereof to receive the edges of the spill slat supports to prevent lateral displacement thereof, said supports being notched to receive the tie bars to preclude lateral displacement thereof when the supports are in the notches of the tie bars.

13. A splash deck assembly for cooling towers comprising spaced side walls; a plurality of spill slats bridging the space between the side walls and prevented thereby from longitudinal movement; a plurality of spill slat supports substantially parallel with the side walls and disposed transversely of the spill slats; and integral, interlocking structure on the spill slats and said supports precluding lateral movement of any of the same after the splash deck is assembled.

LEON T. MART.