Nov. 25, 1969 J. SCHWARZ ET AL 3,479,780

CAMBER TRUSS UPPER FRAME SUPPORTING MEANS FOR SIDEWALLS OF AN ABOVE GROUND SWIMMING POOL

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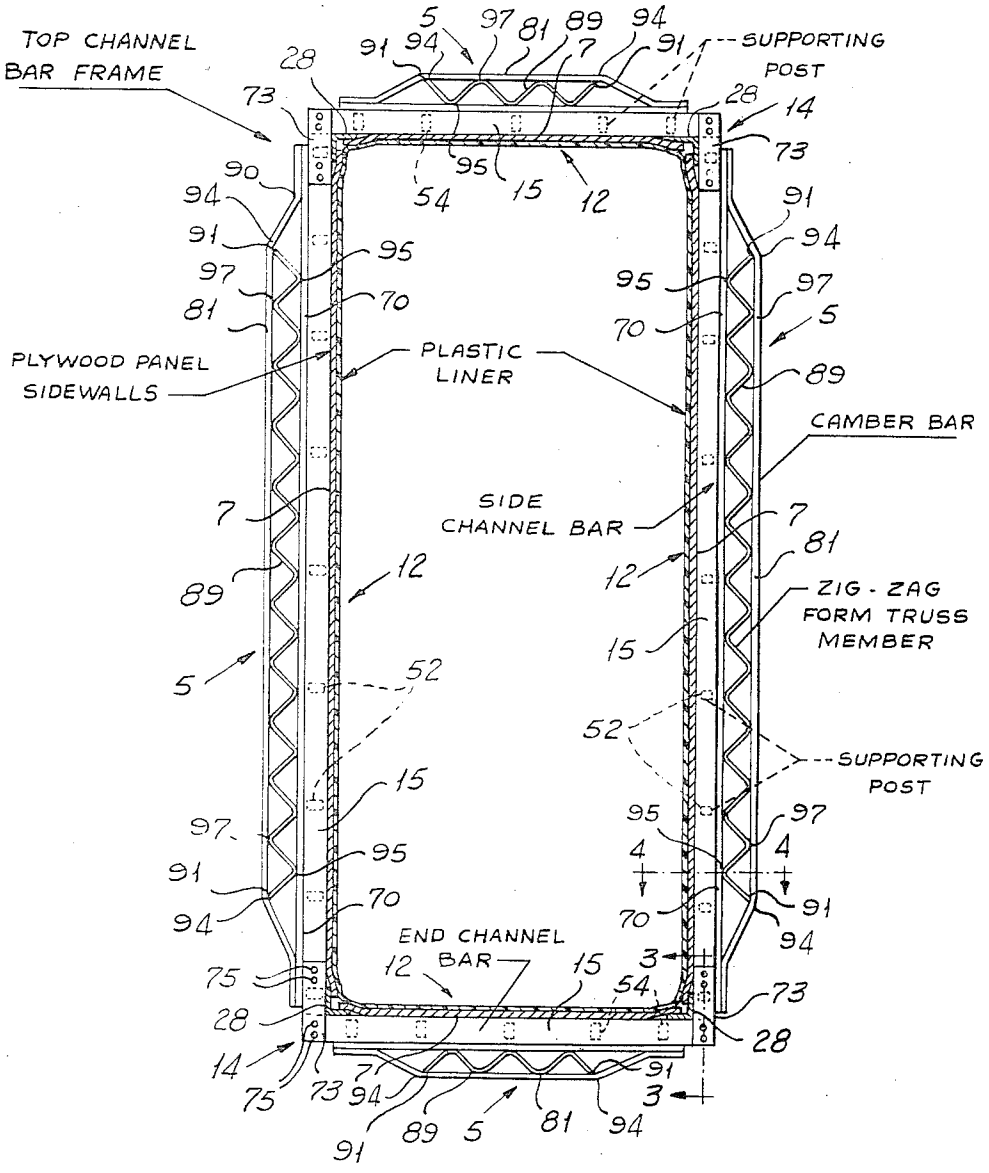


Fig 1

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CAMBER TRUSS UPPER FRAME SUPPORTING MEANS FOR SIDEWALLS OF AN ABOVE GROUND SWIMMING POOL

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FIG 2

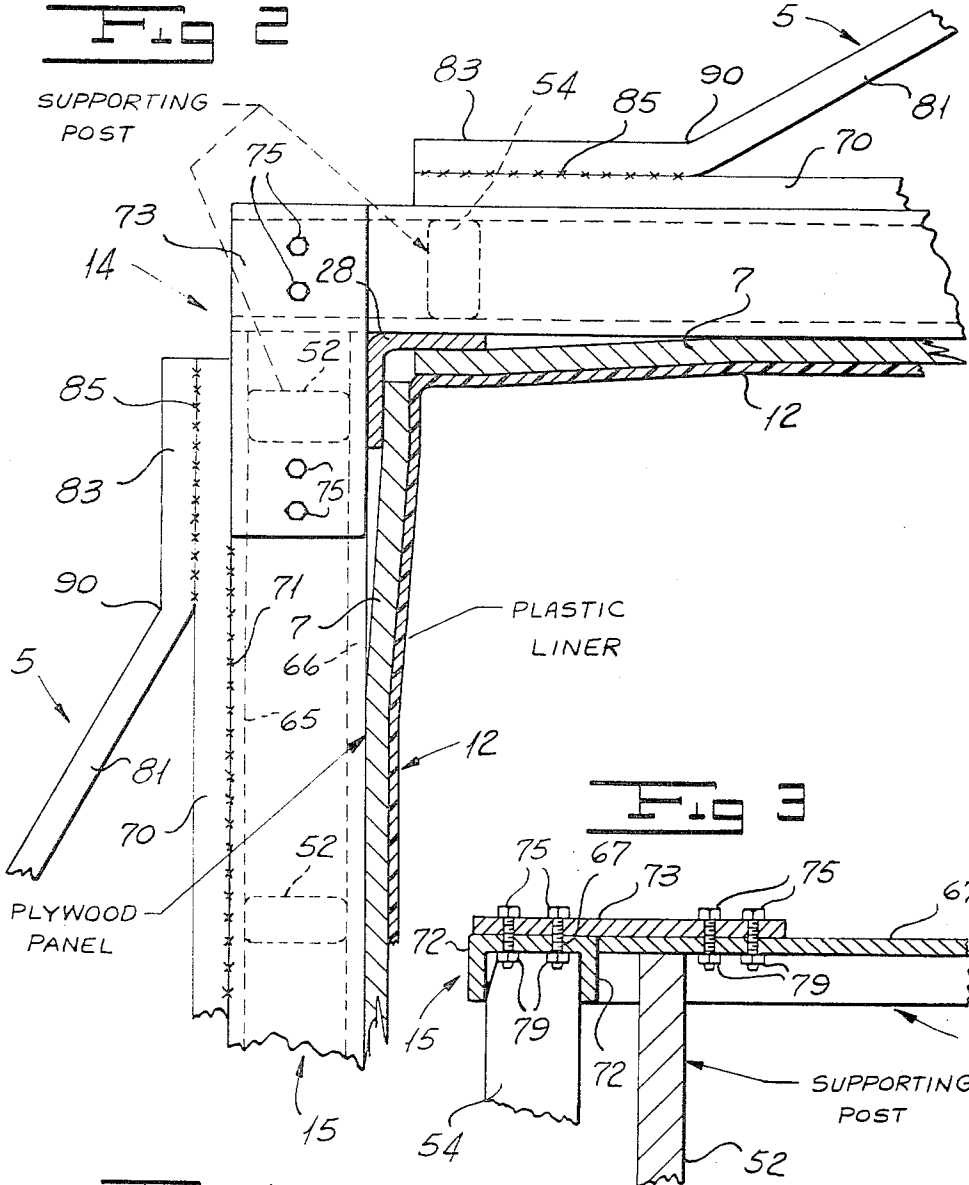
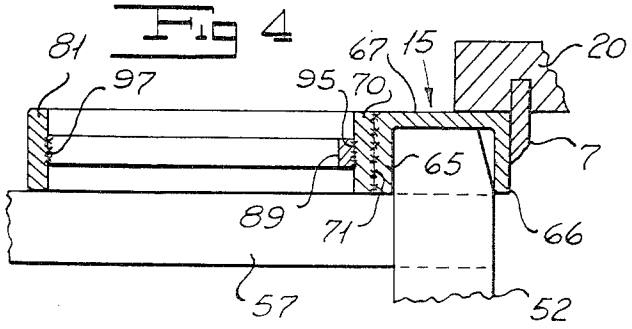


FIG 3

FIG 4



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CAMBER TRUSS UPPER FRAME SUPPORTING MEANS FOR SIDEWALLS OF AN ABOVE GROUND SWIMMING POOL

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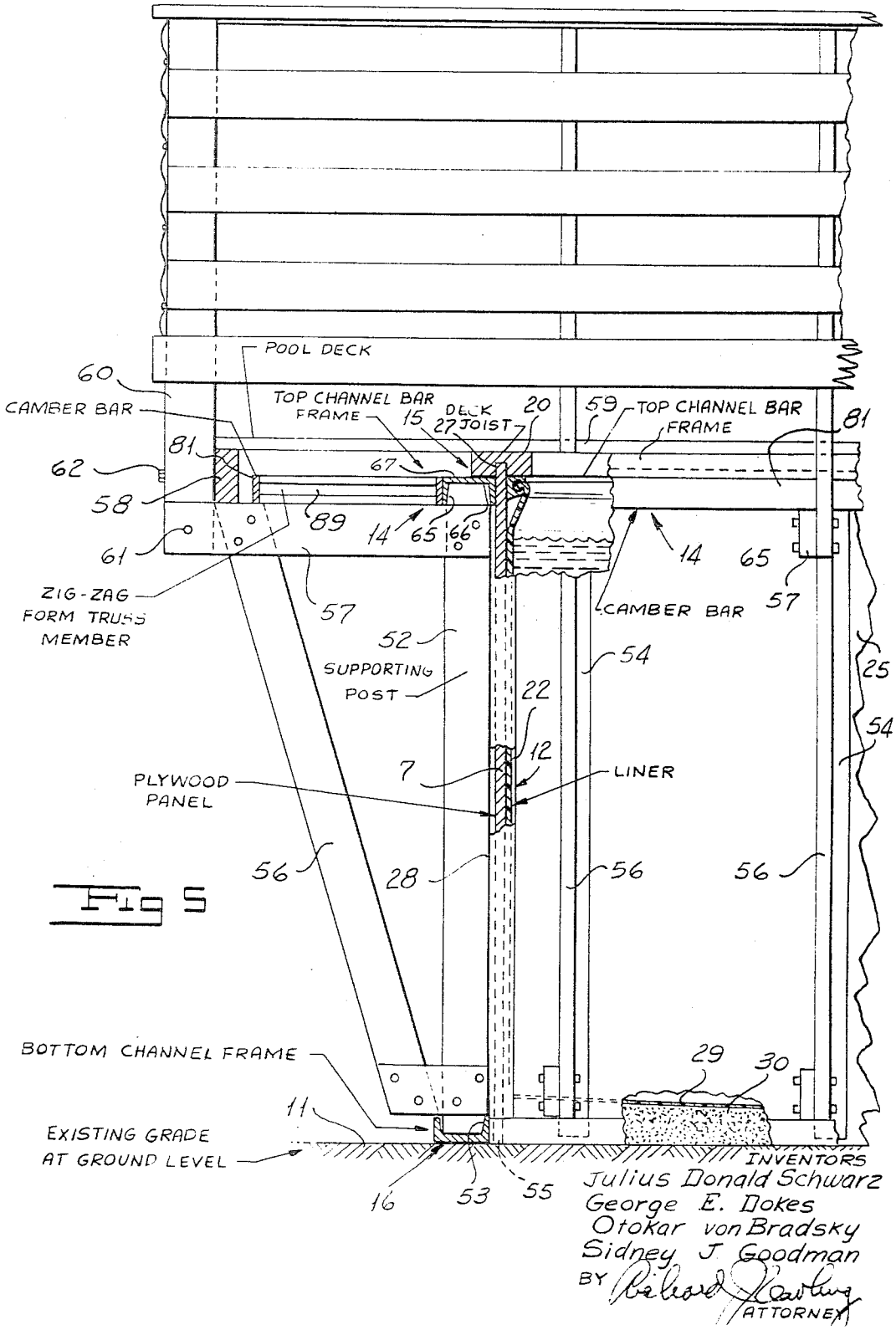


Fig 5

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CAMBER TRUSS UPPER FRAME SUPPORTING MEANS FOR SIDEWALLS OF AN ABOVE GROUND SWIMMING POOL

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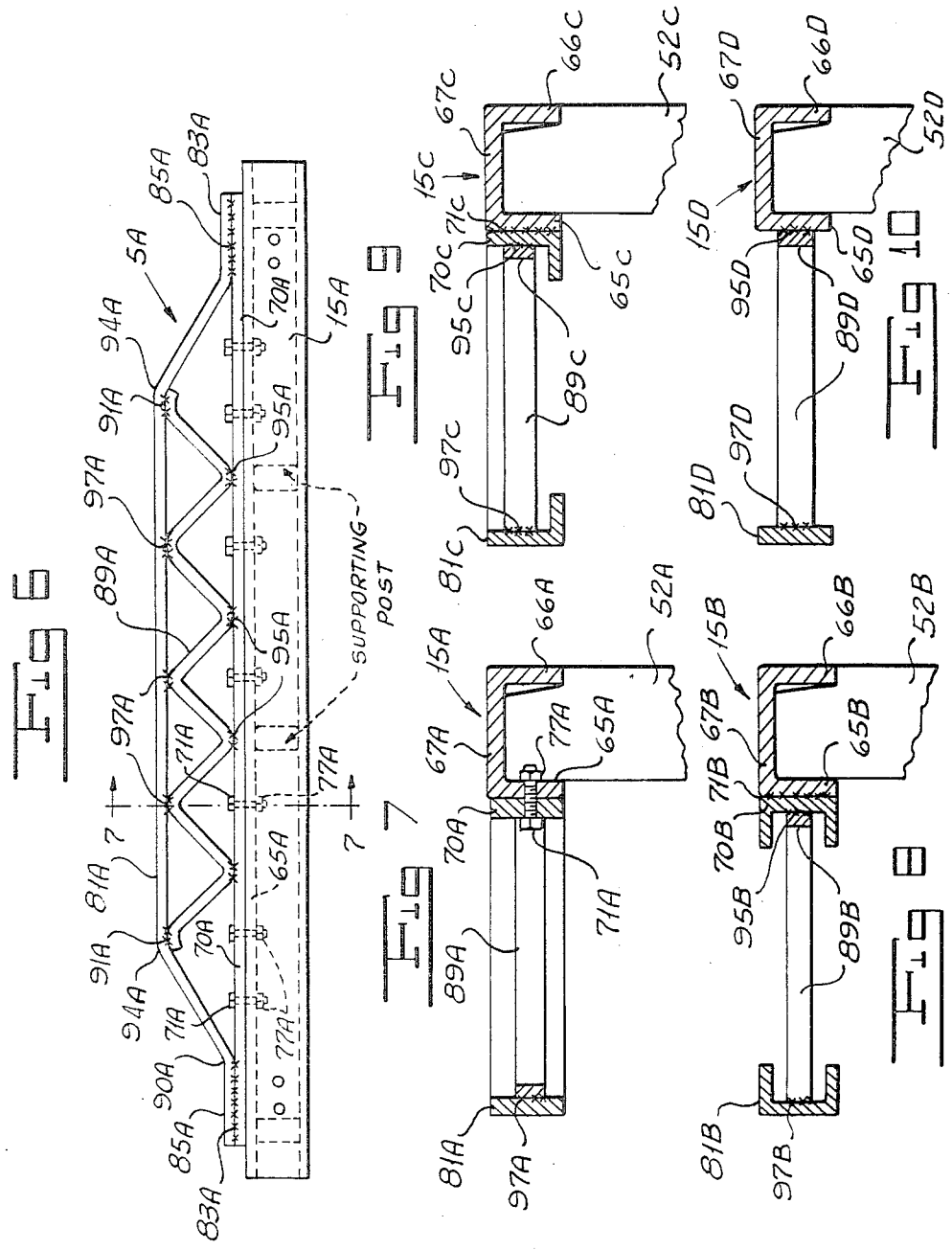


FIG 6

FIG 7

FIG 8

FIG 9

FIG 10

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CAMBER TRUSS UPPER FRAME SUPPORTING MEANS FOR SIDEWALLS OF AN ABOVE GROUND SWIMMING POOL

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Fig 11

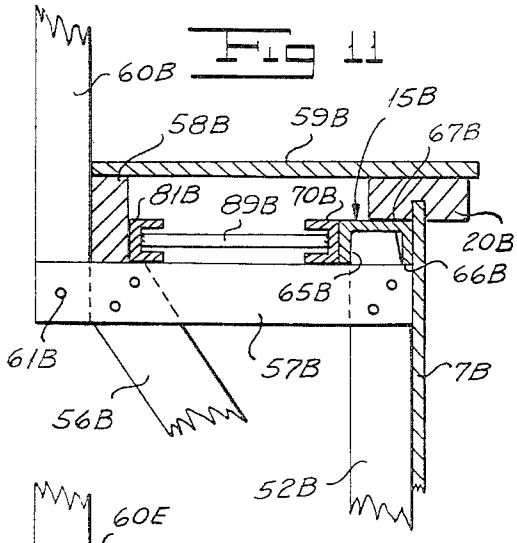


Fig 12

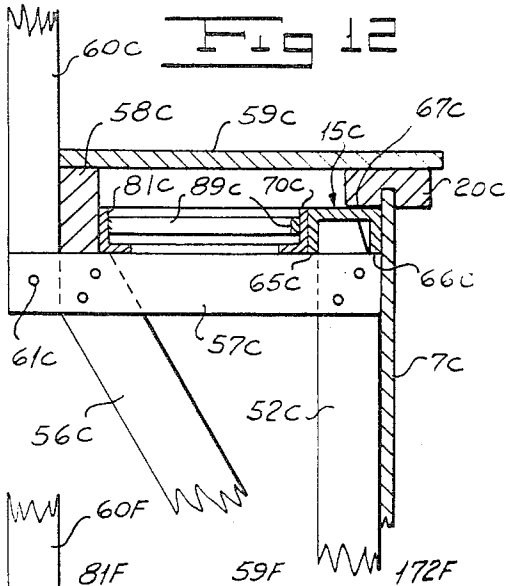
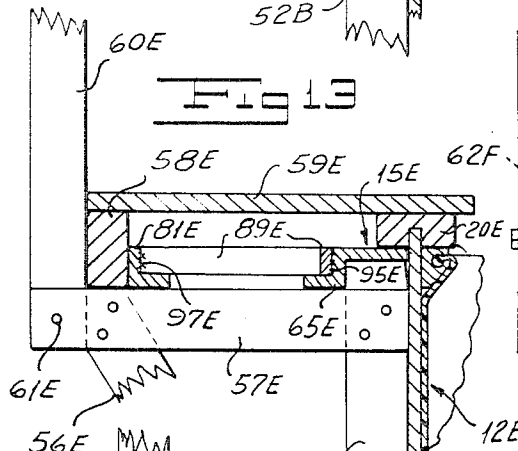


Fig 13



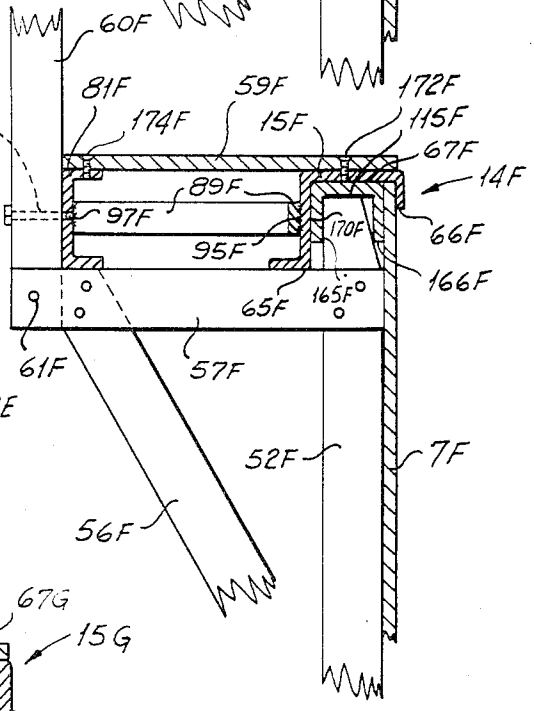


Fig 14

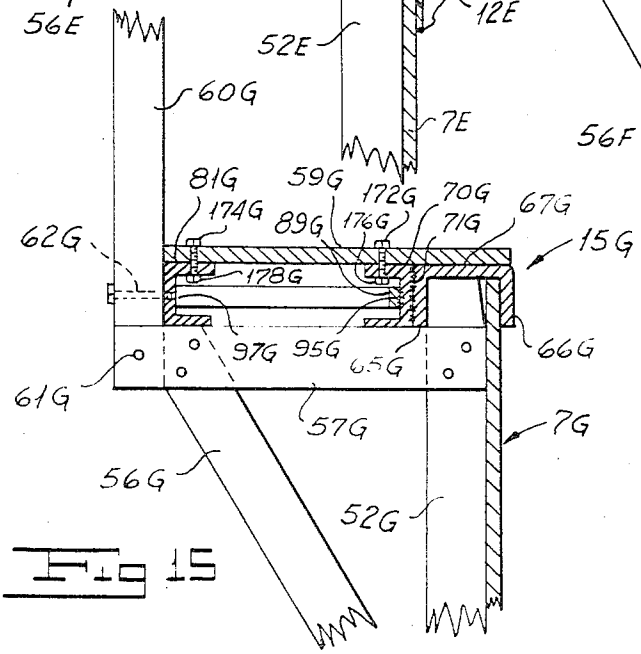


Fig 15

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SIDEWALLS OF AN ABOVE GROUND SWIMMING POOL
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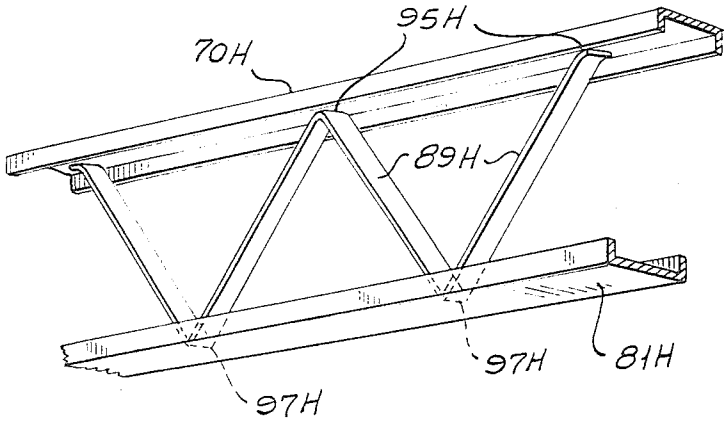


Fig 16

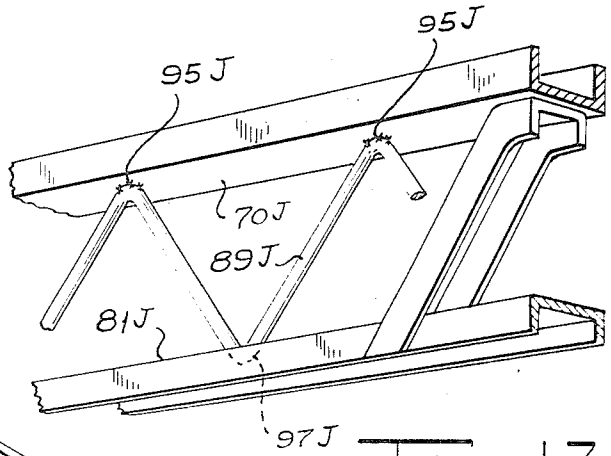


Fig 17

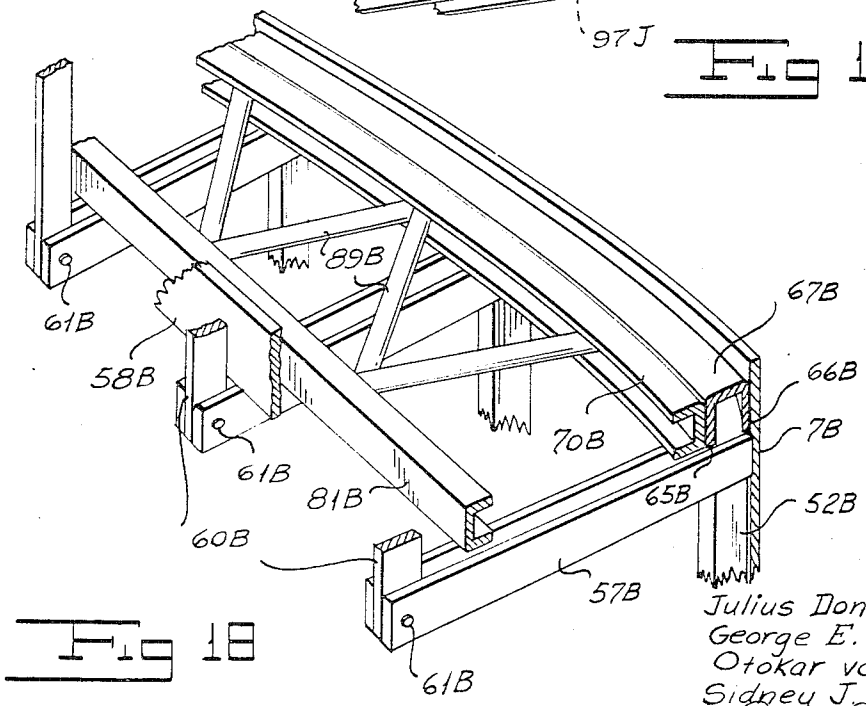


Fig 18

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CAMBER TRUSS UPPER FRAME SUPPORTING MEANS FOR
SIDEWALLS OF AN ABOVE GROUND SWIMMING POOL
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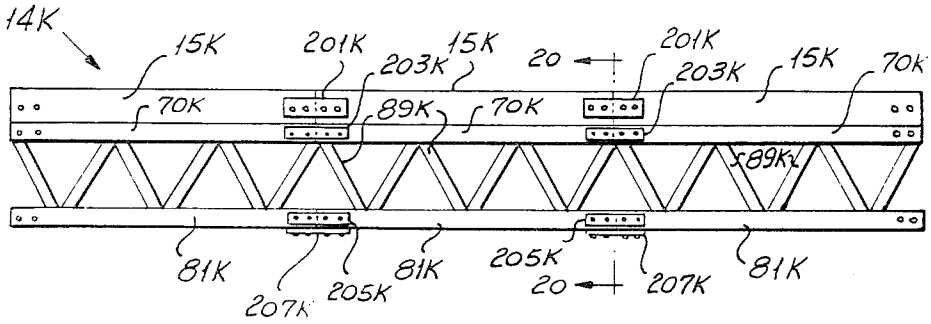


Fig 19

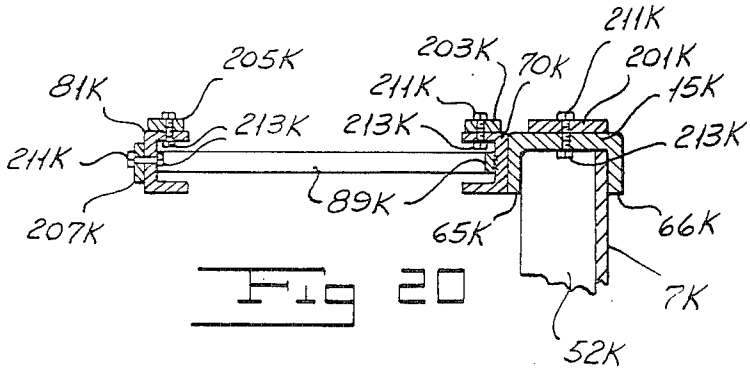


Fig 20

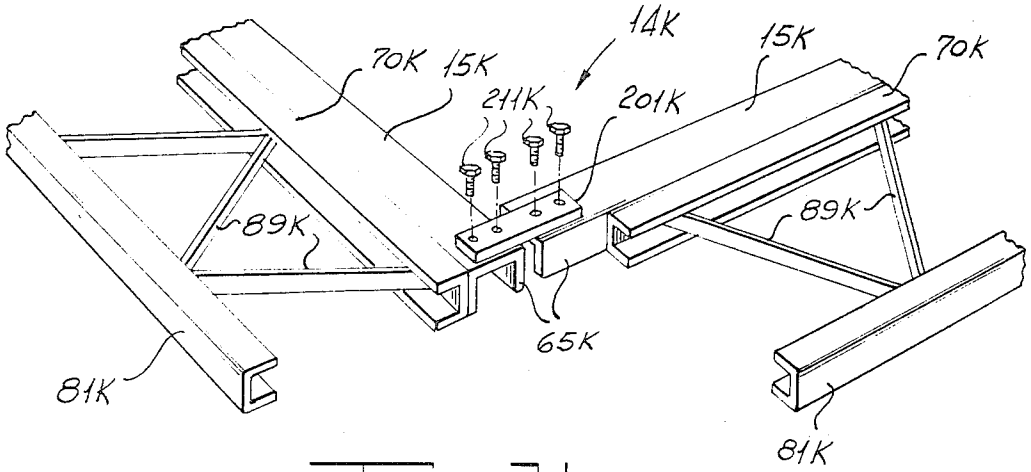


Fig 21

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CAMBER TRUSS UPPER FRAME SUPPORTING MEANS FOR SIDEWALLS OF AN ABOVE GROUND SWIMMING POOL

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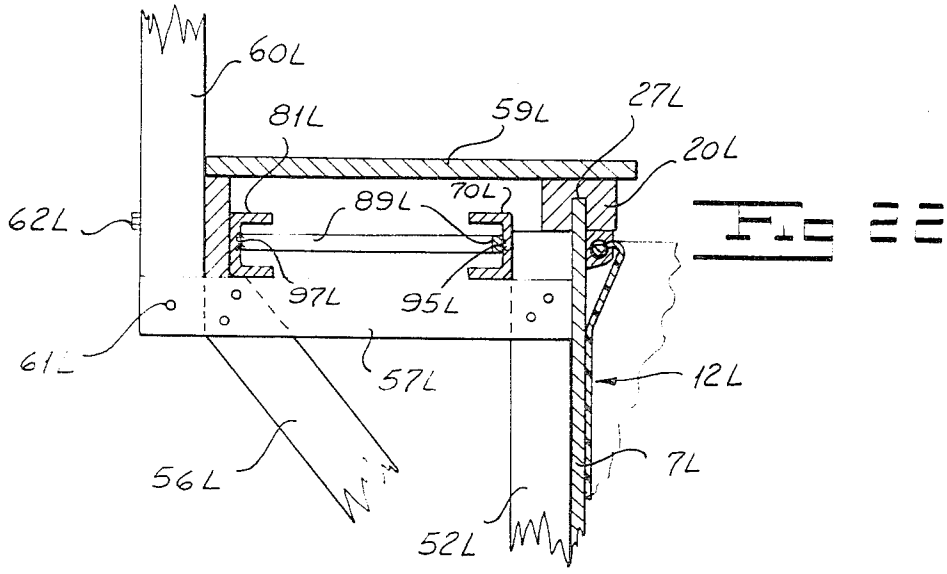


Fig 22

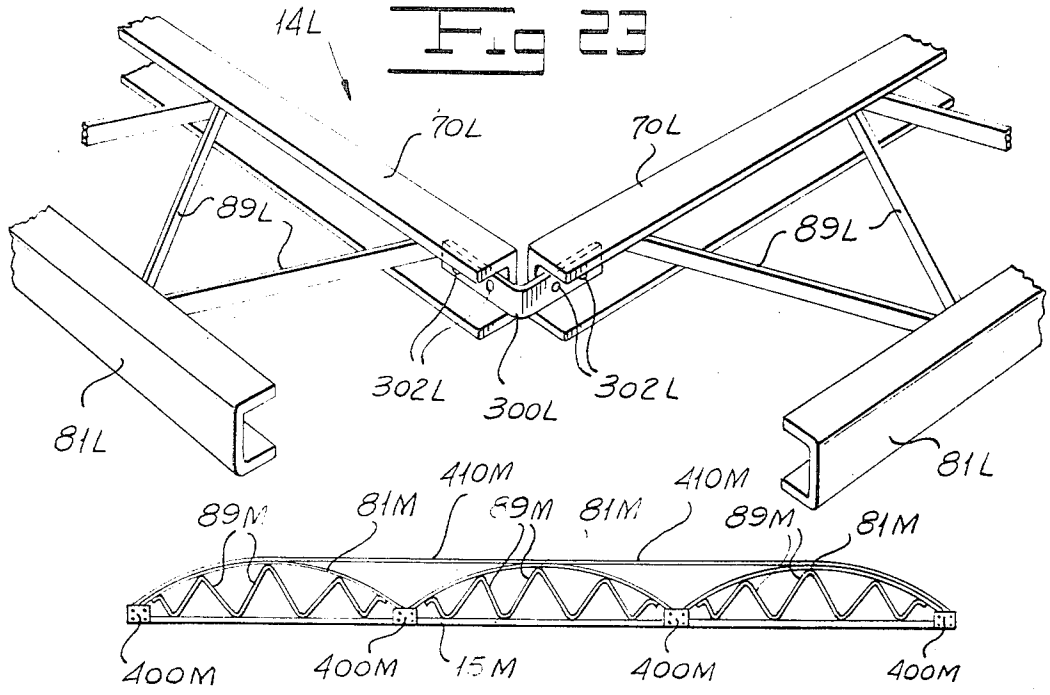


Fig 23

Fig 24

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CAMBER TRUSS UPPER FRAME SUPPORTING MEANS FOR SIDEWALLS OF AN ABOVE GROUND SWIMMING POOL

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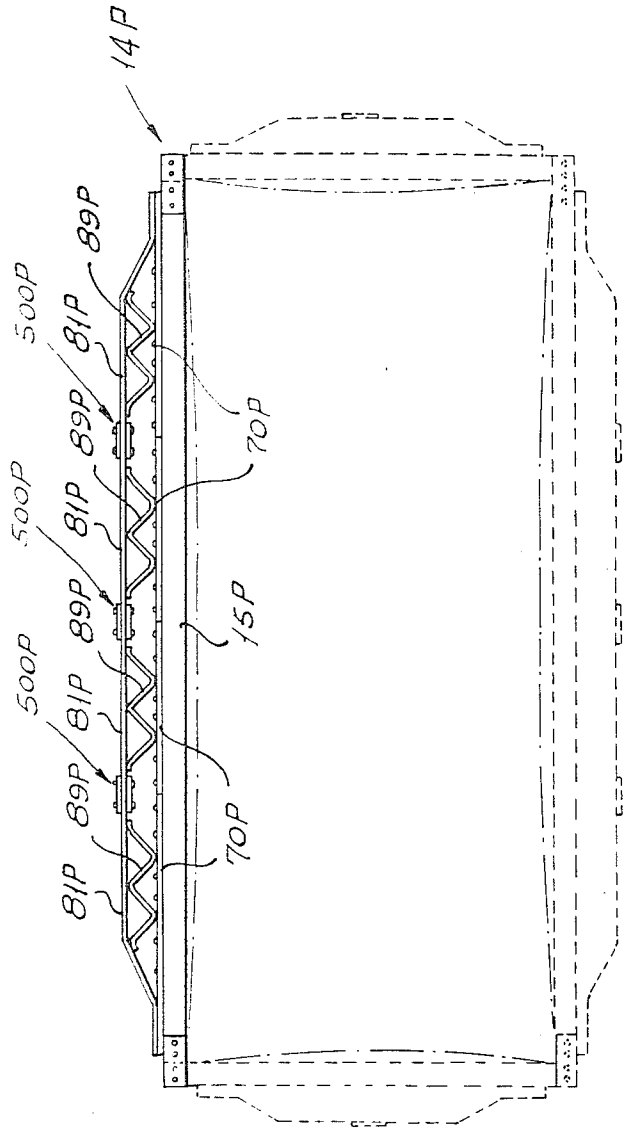


Fig 25

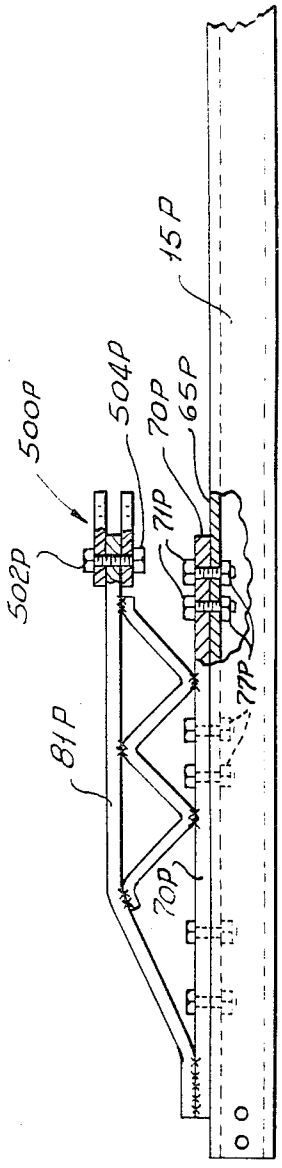


Fig 26

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United States Patent Office 3,479,780
Patented Nov. 25, 1969

3,479,780

CAMBER TRUSS UPPER FRAME SUPPORTING MEANS FOR SIDEWALLS OF AN ABOVE GROUND SWIMMING POOL

Julius Schwarz, Teaneck, George E. Dokes, Hillsdale, Otokar von Bradsky, Westwood, and Sidney J. Goodman, Paramus, N.J., assignors to Hendon Construction Company, Little Ferry, N.J., a corporation of New Jersey

Filed July 25, 1967, Ser. No. 655,886
Int. Cl. E02d *27/32;* E04c *3/04;* E04h *3/16*
U.S. Cl. 52—169 4 Claims

ABSTRACT OF THE DISCLOSURE

A camber truss upper frame supporting means for sidewalls of an above ground swimming pool including an angle bar frame for supporting an upper portion of upright sidewalls of the swimming pool, channeled camber bars suitably affixed at opposite ends to the angle bars of the upper frame, and prefabricated truss members in a zig-zag form and mounted in cooperative relation between the angle bars and the camber bars.

CROSS-REFERENCE TO RELATED APPLICATION

The present invention relates to improvements in a camber truss for providing a flexural upper frame for supporting in cooperative relation with a bottom frame a liner for carrying the water of a swimming pool above a ground level, which swimming pool may be of a type such as described and claimed in copending patent application Ser. No. 461,920 of Julius Donald Schwarz and George E. Dokes, now Patent No. 3,335,430, granted Aug. 15, 1967. Julius Donald Schwarz and George E. Dokes, the joint inventors of said patent application Ser. No. 461,920, are, together with Otokar von Bradsky and Sidney J. Goodman, the joint inventors of the present invention and application.

BACKGROUND OF THE INVENTION

Field of the invention

Means for providing an improved flexural support for the upper portion of the sidewalls of a swimming pool having a liner for carrying the water of a swimming pool above a ground level.

Description of the prior art

Heretofore, as described in the U.S. Patent No. 602,194, granted Apr. 12, 1898, to Edward L. Pease and in U.S. Patent No. 2,018,920 granted Oct. 29, 1935 to Herbert B. Mette, plural camber units have been utilized in supporting the walls of a house and in a retaining wall, respectively. While in a U.S. Patent No. 3,242,624, granted Mar. 29, 1966, to Kurt L. Stier, there are described prefabricated truss-structure sections utilized in an excavation preparatory to pouring concrete for the base foundation of a swimming pool, followed by a subsequent back-filling of the space between the panels and the excavation wall, and an installing of a collar or walk of poured concrete around the top of the swimming pool.

These prior art patents fail to suggest the idea of means provided in the present invention for effecting a flexural upper frame to support the upper portions of the sidewalls of a swimming pool, together with a liner for carrying the water of the swimming pool above a ground level.

SUMMARY OF THE INVENTION

In the present invention, there is provided a camber truss channel bar frame arranged in supporting relation about upper portions of the upright sidewalls of a swimming pool, including camber bars suitable affixed at opposite ends to the channel bars of the supporting frame, and prefabricated truss members positioned in cooperative relation between the channel and camber bars, said truss members being bent in a zig-zag form having opposite ends thereof suitably affixed in opposite angular portions of the camber bars. The intermediate diagonal portions of each of the truss members being affixed at the apices thereof alternately on surfaces of the channel bar and of the camber bar so as to permit a limited flexure of the upper channel bar frame in supporting, in cooperative relation with a bottom frame, the liner for carrying the water of the swimming pool above a ground level. Moreover, in such arrangement the channel bars of the upper frame may have end flange portions which are bolted together at corners of the upper frame with suitable anchor plates and angular corner plates so as to facilitate a knock-down construction of the upper channel bar frame, whereby it may be readily assembled and disassembled.

Thus, it is within the contemplation of the present invention to provide an above ground swimming pool liner supporting means of a simple construction that may be readily assembled with no special tools or skills, and with novel sidewall supporting camber bars providing superior strength and support to prevent distortion and bursting of the sidewalls of the pool under the pressure of the water contained therein.

Another object of the invention is to provide an improved swimming pool construction including a novel top frame of steel channel bars for effecting a flexural support of a liner for the pool above ground level.

Another object of the invention is to provide in combination with a top frame of steel side channel bars, channeled camber bars affixed at opposite ends to a corresponding side channel bar, each camber bar including a truss rod of a zig-zag form positioned between the camber bar and the side channel bar with the ends of the truss rod suitably affixed in opposite angular portions of the channeled camber bar, while intermediate diagonal portions of each of the truss members are affixed to surfaces of the side channel bar and of the camber bar so as to permit a limited flexure of the side channel bars of the upper frame in supporting, in cooperative relation with a bottom channel bar frame, a liner for a swimming pool above ground level and under pressure of the water carried within the liner of the swimming pool.

These and other objects and advantages of the invention are pointed out in the following description in terms of the embodiments thereof, which are shown in the accompanying drawings. It is to be understood, however, that the drawings are for the purpose of illustration only and are not a definition of the limits of the invention, reference being had to the appended claims for this purpose.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, in which corresponding parts have been indicated by like numerals:

FIGURE 1 is a fragmentary top plan sectional view of a swimming pool assembly embodying the invention and illustrating in section the arrangement of a suitable plastic liner for carrying the water of the pool, cooperating with plywood panel sidewalls and a novel camber truss angle bar frame arranged in supporting relation about an upper portion of the sidewalls;

FIGURE 2 is an enlarged fragmentary sectional top plan view showing the detail structure of a corner of the swimming pool assembly of FIGURE 1;

FIGURE 3 is an enlarged fragmentary sectional view taken along the lines 3—3 of FIGURE 1 and looking in

the direction of the arrows so as to show the detail structure of a corner connection of the top angle bar frame.

FIGURE 4 is an enlarged fragmentary sectional view taken along the lines **4—4** of FIGURE 1 and looking in the direction of the arrows so as to show the detail structure and arrangement of the angle bar, camber bar and truss member in relation to the supporting post.

FIGURE 5 is an enlarged fragmentary vertical sectional view of a side of the swimming pool assembly of FIGURE 1, as applied to a swimming pool of a type such as that described and claimed in U.S. Patent No. 3,335,-430 to which reference has been made heretofore.

FIGURE 6 is an enlarged top plan view of a modified form of the channel bar, camber bar and zig-zag form truss member for the angle bar frame of FIGURE 1, and showing bolts for fastening the camber bar truss to the channel bar.

FIGURE 7 is an enlarged fragmentary sectional view taken along the line **7—7** of FIGURE 6 and looking in the direction of the arrows so as to show the detail structure and arrangement of the angle bar, camber bar and truss member of the modified form of FIGURE 6 with the bolt for fastening the camber bar truss to the channel bar shown in an operative relation.

FIGURES 8, 9 and 10 are enlarged fragmentary sectional views of additional modified forms of the channel bar, camber bar and zig-zag form truss structure and arrangement from that shown by FIGURE 7.

FIGURES 11 and 12 are fragmentary vertical sectional views of modified forms of the swimming pool assembly of FIGURE 5, and illustrating application of the modified channel bar and camber bar truss structure of FIGURES 8 and 9, respectively, to the deck and outrigger structure of FIGURE 5.

FIGURE 13 is a fragmentary vertical sectional view of a further modified form of the swimming pool assembly of FIGURE 5 and illustrating the application of an additional modified form of channel bar and camber bar truss structure to the deck and outrigger structure of FIGURE 5.

FIGURES 14 and 15 are fragmentary vertical sectional views of additional modified forms of the swimming pool assembly of FIGURE 5 and illustrating the application of other modified forms of the channel bar and camber bar truss structure which may provide a preload for the top angle bar frame, an interlock for the supporting posts while also serving to directly support the pool deck planks which may be bolted to the channel bar and camber bar truss, as shown, as well as directly supporting the side rail of the pool or similar superstructure and in addition providing an interlock for an upper edge portion of the plywood panel sidewalls of the above ground swimming pool.

FIGURE 16 is a fragmentary perspective view of a modified form of camber channel bar truss such as illustrated in FIGURE 11 and showing that the truss may be of a continuous sheet metal web of a zig-zag form suitably secured or welded at the apices thereof in the U-shaped channels of the opposite channel bars.

FIGURE 17 is a fragmentary perspective view of a further modified form of the camber channel bar truss of FIGURE 16 and showing that the truss may be of a continuous metal bar web of a zig-zag form suitably secured or welded at the apices thereof to opposite camber bars which may have inverted U-shaped channels as shown.

FIGURE 18 is a fragmentary perspective view of the modified form of camber channel bar truss such as illustrated in FIGURE 11 and illustrating the inward bow imparted to the upper portion of the plywood panel sidewall by the inner side channel bar and showing that the outer camber channel bar for the truss rests upon a cross bar of the outrigger structure of FIGURE 5.

FIGURE 19 is an enlarged top plan view of a modified form of the channel bar and camber bar truss for the angle bar frame of FIGURE 1 and showing discontinuous sectional channel bars and camber bar truss members with fastening plates and bolts securing the sections in operative relation as shown.

FIGURE 20 is an enlarged fragmentary sectional view taken along the lines **20—20** of FIGURE 19 and looking in the direction of the arrows so as to show the detailed structure and arrangement of the channel bar, camber bar and truss member sections of the modified form of FIGURE 19 with the bolts and plates for fastening the sections shown in an operative relation so as to form one continuous long truss out of a series of shorter truss lengths.

FIGURE 21 is an enlarged fragmentary perspective view illustrating a manner of fastening a corner of the sectional channel bars and camber bar truss members of the modified form of FIGURE 19 in a channel bar frame of the type shown by FIGURE 1.

FIGURE 22 is a fragmentary vertical sectional view of a further modified form of the swimming pool assembly of FIGURE 5, illustrating application of a camber bar truss of a channel bar construction in which there is eliminated the additional channel bars to interlock with upper ends of the supporting posts for the sidewall panels of the pool and in which further modified form of the invention the outward pressure of the water supported by the plastic liner is transmitted directly through the sidewall panels and the supporting posts to the camber bar truss.

FIGURE 23 is an enlarged fragmentary perspective view illustrating a manner of fastening a corner of the further modified camber bar truss of the channel construction of FIGURE 22 in a top camber bar frame of the type shown by FIGURES 1 and 5.

FIGURE 24 is an enlarged top plan view of a further modified form of the channel bar and camber bar truss of FIGURE 1 and showing a plurality of camber bar sectional trusses bolted together in an operative relation within a main camber bar.

FIGURE 25 is an enlarged top plan view of another modified form of channel bar frame in which the supporting channel bars are shown of a continuous U-shape channel type with a plurality of sectional supporting bars, camber bars and truss members, each of the supporting bar sections being secured by fastening bolts to a side of one of the channel bars, the camber bar sections being secured together by fastening bolts and plates, while certain of the parts of the channel bar frame are shown in dotted outline.

FIGURE 26 is an enlarged fragmentary top plan view of a portion of one of the truss members in assembled relation in a camber bar section to better illustrate the detail structure thereof.

DESCRIPTION OF THE INVENTION

Referring to the drawings and particularly FIGURES 1 and 5, there is shown an improved construction, embodying the present invention of a camber truss upper frame supporting means **5** for sidewalls **7** of a swimming pool, which may be of a type described and claimed in U.S. Patent No. 3,335,430; and a swimming pool which may be mounted above a ground level **11**, as shown by the fragmentary sectional side view of FIGURE 5.

The pool construction includes a fluid tight liner indicated generally by the numeral **12**, and carried above the level of the ground **11** by an assembly of a rectangular top frame **14** of steel channel bars **15** supported by a corresponding rectangular bottom frame **16** of steel channel bars resting on the ground level **11**, as shown in FIGURE 5, and explained in the U.S. Patent No. 3,335,430.

The liner **12** may be of any suitable flexible sheet material that is somewhat stretchable, and a vinyl plastic material such as polyvinylchloride has been found to be very satisfactory. There is provided along the upper

or top free edge of the liner **12** and extruded bead that may be snapped into a liner lock strip or other suitable means and fastened to the underside of an inner joist **20** supporting a pool deck, as explained in the U.S. Patent No. 3,335,430.

The liner **12** has a vertical portion **22**, which is adapted to be pressed tightly under pressure of the water carried by the liner **12**, against the inner surface of sidewalls or plywood panels **7**. Each of the panels **7** has an upper edge mounted in a suitable channel **27** provided in the joist **20**. The panels **7** are positioned between the joists **20** and the ground level **11**, as shown in FIGURE 5, and the joists **20** serve not only to lock the plywood panels **7** in a vertical position, but also to automatically align and prevent any shifting of the pool deck.

Further, a steel angle bar **28**, as shown by FIGURES 1 and 2, is set vertically at each outer corner of the sidewalls **7** and within each corner of the top channel bar frame **14** and the lower channel bar frame **16** between the plywood walls **7** and the inside flange of the U-shaped channel bars of the top frame **14** and the inside flange of the U-shaped channel bars of the lower frame **16**. The corner angle bars **28** are thereby locked at the upper and lower ends thereof and extend vertically from the inner corner of the U-shaped channel bars of the lower frame **16** for the full height of the sidewalls **7** being further locked at the upper end in a suitable channel provided in the inner joist **20**. The corner angle bars **28** serve to prevent the adjacent corner of the plywood panels or sidewalls **7** and the liner **12** resting against it from moving out of position or bursting.

A bottom portion **29** of the liner **12** will be stretched and pressed tightly under the pressure of the water filling the pool against a sand bottom **30** suitably formed so that the bottom portion **29** of the liner **12** is pitched at an incline from the vertical wall portions **22** of the liner **12** toward a suitable drain opening provided therein and connected through suitable plumbing means to drain the water from the pool, as desired. Further, there is provided a suitable water inlet fixture which opens through a wall portion of the liner **12** and is connected to a suitable water supply means for filling the pool, as explained in U.S. Patent No. 3,335,430.

A feature of the present invention is the provision of the novel camber truss upper frame **5** and the assemblage thereof in relation to the rectangular top frame **14** of steel angle bars **15** for supporting the upper portions of the sidewalls or plywood panels **7**, and thereby the water filled pool liner **12** above ground level under pressure of the water, while the lower portions of the sidewalls **7** are supported by a corresponding rectangular bottom frame **16** of steel channel bars resting on the ground level **11**, as shown in FIGURE 5, and assembled as explained in the aforementioned U.S. Patent No. 3,335,430.

With the bottom channel frame **16** thus assembled, the plywood panels **7**, shown in FIGURES 1, 2 and 5, are then set edgewise in the ground inside the bottom channel frame **16** and against the U channel bar of the frame **16** with the smooth side of the plywood panels **7** facing out.

A series of wooden supporting posts **52** and **54**, as shown in FIGURES 1, 2 and 5, extend vertically from the channel bars of the bottom frame **16** with the lower ends of the posts **52** and **54** standing in the U channel of the bars of the bottom frame **16**. The bottom of the supporting posts are suitably chamfered, as indicated at **53** in FIGURE 5, to fit the channels of the U bar of the bottom frame **16** so as to render a full bearing surface for the plywood panels **7**.

Care should be taken that the lower end portions **55** of the plywood panels **7** are flush with the bottom of the channel bars **16** of the bottom frame, as shown in FIGURE 5. The plywood panels **7** are then secured by nails or suitable wood screws to the posts **52** and **54**.

Referring now to FIGURE 5, each of the supporting posts **52** and **54** has fastened thereto a supporting beam **56**, and adjacent an upper portion of the supporting post **52** there is affixed a cross bar **57**, which projects outwardly at a right angle to the supporting post **62**. The cross bar **57** is supported by the supporting beam **56** and, in turn, carries an outer deck joist **58** arranged in spaced relation to the inner deck joist **20**. The joist **20** is carried by the upper portion of the sidewalls or panels **7**, which are mounted in the channel **27** provided in the joist **20** for supporting the pool deck. The pool deck includes suitable planks **59**, which are nailed to the joists **20** and **58**, while top posts **60**, as shown by FIGURE 5, are each secured to the cross bar **57** by suitable bolts **61** and to the outer deck joist **58** by a second bolt **62**. The deck of the pool may be further constructed, as described in the aforementioned U.S. Patent No. 3,335,430.

Steel channel bars **15** of the rectangular top frame **14** are now assembled with outer and inner flange portions **65** and **66** respectively, lying flat on the top surface of the cross bars **57**, and extending transversely of the bars **57**, as shown by FIGURE 5. The flange portions **65** and **66** extend at right angles to a main portion **67** of the channel bar **15** which is positioned so as to lie flat along a lower surface of the inner joist **20**, as best shown by FIGURES 4 and 5.

The outer flange portions **65** of the channel bars **15** have a camber truss flat steel adaptive member **70** extending along the outer surface of each flange **65** and suitably fastened thereto as by welding at **71**, as indicated by FIGURE 4. End portions **72** of the channel bars **15** are clamped together by a suitable metal plate indicated generally by the numeral **73**, in FIGURES 1, 2 and 3, and secured thereto by suitable means such as by welding, rivets or bolts **75**.

As shown in detail by FIGURE 3, the metal plates **73** are secured to the end portions **72** of the channel bars **15** in an assembled relation by suitable fastening bolts **75** passing therethrough from the outer side and being fastened at the opposite inner side of the channel bars **15** by suitable retaining nuts **79** screw threadingly engaged on the fastening bolts **75**. All corners of the upper frame **14** are similarly connected by the plates **73** and bolts **75**, as shown by FIGURE 1.

The novel camber truss upper frame **5** of the present invention, includes the provision of a bowed camber bar **81**, which is fastened at opposite end portions **83** to the flat steel adaptive member **70** extending along the outer surface of the flange portion **65** of the channel bar **15** by being welded thereto at **85**, as shown by FIGURE 2, or through other suitable fastening means. The camber bars **81** are formed of hot rolled flat spring steel, which is bowed or has a bend **90** formed therein adjacent the opposite ends thereof and additional bends **94** therafter, as shown by FIGURES 1 and 2.

There is also inserted between each bowed camber bar **81** and the steel channel bar **15** a spring steel truss member or rod **89** made in one piece and bent into a zig-zag form with opposite ends thereof fastened by suitable means, as by welding at **91** to the inner surface of the camber bar **81** at the additional bends **94** in the bowed camber bar **81**, as shown by FIGURE 1.

The truss member **89**, in the zig-zag form shown, provides alternate V-shaped bends having apices **95** and **97** which alternately bear upon the flat steel adaptive member **70** extending along the flange portion **65** of the channel bar **15** and upon the inner surface of the chamber bar **81** so that there is effected an inward bow or arch to each of the channel bars **15** of the top channel bar frame **14** at the middle portion thereof. Furthermore the spring steel truss member or rod **89** is suitably fastened as by welding at the apices **95** and **97** thereof to the adaptive member **70** and the camber bar **81**, as shown by FIGURE 4.

The supporting posts **52** and **54** are inserted between the inwardly bowed channel bars **15** and the sidewalls **7** to

effect a corresponding inward bow or arch at the upper ends of the sidewalls **7**. The camber truss upper frame **5** thus serves to flex or arch the channel bars **15** inwardly so as to provide a novel flexural top channel bar frame **14** of greater strength for supporting, in cooperative relation with the bottom channel bar frame **16**, the pool liner **12** above the ground level **11** and under the pressure of the water carried within the liner **12**.

Thus, as the pressure of the water within the liner **12** increases, the apices **95** and **97** of the zig-zag form truss member **89** being welded to the adaptive member **70** and camber bar **81**, respectively, bear upon the outer surface of the flange portion **65** of the channel bar **15** so as to tend to resiliently support the channel bar **15** in relation to the inner surface of the camber bar **81** so that the angle of the alternate V-shaped bends in the truss member **89** effectively increase under tension, thereby providing a substantial increase in the strength of the structural support provided for the liner **12** by the top frame **14** in cooperation with the bottom frame **16**. Thus, the water capacity of the liner **12** supported above the ground level **11** may be substantially increased without danger of distortion or bursting of the sidewalls **12** of the assembled pool under the pressure of the water contained therein.

MODIFIED FORMS OF THE INVENTION

Modified forms of the invention, as heretofore described with reference to FIGURES 1 through 5, are shown in FIGURES 6 through 26 in which corresponding parts have been indicated by like numerals bearing appropriate suffixes indicating the modified form.

Thus, in the modified form of the channel bar camber truss of FIGURES 6 and 7, the camber truss adaptive member **70A** is shown secured to the flange portion **65A** of the channel bar **15A** by suitable fastening bolts **71A** passing through the outer flange portion **65A** of the channel bar **15A** from the outer side of the camber truss adaptive member **70A** and being fastened at the opposite inner side of the channel bar **15A** by suitable retaining nuts **77A** screw threadedly engaged on the fastening bolts **71A**. The structural arrangement of the modified channel bar camber truss **5A** of FIGURES 6 and 7 in the top channel bar frame of FIGURES 1 and 5 being otherwise substantially as heretofore described.

Further, in the modified form of the invention of FIGURES 8, 11 and 18, there is provided a channel bar camber truss adaptive member **70B** welded at **71B** to the outer flange portion **65B** of the channel bar **15B** and a camber channel bar **81B**. The truss member **89** has the alternate V-shaped bends welded at the apices **95B** and **97B** to the inner surface of the channel bar member **70B** and the inner surface of the camber channel bar **81B**, and is otherwise substantially the same as the structure heretofore described with reference to FIGURES 4 and 5.

The modified form of FIGURES 9 and 12 differs from the form of FIGURE 8 merely in the provision of an angle bar camber truss adaptive member **70C** and a camber angle bar **81C** while the modified form of FIGURE 10 differs from the form of FIGURE 4 in the securing of the truss member **89D** directly by the welding of the apices **95D** thereof to the outer surface of the flange portion **65D** of the channel bar **15D**, thereby eliminating the camber truss adaptive member **70** of FIGURE 4.

Likewise, the form of the invention of FIGURE 13 is similar to FIGURES 9 and 12 except for an elimination of the camber truss angle bar adaptive member by securing the truss member **89E** directly to the outer surface of an angle bar flange portion **65E** of an angle bar **15E** in which the inner flange **66C** of the channel bar **15C** has also been eliminated. The structure of the form of FIGURE 13 is otherwise substantially the same as that heretofore described with reference to FIGURES 9 and 12.

A further modified form of the invention is illustrated by FIGURE 14 in which the outer deck joist **58E** of FIGURE 13 has been eliminated by the utilization of a camber channel bar **81F** while the inner deck joist **20E** of FIGURE 13 has been eliminated by the utilization of a channel bar **15F** having an outer angle bar flange portion **65F** and an inner flange portion **66F**. Within the channel bar **15F** there is provided an inner channel bar **115F** having downwardly extending flange portions **165F** and **166F** forming therewith a U channel in which is received and upper end of the supporting post **52F**.

The inner channel bar **115F** has the flange portion **166F** secured to the inner surface of the flange portion **65F** of the channel bar **15F** by suitable means such as by welding at **170F**, while the flange portion **166F** is positioned in spaced relation to the inner surface of the flange portion **66F** of the channel bar **15F**. A main portion **67F** of the channel bar **15F** has formed therein suitable screw threaded openings in which there may be received suitable screw treaded bolts **172F** which pass through planks **59F** of the pool deck from the outer side.

Each bolt **172F** is fastened at the opposite side of the pool deck in screw threaded engagement in the screw threaded opening in the main portion **67F** of the channel bar **15F**. One of the fastening bolts **172F** is shown in operative engagement in FIGURE 14.

Similarly other screw threaded fastening bolts **174F** pass through the planks **59F** from the outer side being fastened at the opposite side of the pool deck in another screw threaded opening in an upper flange portion of the channel camber bar **81F** while a bolt **62F** extends through a lower end portion of the top post **60F** from the outer side thereof and is secured at an inner end in screw threaded engagement in a suitable screw threaded opening formed in a main portion of the camber channel bar **81F**, as indicated in dotted lines at FIGURE 14.

It will be further noted that the upper end of the side wall panel **7F** is received in the space between the flange portion **166F** of the inner channel bar **115F** and the inner surface of the flange portion **66F** of the channel bar **15F**.

It will be seen that the novel arrangement of the channel bar camber truss of FIGURE 14 may serve the following functions:

(1) Provide a preload for the channel bar frame **14F** of the above ground swimming pool;

(2) Provide through the channel bars **115F** an interlock for the upper ends of the side wall **7F** supporting posts **52F**;

(3) Directly support the pool deck planks **59F** through the arrangement of the channel bar **15F** and the camber channel bar **81F** together with the deck plank fastening bolts **172F** and **174F**;

(4) Directly support the side rail posts **60F** for the pool deck through the arrangement of the camber channel bar **81F** and fastening bolt **62F** as well as similar superstructure to be carried by the posts **60F**; and

(5) Provide through the arrangement of the flange **166F** of the inner channel bar **115F** in spaced relation to the inner surface of the flange portion **66F** of the channel bar **15F** means for effecting an interlock for the upper edge portions of the sidewall panels **7F**, as shown by FIGURE 14.

In order to effect the aforenoted functions with a more simplified arrangement the modified structural arrangement of FIGURE 15 was provided. This arrangement is quite similar to that of FIGURES 8, 11 and 18, except that in the channel bar **15G** the flange portions **65G** and **66G** extend downwardly from the main portion **67G** in a sufficiently spaced relation to provide a U-shaped channel to receive both the upper end portion of the supporting post **52G** as well as an upper end portion of the sidewall panels **7G** supported by the posts **52G**, as heretofore explained.

Furthermore, as shown by FIGURE 15, the deck planks **59G** rest upon the main portion **67G** of the channel bar **15G** as well as upon the upper flange portion of the channel bar camber truss adaptive member **70G** and the upper flange portion of the camber channel bar **81G**. The

planks 59G being secured thereto by suitable fastening bolts 172G and 174G.

The bolts 172G and 174G pass through the planks 59G from the outer side of the pool deck and are fastened at the opposite inner side of the adaptive member 70G and the camber channel bar 81G, respectively, by suitable retaining nuts 176G and 178G, as shown by FIGURE 15.

The top post 60G is further fastened in position by a bolt 62G which extends through a lower end portion of the top post 60G from the outer side thereof and is secured at an inner end in screw threaded engagement in a suitable screw threaded opening formed in a main portion of the camber channel bar 81G, as indicated in dotted lines at FIGURE 15.

FIGURE 16 illustrates another modification in the truss in that the truss 89H may be in the form of a sheet metal strip welded or bolted at the apices thereof 95H and 97H in the channels of the respective channel bar adaptive member 70H and the camber channel bar 81H, while the modified form of FIGURE 17 illustrates the truss 89J as a bent bar welded or bolted at the apices thereof 95J and 97J to the surfaces of an adaptive member 70J and camber bar 81J which may be in the form of inverted U-shaped channel bars 70J and 81J or the truss may be in the form of a flat bar member.

FIGURES 19, 20 and 21 illustrate a further modified form of the invention in which the channel bar frame 14K may be formed of discontinuous sectional channel bars 15K and sectional channel bar camber truss adaptive members 70K secured together by suitable fastening plates 201K and 203K as well as sectional camber channel bars 81K that may be secured by plates 205K and 207K. The respective plates 201K, 203K, 205K and 207K may be secured in an operative relation by suitable fastening means such as rivets, welding or bolts 211K passing through the respective plates, bars and members and being secured on the inner side by screw threadedly engaged nuts 213K, as shown by FIGURE 20.

A similar plate 201K and fastening bolts 211K secured on the inner side by screw threadedly engaged nuts 213K may be used to secure the sectional channel bars 15K together at the corners of the channel bar frame 14K, as shown by FIGURE 21.

In the modified form of the invention illustrated by FIGURES 22 and 23 the channel bar for interlocking the upper end portions of the supporting posts 52L has been eliminated, and the pressure of the water applied to the sidewalls 7L through the plastic liner 12L is transmitted to the truss 89L through the supporting posts 52L which in turn support the side panels 7L.

As shown in detail in FIGURE 23, at the corners of the channel bar frame 14L, there is provided a right angled corner bracket 300L which is secured in the channels of the respective channel bar members 70L by suitable fastening means such as rivets, welding or fastening bolts 302L. The structure of the assembly will be otherwise the same as that heretofore described with reference to FIGURES 5, 8, 11 and 18.

A further modified form of the sectional form of FIGURES 19, 20 and 21 is illustrated in FIGURE 24 in which a plurality of separate camber bars 81M are provided secured at opposite ends by fastening plates 400M and suitable fastening screws to a channel bar 15M as in FIGURE 10 and including in co-operative relation with each camber bar mounting a truss 89M which may be of the structure heretofore described.

Extending over the respective separate camber bar mountings 81M is a main resilient camber bar 410M which may be connected in a suitable manner at opposite ends of the channel bar 15M, at 400M, and cooperatively arranged in relation to the separate camber bar mountings 81M to resiliently support the channel bar 15M upon tension being applied thereto by the pressure of the water carried by the plastic liner as heretofore explained with reference to FIGURES 5 and 10.

An additional form of a sectional channel bar frame 14P is shown by FIGURES 25 and 26 in which the supporting channel bars 15P are shown as of continuous U channel type as in FIGURE 1, but including a plurality of sectional camber bars 81P, sectional truss members 89P, and sectional adaptive members 70P. The sectional adaptive members 70P may be bolted to the flange portion 65P of the channel bar 15P by suitable bolts 71P passing through the outer flange portion 65P of the channel bar 15P and being fastened at the opposite inner side of the channel bar 15P by suitable retaining nuts 77P screw threadedly engaged on the fastening bolts 71P, as in the form of FIGURES 6 and 7. Furthermore, in the form of FIGURES 25 and 26, the respective sectional camber bars 81P may be suitably connected together by fastening plates 500P, bolts 502P and fastening nuts 504P, as shown in FIGURE 25 and in detail in FIGURE 26.

The form of FIGURES 25 and 26 is operatively arranged in the channel bar frame so as to operate, as heretofore described with reference to FIGURES 1 and 5.

Although numerous embodiments of the invention has been illustrated and described, various changes in the form and relative arrangements of the parts, which will now appear to those skilled in the art may be made without departing from the scope of the invention. Reference is, therefore, to be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. In a swimming pool assembly of a type including upright sidewalls, a bottom frame for supporting lower portions of the sidewalls, supporting posts for the sidewalls extending vertically from the bottom frame, a top frame for supporting upper portions of the supporting posts, a liner for carrying water for the pool above a ground level, the liner having a vertical portion, a bottom portion and an upper edge, the vertical portion of the liner extending adjacent inner surfaces of the sidewalls, the bottom portion of the liner being positioned adjacent surfaces of the ground, means for securing the upper edge of the liner adjacent the top frame, and the top frame including a plurality of side bars interconnected at opposite ends and positioned adjacent the upper portions of the supporting posts; the improvement comprising a plurality of sectional camber trusses mounted along an outer side surface of one of said side bars, each sectional camber truss including a camber bar and a resilient truss bar, each resilient truss bar being positioned between the corresponding camber bar and the outer side surface of said one side bar, means for serially connecting the camber bars of the sectional camber trusses mounted along said outer side surface of said one side bar so as to effectively position said camber bars in an operative relation to effect a flexural top frame for supporting in cooperative relation with the bottom frame the upper portions of the adjacent supporting posts and sidewalls and thereby the liner for carrying the water of the pool above the ground level, a main resilient camber bar extending over the camber bars of the plurality of sectional camber trusses, and means connecting opposite ends of the main camber bar in spaced relation on said one side bar adjacent opposite ends of the side bar to resiliently support said side bar upon tension being applied thereto by the water carried by the liner.

2. The improvement defined by claim 1 in which each resilient truss bar is provided in a zig-zag form having alternate V-shaped bends with apices which alternately bear upon the outer side surface of said one side bar and an inner surface of the camber bar of the corresponding sectional camber truss, and said truss bar having opposite ends secured in spaced relation along at least one of said surfaces in spaced relation.

3. The improvement defined by claim 2 including means for securing the resilient truss bar at the apices of alternate bends therein to at least one of said surfaces.

4. In a swimming pool assembly of a type including upright sidewalls, a bottom frame for supporting lower portions of the sidewalls, supporting posts for the sidewalls extending vertically from the bottom frame, a top frame for supporting upper portions of the supporting posts, a liner for carrying water for the pool above a ground level, the liner having a vertical portion, a bottom portion and an upper edge, the vertical portion of the liner extending adjacent inner surfaces of the sidewalls, the bottom portion of the liner being positioned adjacent surfaces of the ground, means for securing the upper edge of the liner adjacent the top frame, and the top frame including a plurality of side bars, interconnected at opposite ends and positioned adjacent the upper portions of the supporting posts; the improvement in which the top frame includes locking means within said side bars for receiving upper portions of the sidewalls together with upper portions of the supporting posts for locking said upper portions in a fixed relation, said locking means including a pair of channel bars, one of said pair of channel bars being positioned within the other of said pair of channel bars, upper portions of the supporting posts being mounted in a channel portion of said one channel bar, upper portions of said sidewalls being mounted in a channel portion of said other channel bar and the upper portions of said sidewalls being positioned between an outer side surface of said one channel bar and an inner side surface of said other channel bar so as to lock the upper portions of the supporting posts and sidewalls in said fixed relation.

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