

[54] **INFLATABLE ENCLOSURE FOR
SWIMMING POOLS AND THE LIKE**

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52/2; 220/26

[56] **References Cited**

UNITED STATES PATENTS

3,063,062	11/1962	Logan.....	4/172.14
3,338,001	8/1967	Fraser.....	52/2
3,353,309	11/1967	Kwake.....	52/2

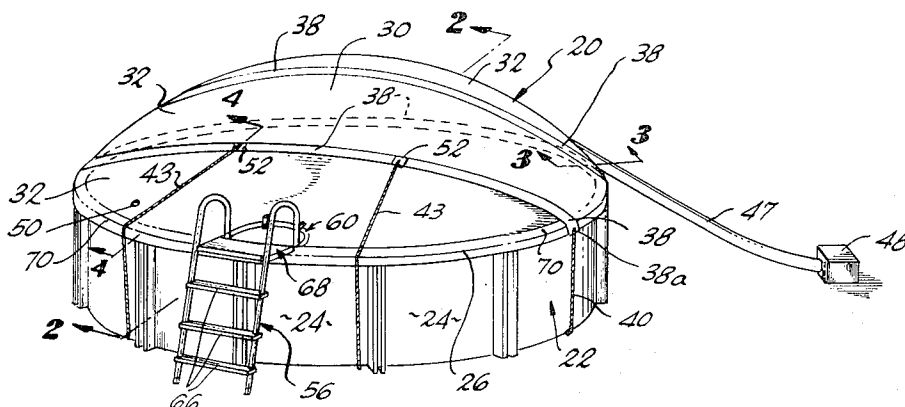
3,366,977	2/1968	Koehler	4/172.12
3,373,531	3/1968	Meyer et al.....	52/2
3,389,510	6/1968	Stock.....	52/2
3,478,472	11/1969	Kwake.....	52/1
3,512,186	5/1970	Sanford	4/172.12
3,528,110	9/1970	Woycik.....	4/172.12
3,600,721	8/1971	Pusey.....	4/172.12

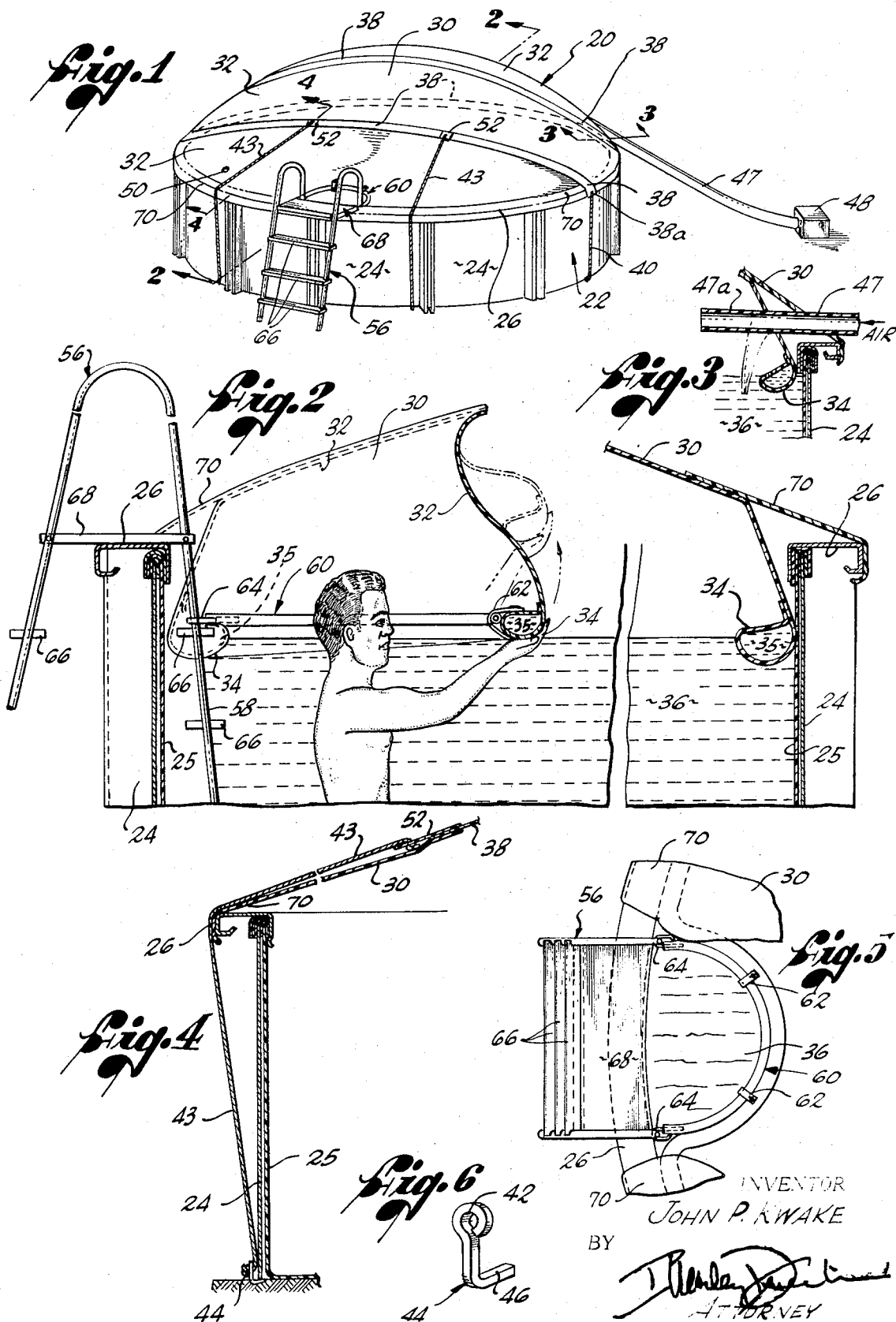
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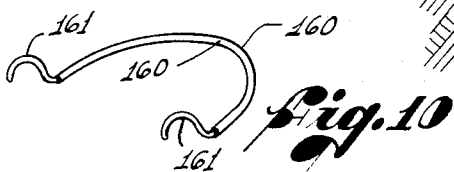
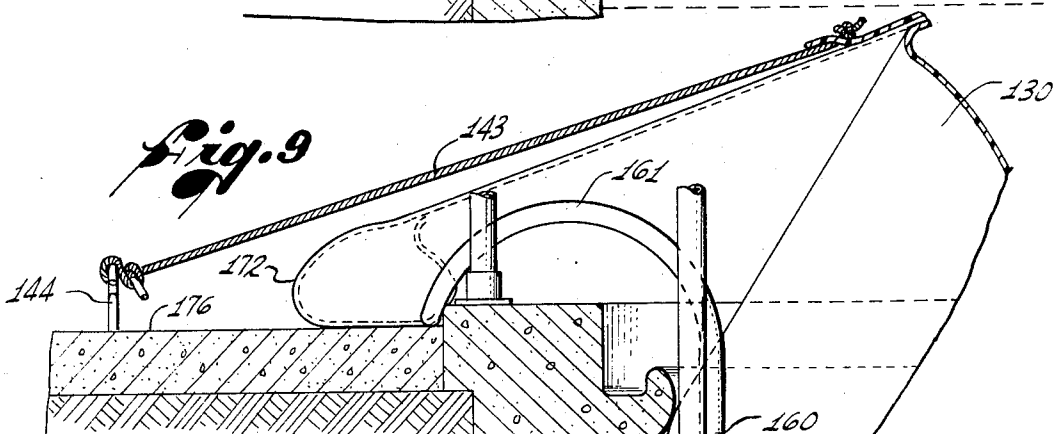
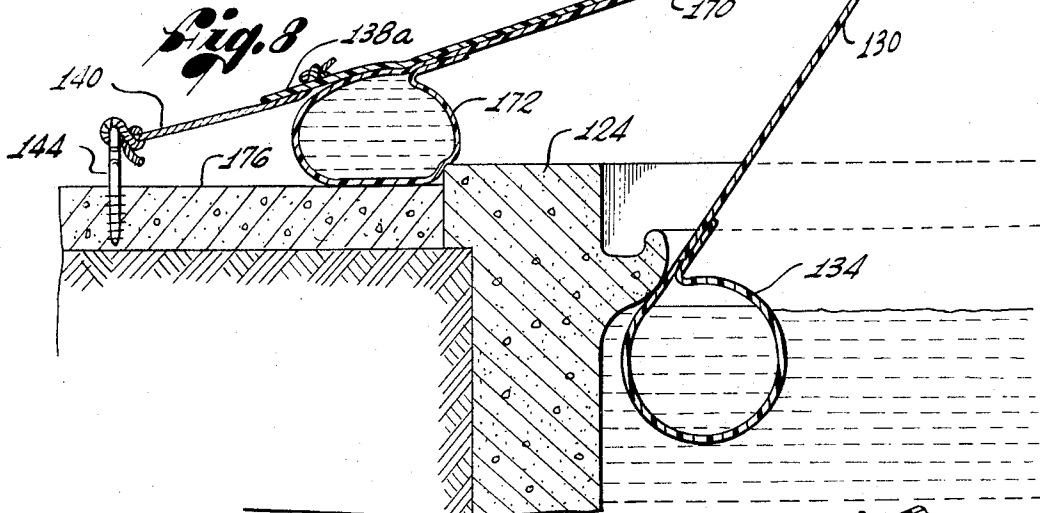
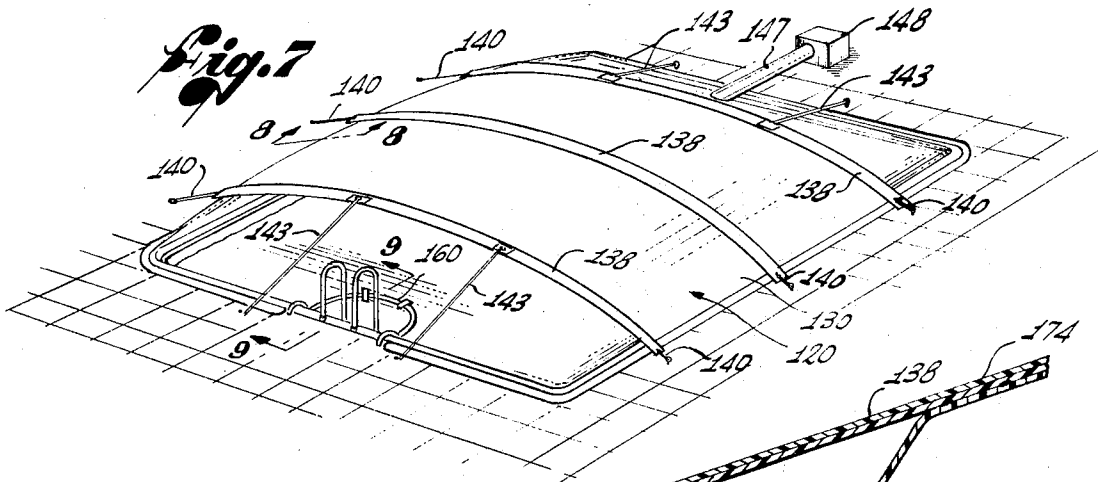
[57] **ABSTRACT**

A vinyl, or other plastic, enclosure for swimming pools (both in-ground and above-ground), storage tanks, or other liquid carrying containers which can be inflated by blower means, to a domed position. When inflated, a simplified non-zipper entry into the enclosed space is provided. The enclosure can also be used as a slightly domed or crowned cover to shed rain and dirt.

19 Claims, 10 Drawing Figures







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INFLATABLE ENCLOSURE FOR SWIMMING POOLS AND THE LIKE

BACKGROUND OF THE INVENTION

Flexible plastic inflatable enclosures and covers are well known for the purpose of enclosing and/or covering swimming pools, and other liquid-carrying containers. However, so far as I am aware, no inflatable enclosure has been provided for an above-ground swimming pool (one in which the pool walls sit wholly or partially above the ground rather than being wholly below ground level) or for an in-the-ground pool which (a) has reinforcing means to resist high winds and to enable maximum pressurization of the enclosure, (b) acts as an efficient solar heater, (c) is provided with a simple and novel entry, (d) is air-tight, (e) is provided with means to prevent entry of dirt and dust and to keep chemical additions to a minimum and (f) can be utilized as a cover, which remains crowned thereby shedding rain and dirt — all at a low cost and with simplicity of installation.

To my knowledge, all of the air-inflatable enclosures which utilize a sealing means comprising a water tube require that this sealing means be placed on the deck or ground adjacent the pool or container enclosed. In following this concept, however, the area that must be enclosed is at least 25 percent and usually closer to 60 percent greater than the pool area itself, and the cost of the enclosure is therefore large. It is an object of this invention to avoid this additional cost.

Pool covers of which I am aware, are generally flat or dished, and cannot shed water and/or debris readily as can a crowned or domed cover. I am not aware of a domed pool cover that can quickly and easily be converted to an enclosure within which one can readily enter. It is an object of this invention to provide such a combination.

SUMMARY OF THE INVENTION

The main objects of this invention are to provide a relatively low cost enclosure, enclosing a swimming pool or other liquid-carrying containers, whether it be above or below ground, which has the features enumerated in (a) through (f) above.

The enclosure comprises a unitary roof and sidewall member made, preferably, of a plurality of heat-welded 12–20 mil polyvinyl chloride flexible plastic sheets. At or near the periphery of the said roof and sidewall member is welded a tubular plastic member adapted to contain water or liquid equal to or lighter in density than the liquid in the container. The tubular plastic member generally follows the periphery of the walls of the container to be enclosed, and is of approximately the same length as the perimeter of the container to be enclosed. The unitary roof and sidewall member has a surface area somewhat larger than the area of the pool, or other item to be enclosed.

The roof and sidewall member of the enclosure is preferably supplied with non-stretchable, but flexible reinforcing means, e.g., made of nylon fused to the roof and sidewall member, the reinforcement means having attachment means to be tied down to decking or the ground adjacent the pool or other container to be enclosed.

The roof and sidewall member is provided with a blower sleeve or opening to which can be attached a blower for flowing air therethrough.

To install the enclosure, it is first simply floated across the water or other liquid in the container, e.g. an above-ground or below-ground pool. The tubular member is then filled with water to create an air-tight seal of the tube with the water in the pool, and the reinforcing means is tied down adjacent the pool.

The blower is then turned on and the air flows under the roof and sidewall member and inflates the enclosure. Upon inflation, the attached tubular member is forced outwardly against the pool wall and conforms thereto. The enclosure is thus provided with an air seal by means of the engagement of the tubular member with the water in the pool. Maximum internal pressurization of the enclosure is obtained because of

the air seal in conjunction with the reinforcement means. In this way, high winds are resisted and the enclosure achieves great stability.

The enclosure, as described to this point, functions as an airtight reinforced cover which has a crowned shape, and can thus shed dirt and rain easily. After full inflation, the blower can be shut off. Because of the air seal, as well as means to prevent backflow of air through the blower, no leakage of air will occur to deflate the cover from its original crowned shape.

To convert the crowned cover to a swimming enclosure, or space which can be entered, a simple and novel entry is provided. The entry comprises, preferably, a semi-circular piece of aluminum or other rigid tubing, the ends of which are pivotally mounted or attached to the pool or container wall, while the remainder of the tubing is attached to a portion of the external surface of the sidewall of the enclosure, to force the sidewall of the enclosure away from the pool wall. In this way, space for easy entry into the pool is provided.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an above-the-ground pool, with the inflated swimming pool enclosure of this invention positioned thereon;

FIG. 2 is a cross-sectional view, taken along the line 2–2 of FIG. 1, showing the means for entry into the pool;

FIG. 3 is a cross-sectional view, taken along the line 3–3 of FIG. 1, showing the air inlet into the pool;

FIG. 4 is a cross-sectional view, taken along the line 4–4 of FIG. 1, showing one preferred means of attaching the reinforcement means of the enclosure to the underside of the pool wall itself;

FIG. 5 is a plan view of the entry into the swimming pool enclosure;

FIG. 6 is a perspective view of a combined hook and eye used in attaching the stabilizing means of the enclosure to the underside of the pool wall;

FIG. 7 is a perspective view of an inflated swimming pool enclosure of this invention positioned over an in-the-ground pool;

FIG. 8 is a view, in cross-section, taken along the line 8–8 of FIG. 7;

FIG. 9 is a cross-sectional view taken along the line 9–9 of FIG. 7; and

FIG. 10 is a perspective view of the frame member of the entry means.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The enclosure of this invention as shown in the embodiment of FIGS. 1–6, is given the numeral 20. It is shown enclosing an above-the-ground swimming pool 22 having sidewalls 24. A narrow top deck or coping 26 constitutes the upper edge of the pool 22 and is attached to sidewalls 24. It will be understood that any liquid-carrying container may be enclosed by the means of this invention but enclosure of the swimming pool will be described by way of example. Attached to the pool sidewall 24 is a waterproof liner 25.

The enclosure 20 comprises a unitary roof and sidewall member 30, made of a series of opaque, or a combination of opaque and transparent plastic sheets or panels 32. The plastic panels 32 are preferably made of flexible polyvinyl chloride of between 12 and 20 mils in thickness. The panels 32 are heat-welded by conventional ultra high frequency heating techniques to form a sheet large enough to disclose a curved space above said predetermined pool area when fully inflated. The edges of the sheet of plastic forming the roof and sidewall member 30, are then cut so as to conform generally to the diameter or shape of the pool to be enclosed.

A tubular flexible polyvinyl chloride member 34 (preferably of 15–30 mils in thickness) is then welded to the edge or periphery of the roof and sidewall member 30. The tubular member 34 is, preferably, between 7 and 15 inches in diame-

ter, and is provided with a water filling valve. A second opening or valve is also formed therein for the purpose of venting air from the tube when it is being filled with water. These valves are conventional and are not shown in the drawings. The tubular member 34 is attached along the entire periphery of the roof and sidewall member 30 so that a complete seal will be formed between the tubular member 34 and the water 36 in the pool 22, (when the tube 34 is filled with water and the enclosure 20 is inflated).

The roof and sidewall member 30 of the enclosure 20 is preferably supplied with reinforcing means, straps or stabilizers. These stabilizers may be of the type described in detail in my U.S. Pat. No. 3,353,309 and pending patent application, Ser. No. 60,038 filed July 31, 1970 and comprise, in general, a non-stretchable, but flexible, nylon webbing which is first laminated between non-porous polyvinyl chloride sheets and then welded to the roof and sidewall member 30.

The nylon-PVC stabilizers, just described, are designated by the numeral 38 and are formed in strips of, preferably, between 4 - 8 inches in width. A plurality of stabilizers 38 are laminated along a major portion of the length of the roof and sidewall member 30, in parallel, and spaced, preferably between 3 - 8 feet from each other.

Each end 38a of each of the stabilizer straps 38 are attached to nylon ropes 40, or other suitable tying means, which tying means are, in turn, tautly affixed to the ground or decking adjacent the pool by any suitable means. Preferably, however, one end of each nylon rope 40 is tied to the eye portions 42 of hook and eye members 44 (See FIG. 5) and the other ends of ropes 40 to stabilizer ends 38a. The hooks 46 of the members 44 are then set under the lower edge of the pool wall 24, as shown in FIG. 4 and the ropes 40 tightly cinched before inflation of the enclosure 20 commences. Additional nylon ropes 43 are similarly attached to the outermost stabilizers 38, between the ends thereof, and similarly tightly cinched by hook and eye members 44. A web 52 of nylon-PVC is laminated to stabilizer 38, and has a reinforced opening therein, through which one end of the rope 43 may be attached.

Turning now to the installation of the enclosure 20 thereof, the entire enclosure, i.e., the members 32, 34 and welded stabilizers 38 are floated across the water in the pool 22, the pool 22 having previously been filled with water 36 to a level, preferably, within 4 inches to 8 inches below the top edge of the pool walls 24. The water tube 34 is then filled with water 35, and the air duct or sleeve 47 connected to blower 48.

The blower 48 is turned on and inflation of the enclosure takes only a short period of time, perhaps 20 - 40 minutes, depending on the size of blower and air space enclosed. The tube 34 is forced outwardly against the pool walls 24, and generally conforms to the periphery of the pool walls. Because the water tube 24 is initially made of dimensions and general shape so as to abut the pool walls 24, when inflated, the enclosure 20 cannot readily be moved about under the influence of winds. Also, an air-tight seal is made by means of the water tube 34 laying on the water 36 in the pool 24. The pressurization within the enclosure 20 is self-regulating because, if the pressure within the enclosure should become too high, a portion of the water tube will lift up from the water 36, allowing air to escape to relieve the internal pressure.

A closeable opening 50 (FIG. 1) is also provided in the roof and sidewall member 30 of the enclosure 20 which permits air to be vented, and also enables air to be circulated within the enclosure. To maximize the circulation of air, the vent 50 is preferably placed at a point in the enclosure diametrically across from the blower inlet. The vent 50 is provided with a conventional snap-in closure (not shown) to provide an air-tight seal when the blower 48 is not in operation and the enclosure 20 is to be utilized as a completely air-tight domed cover.

The enclosure 20, as described to this point, is the most economical form of combined cover and enclosure. However, in the event of high winds, it is possible for this enclosure to be

moved or whipped about by such winds, especially if it is not fully pressurized, and for this reason, it is preferable to stabilize the enclosure by means of the stabilizer straps 38 fused or otherwise affixed to the enclosure. Such stabilizing straps 38 and attachment means therefor were described in detail in my issued Pat. No. 3,353,309 issued November 21, 1967 and further described in Ser. No. 60,038, my pending patent application filed July 31, 1970.

The stabilizers 38 each comprise a lamination of two outer pieces of non-porous polyvinyl chloride sheet between which is placed a nylon webbing so that the stabilizer 38 becomes non-elastic and substantially non-stretchable while at the same time being flexible and readily fusible to the PVC sheet of the enclosure 20 by conventional techniques. Normally, the stabilizers 38 are preformed into strips of requisite width and length so that only welding of the lower PVC layer of the stabilizer 38 to the PVC member 30 of the enclosure 20 is required.

Both ends of each stabilizer 38 are then tied down as has been described by tie-ropes 40 to the pool walls 24.

After full inflation, the tie lines can be adjusted so as to be taut. In this way, the air space within the enclosure 20 can be pressurized to a maximum extent so as to maximize resistance of the enclosure to high winds and prevent ballooning on hot days as well. Additional tie ropes 43 as previously described, may then be provided for further stabilization.

Because of the construction of the enclosure 20, it is possible to enter the pool 22, without the use of any additional entry means, by merely forcing a portion of the roof and sidewall member 30 of the enclosure 20 inwardly (away from the pool walls 24). The swimmer may then step down into the pool 22 in the space manually provided by the swimmer himself.

Entry into the pool 22 may also be effected in a novel and simple manner. A rigid, semi-circular frame member 60, preferably made of aluminum tubing, is first formed having a diameter of preferably between about 4 feet to 6 feet. Both ends of the frame member 60 are adapted to be pivotally mounted to the legs 58 of a ladder 56, as by split-rings or collars 64, as shown in FIGS. 2 and 5, and a mid-portion of the frame member 60 is adapted to be attached to an exterior surface of the enclosure 20 by snaps 62. Because of the air pressure within the enclosure, the enclosure 20 is forced outwardly towards the walls 24 of the pool 22 and the water tube conforms not only to the walls of the pool but to the external shape of the semi-circular frame member 60 as shown in FIG. 5. An entry-way, into the pool 22, is thus provided.

Referring now particularly to FIG. 2, a swimmer will climb up the steps 66 of the ladder 56 to the top ledge 68 thereof, step down into the water 36 and into the space provided by the frame member 60. Since the entry frame member 60 is pivotally attached to the legs 58 of the ladder and is attached to a portion of the enclosure 20, a portion of the enclosure can be raised by the swimmer in the manner shown in FIG. 2, in dotted line, and the swimmer can move into the major pool area. The frame member 60 in its normal resting position, lies on the water and is flush with, or closely adjacent the water level since it is weighed down by the water tube 34. However, it is found that a portion of the tube 34, can be readily pushed upwardly out of the water enabling the swimmer to move forwardly under the raised portion of the enclosure and into the swimming pool proper. To further facilitate entry, a portion of the water tube 34 can easily be made of smaller diameter (than the remainder of the tube) at the entry section, although this is not mandatory. Entry into the pool proper may also be gained by simply ducking into the water and under the water tube 34 without raising it, if one so desires.

When it is desired to use the swimming enclosure 20 as a cover, the rigid frame member 60 is easily removed by disengaging it from the legs 58 of the ladder 56 and from its engagement with the water tube 34. The enclosure 20, because of its internal pressure, moves outwardly so that water tube 34 rests against the pool walls 24, as shown in dotted line in FIG. 2.

The air vent 50 is closed and the blower 48 is then shut-off. Upon shutting off the blower 48, that portion of the air duct or sleeve 47a, within the enclosure 20 immediately drops down into the water 36, as shown in dotted line in FIG. 3, thus providing a complete air seal and preventing any back flow of air through the air duct 47a, 47. Since all flow paths of air away from the interior of enclosure 20 are thus prevented, the enclosure 20 stays in its crowned or dome shape. In this way, the enclosure 20 functions as a domed cover for an indefinite period of time, easily sheds rain or dirt and at the same time, it is stabilized against high winds by virtue of the stabilizer straps 38 and tie lines 42, 43 described.

Another feature of the pool enclosure 20 of this invention is the provision of a dust skirt 70. The dust skirt 70 is preferably made of a PVC sheet of 10 - 20 mils in thickness, and has its upper edge welded along the entire roof and sidewall member 30, adjacent the periphery of the enclosure 20 and above the water tube 34. The lower edge of the skirt 70 hangs freely and is of sufficient length to extend tautly around the top edge or deck 26 of the pool wall 24 when stretched. While a dust skirt 70 is not mandatory, it is very helpful in preventing the entry of dust and dirt into the pool 22. For while the water tube 34 acts as an air seal for the enclosure of air, it does not prevent entry of dust and dirt into the water 36 itself when the tube 34 is moved away from the pool sidewalls 24. The provision of a peripherally attached dust skirt 70, adapted to be stretched to the underside of the top deck 26, normally found in above-ground pools, is of great advantage in keeping the pool clean.

The principles described with reference to my combined cover and enclosure for above-ground pools of FIGS. 1-6 may also be utilized for pools that are so-called in-ground pools.

An in-the-ground pool embodying the principles of this invention is shown in FIGS. 7 through 10. In FIG. 7, an enclosure 120 is shown comprising a roof and sidewall member 130, welded together as described previously and having attached to the periphery thereof, as by heat-welding a continuous water tube 134 forming an air-tight seal with the water as earlier described. The roof and sidewall member 130 of the enclosure 120 is preferably stabilized by stabilizers 138 formed as described previously. Stabilizers 138 are preferably fused to the roof and sidewall member 130 and overlie a major portion of the roof and sidewall member of the enclosure 120. The ends of each of the stabilizers 138 are affixed to the decking or other base adjacent the pool, by suitable anchoring means.

In this in-ground pool embodiment, a dust skirt 170 may also be provided which includes a continuous or substantially continuous water tube 172 adapted to be sealingly engaged with the decking 176 adjacent the pool. The water tube 172 is attached to the free end of the skirt 170. The skirt 170 is laminated to the roof and sidewall 130 above the water tube 134 at 174 (see FIG. 8).

In this embodiment, the stabilizers 138 extend over the skirt 170 and water tube 172, and are welded thereto as shown in FIGS. 7 and 8. The stabilizer ends 138a are then attached to screw-type anchoring bolts 144 by guy ropes 140. The bolts 144 each have an eye through which the guy ropes may be attached.

The blower 148 and air venting means (not shown) are the same as described with reference to the FIGS. 1-6 embodiment. Also, additional guy ropes 143 may be attached as before, to further stabilize the enclosure 120.

The air sleeve is formed within the enclosure 120 (not shown) in the same manner as described with reference to the above-the-ground pool embodiment and back flow of air is prevented in the same fashion as described previously.

Entry into the pool may be provided in a manner similar to that described with reference to the above-the-ground pool, i.e., by merely disengaging the dust skirt 170 (if any) and pushing the enclosure 120 inwardly away from the pool walls 124. Also, a semi-circular rigid entry frame member 160 may be provided with hooked ends 161 for attachment to the upper edge of the pool walls 124 as shown in FIG. 9. The por-

tions of the frame member 160, between the ends thereof are adapted to be attached to a portion of the water tube 124, as previously described with reference to FIGS. 1 through 6, and to push it inwardly away from the pool walls. The water tube 172, laying on the deck 176, may be terminated at either side of the entry area, to facilitate entry into the pool, as shown on FIGS. 7 and 9.

The enclosure 120 comprises a unitary roof and sidewall member 130 made preferably of 12 to 20 mil polyvinyl chloride flexible air-impermeable plastic sheets. As in the above-the-ground embodiment of FIGS. 1-6, the unitary roof and sidewall member 130 has an area somewhat larger than the area of the pool or other container to be enclosed and is preferably, but not mandatorily, supplied with stabilizer means.

To install the enclosure 120, it is first simply floated across the water and the tubular member 134 is then filled with water to create an air seal of the tube 134 with the water in the pool. The stabilizers 138 are then tied down adjacent the pool. Next, the blower is turned on and the air flows under the roof and sidewall member 130 and inflates the enclosure 120. Upon inflation, the attached water tube 124 is forced outwardly against the pool wall and conforms thereto to provide the enclosure with an air tight seal. Maximum pressurization is obtained because of the combination of the air seal with the reinforcing means, in the same manner as in the above-ground pool embodiment. High winds are thus easily resisted and the enclosure achieves great stability.

The enclosure 120 also functions as a stabilized air tight cover which has a crown or dome shape by simply detaching the entry frame member 160 and turning the blower off. No leakage can occur because there is no back-flow of air to the blower.

In particular, the enclosure of this invention functions as an excellent solar collector for both in-ground and above-ground liquid containers when the blower is turned off and the air venting means is closed. This is because the air is effectively trapped within the domed enclosure and is readily heated by the sun's rays. In turn, the water within the pool is raised in temperature.

While particular forms of the enclosure have been illustrated and described, various modifications can be made without departing from the spirit and scope of the invention.

I claim:

1. An air-supported enclosure for liquid-carrying containers comprising:

a roof and sidewall member composed of flexible air-impermeable plastic sheeting, said member having a surface area larger than the area to be enclosed;

an air-impermeable tubular plastic member, attached to the periphery of said roof and sidewall member, generally following the periphery of, and of dimensions such that said tubular member abuts, the walls of the container to be enclosed;

means for filling said tubular plastic member with liquid; and blower means for blowing air into said enclosure to thereby inflate said roof and sidewall member and cause said tubular member, when filled with liquid equal to or lighter in density than the liquid to be enclosed, to be forced outwardly to abut the walls of the container while floating on the surface of the liquid to be contained.

2. The air-supported enclosure of claim 1 wherein the roof and sidewall member is composed, substantially, of flexible plastic sheeting of 12 - 20 mils in thickness.

3. The air-supported enclosure of claim 1 wherein the tubular plastic member is welded to the periphery of said roof and sidewall member.

4. The air-supported enclosure of claim 1 wherein the length of the tubular plastic member is approximately the same as the length of the perimeter defined by the walls of said container.

5. The air-supported enclosure of claim 1 wherein said liquid carrying container is a swimming pool, said liquid,

adapted to fill said tubular plastic member is water, and said liquid in said container is water.

6. The air-supported enclosure of claim 1 wherein said liquid carrying container is an above-the-ground swimming pool.

7. The air-supported enclosure of claim 1 wherein said liquid carrying container is an in-the-ground swimming pool.

8. The air-supported enclosure of claim 1 wherein said roof and sidewall member carries a plurality of spaced, non-stretchable, reinforcing straps attached to at least a portion of said roof and sidewall member, and each of the ends of said straps being in turn attached to a base adjacent said container.

9. An air-supported enclosure of claim 1 wherein said roof and sidewall member carries a plurality of spaced, non-stretchable, reinforcing straps, each of the ends of said straps being tied to the underside of the walls of said container.

10. The air-supported enclosure of claim 1 wherein a portion of said roof and sidewall member is light transparent.

11. The air-supported enclosure of claim 1 wherein said roof and sidewall member carries a flexible skirt adjacent the periphery thereof.

12. The air-supported enclosure of claim 11 wherein said skirt has attached thereto an auxiliary water tube for sealing engagement with the surface adjacent to said container.

13. The air-supported enclosure of claim 1 wherein a rigid frame member is adapted to be pivotally mounted between a wall of said container and a portion of said roof and sidewall member.

14. The air-supported enclosure of claim 1 wherein a plurality of spaced, non-stretchable, reinforcing straps are affixed to at least a portion of said roof and sidewall member, each of said straps including nylon.

15. The air-supported enclosure of claim 1 wherein said

blower means includes an air sleeve within said enclosure and attached to said roof and sidewall member thereof, and of such length that when the blower is shut-off the free end thereof is adapted to drop below the normal liquid level carried in said liquid-carrying container.

16. An air-supported enclosure for use in combination with a liquid-carrying container, which comprises:

a roof and sidewall member composed of flexible air-impermeable plastic sheeting, said member having a surface area larger than the area to be enclosed;

an air-impermeable tubular plastic member, attached to the periphery of said roof and sidewall member, generally following the periphery of, and of dimensions such that said tubular member abuts, the walls of the container to be enclosed;

means for filling said tubular plastic member with liquid;

and blower means for blowing air into said enclosure to thereby inflate said roof and sidewall member and cause said tubular member, when filled with liquid equal to or lighter in density than the liquid to be enclosed, to be forced outwardly to abut the walls of the container while floating on the surface of the liquid to be contained.

17. The air supported enclosure of claim 1 wherein said roof and sidewall member is provided with a closeable vent.

18. The air supported enclosure of claim 17 wherein said closeable vent is placed diametrically across from said blower means.

19. The air supported enclosure of claim 13 wherein said rigid frame member is pivotally mounted to a ladder placed between said wall of said container and said portion of said roof and sidewall member.

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