

[54] **AUTOMATIC PRESSURIZATION SYSTEM
FOR INFLATED POOL ENCLOSURE**

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Zinn & Macpeak

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417/43

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[58] Field of Search. 4/172, 172.12, 172.11,
4/172.13, 172.14; 52/2; 200/81.9 HG;
417/43, 44, 212; 251/481.5

[56]

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[57]

ABSTRACT

An air duct extends beneath the water tube of an air supported plastic film pool enclosure with its external end opening up into a box having a pivotable blade which normally overlies the end of the duct and which pivots away from the duct under applied air pressure. A switch senses blade inclination to control an air blower which, in turn, delivers air under pressure to the enclosure to maintain desired inflation pressure. A pivotable door on one side of the box opens the box interior to the atmosphere and modulates blade inclination under applied air pressure.

7 Claims, 6 Drawing Figures

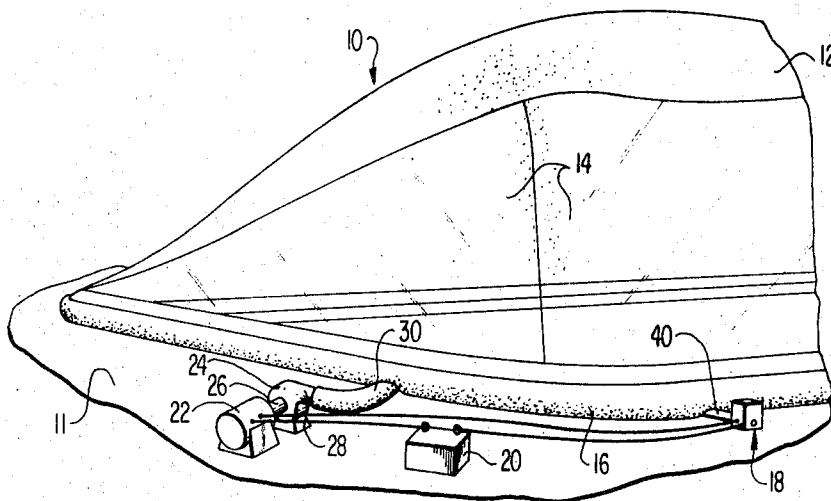


FIG. 1

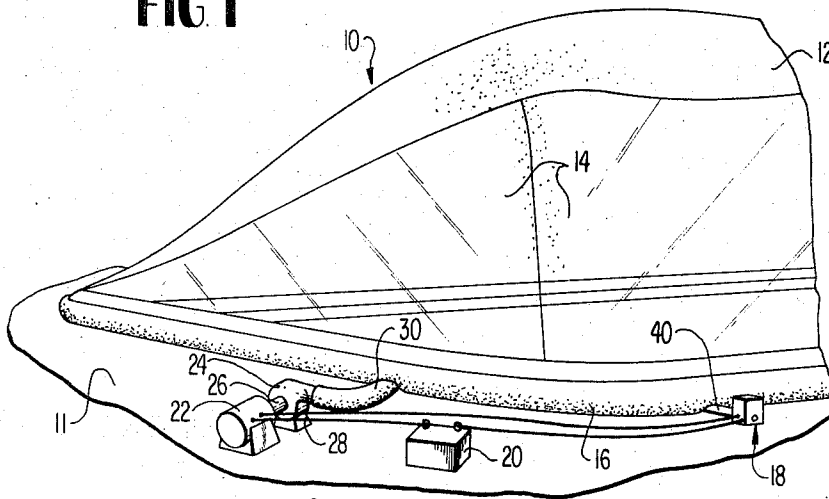


FIG. 5

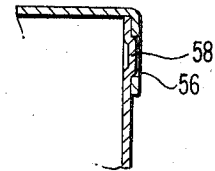


FIG. 2

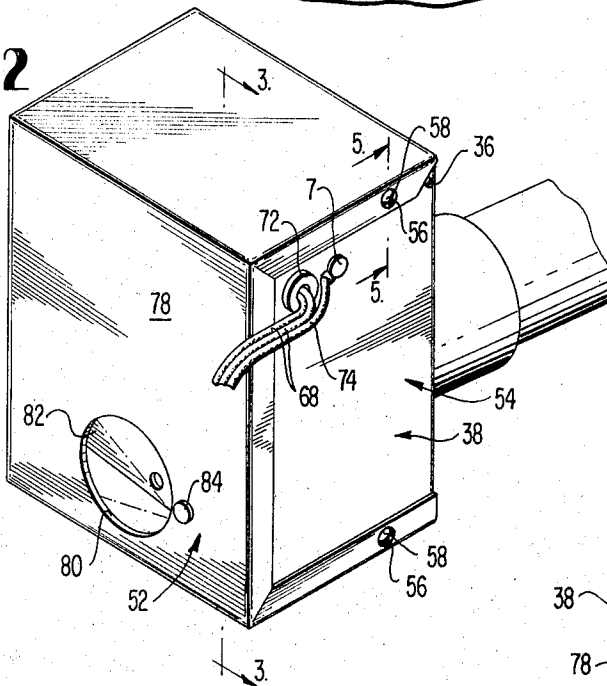


FIG. 4

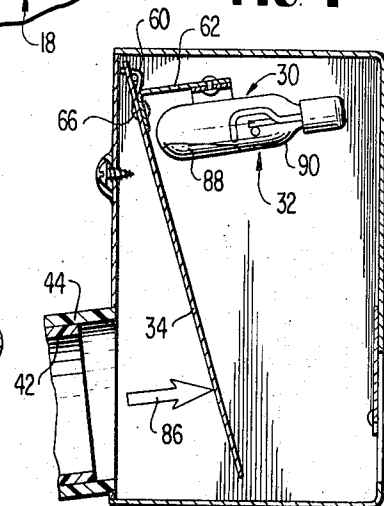


FIG. 6

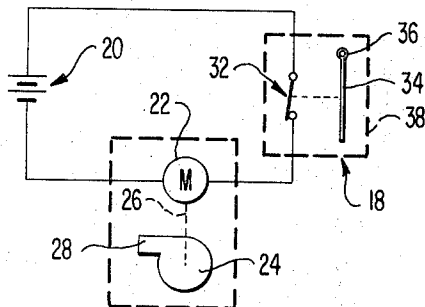
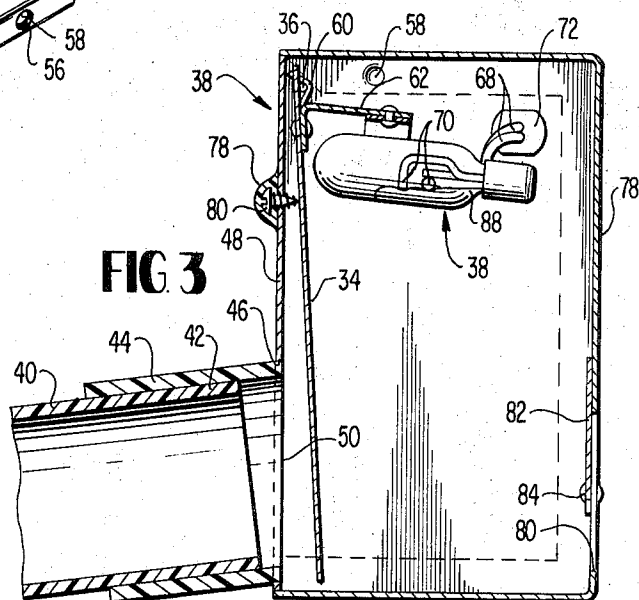


FIG. 3



AUTOMATIC PRESSURIZATION SYSTEM FOR INFLATED POOL ENCLOSURE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to air supported plastic film enclosures for swimming pools and the like and, more particularly, to an improved pressure air supply system and a pressure operated switch for automatically controlling the system air blower.

2. Description of the Prior Art

In order to permit the use of outdoor swimming pools throughout the year and, in particular, in the fall, winter and spring months, attempts have been made to provide low cost pool enclosures which may be set up in the fall and dismantled in the spring and in which the temperature within the enclosure may be maintained relatively comfortable along with that of the water within the pool, regardless of outdoor ambient conditions. Fabric domes supported by air pressure have been created as removable pool enclosures without requiring structural framework and wherein the internal pressurization by air at superatmospheric pressures have permitted pools, tennis courts and like leisure time activities to be enjoyed on rainy days, at night and during the relatively cold seasons of the year.

In particular, such enclosures have been constructed of poly-vinyl chloride permitting the enclosure side walls to be transparent and permitting the ceiling or top of the enclosure to be formed of contrasting color, opaque panels, adding materially to the esthetic appearance of the enclosure. Such light weight enclosures are engineered to stand the most extreme weather conditions and yet are flexible enough to fold to about the size of a foot locker for easy storage and may be installed or removed in a time period of approximately 60 minutes. Such structures have no inner framework and when snugly in place completely seals out leaves and debris and by eliminating direct sunshine on the water such enclosures reduce chlorine consumption from 50 to 80 percent while lowering heating costs for fall, spring and winter use.

In order to anchor such air inflated enclosures, most enclosures terminate at their peripheral edge in a water tube constituting a somewhat heavier enclosure, partially or wholly filled with water which acts as a circumferential anchor for the edge of the enclosure. Entrance to the enclosure is made through a zippered vertical opening within one or more side walls of the enclosure, the enclosure remaining essentially sealed except during the entering and leaving of the same. Pressurization is achieved by the introduction of low pressure air from an electric powered, motor driven blower into the enclosure which inflate the enclosure to a degree permitting the enclosure to remain inflated regardless of environmental conditions. The employment of the water filled tube about the periphery of the enclosure retains the enclosure in position while permitting some light oscillation of the enclosure above the water tube by wind, etc. Since there is some slight air leakage both at the entrance and at places where the water tube does not make close contact with the underlying foundation, it is necessary to periodically energize the blower to maintain the desired superatmospheric pressure within the enclosure.

Attempts have been made to sense the inflated condition of the enclosure and to automatically turn on the blower as the result of enclosure sag. In this respect, lines have been attached to the enclosure wall which sense a change in position as a result of sag, with a reduction in tension, for instance, operating a switch which in turn energizes the blower drive motor until the increased air pressure eliminates the sag and re-tensions the sensing line to automatically turn the blower motor off by opening the switch contacts. Such sensing mechanism is relatively unsightly, is expensive and controls blower operation only as a result of localized deformation or sagging of the enclosure.

SUMMARY OF THE INVENTION

The present invention is directed to an improvement in a pressurized air supply system for a thin plastic film inflatable pool enclosure or the like in which an air supported plastic film enclosure is positioned to overlie the pool and an electric motor driven air blower discharges air under pressure into the enclosure for inflating the enclosure under superatmospheric air pressure by connecting the air blower motor to an electric power supply. The improvement comprises duct means having one end positioned within the enclosure and the other external thereof to permit the pressurized air from the enclosure to exit through the duct means. An air pressure operated switch is operatively positioned relative to the air duct passage and has normally open switch contacts which close at a predetermined minimum air pressure within the duct, the switch being between the air blower motor and the power supply means to cause energization of the blower motor in response to a decrease of air pressure within the enclosure. Preferably, means are provided for modulating air flow within the duct relative to the switch to vary operation of the switch means.

Preferably, the duct is coupled at a point exterior of the enclosure to a box defining a chamber opposite an air discharge opening to the atmosphere. A vertical blade is pivotally mounted within the box and overlies the end of the duct so as to pivot away from the duct opening as result of air flow acting on the blade, and permitting enclosure air to escape through the box discharge opening. A switch responsive to inclination of the blade from a position generally flush with the end of the duct and overlying the same, operates such that the switch contacts close as the blade moves toward the opening to energize the blower and increase air pressure within the enclosure. A rotatable door is mounted on the box to the side of the discharge opening to variably cover the box discharge opening and to modulate operation of the switch by varying the back pressure within the enclosure. The box is preferably positioned externally of the enclosure adjacent a water tube and the duct extends under the water tube with its inner end opening into the enclosure. The switch may take the form of a mercury switch fixed to the blade such that the mercury covers spaced switch contacts when the blade is generally vertical but uncovers the contacts when the blade is inclined therefrom.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partial perspective view of an air supported plastic film enclosure making use of the improved pressure air supply system of the present invention.

FIG. 2 is a perspective view of an air pressure switch assembly forming one component of the pressure air supply system of the present invention.

FIG. 3 is a sectional, elevational view of the air pressure switch assembly of FIG. 2 with the switch contact closed and the blower de-energized.

FIG. 4 is a sectional, elevational view of the switch assembly of FIG. 2 similar to that of FIG. 3 in switch open position.

FIG. 5 is an enlarged sectional view of a portion of the assembly of FIG. 2 taken about line 5—5.

FIG. 6 is an electrical schematic view of the pressure air supply system of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Reference to FIG. 1 indicates the environment of use of the present invention in conjunction with an air supported plastic film enclosure 10 which overlies a swimming pool (not shown) and which creates in conjunction with the concrete deck 11 underlying the same a controlled environment above the pool and internally of the enclosure 10. In conventional fashion, the enclosure may be formed of polyvinylchloride film which may be of 20 mil thickness, for instance, and being formed of stitched panels including an opaque or translucent top panel 12, and a number of transparent side panels 14. The bottom edge of all of said panels terminate in a formed water tube 16 of conventional construction constituting an elongated chamber carrying a given volume of water and acting as the anchoring means for the periphery of the enclosure 10.

In conjunction with the system to which the present invention is directed and particularly with respect to the pressure switch assembly 18 which is shown as being exterior of the enclosure 10 and supported by the deck 11, adjacent water tube 16, an electrical source such as a battery 20 is connected to a blower motor 22 which in turn mechanically drives the squirrel cage blower 24 by connecting shaft 26 in a conventional manner with the discharge end 28 of the blower 24 discharges superatmospheric air whenever motor 22 is energized. The discharge end 28 of the blower 24, FIG. 1, is fluid coupled to enclosure 10 by means of a first plastic duct 30 which extends beneath water tube 16. The vinyl enclosure 10 is maintained in inflated position by the developed air pressure of blower 24. Energization of the blower drive motor 22 occurs as result of closure of switch 32 forming one component of pressure switch assembly 18.

In this regard, the switch 32 is operated mechanically by inclination of pivotable blade 34 mounted for pivoting in this case about a horizontal axis by rod 36 which extends between the side walls of the switch box 38. Reference to FIGS. 2, 3, 4 and 5, shows in greater detail the pressure switch assembly 18, and its manner of construction and operation. An elongated plastic tube 40 is sandwiched between the water tube 16 and the concrete deck 11 with its inner end within the enclosure 10 and its outer end 42 received in this case within a somewhat larger plastic tube 44 in telescoping manner. The large tube 44 in turn terminates within a circular opening 46 within end wall 48 of box 38. The inner end 50 of tube 44 lies generally flush with the interior of end wall 48 of the box. Obviously, tube 40 could itself terminate at opening 46 and thus eliminate the necessity of the short piece of somewhat larger tube 44.

It is noted, that the box 38 consists of sheet metal stock which is formed such that one C-shaped section 52 fits within another C-shaped section 54 rotated 90°. The edges of the outer section 54 are flanged and have small circular openings 56 therein, while protruding from the outer surfaces of the contacting side walls of section 54 are projections or dimples 58, FIG. 5, which snap into the circular openings 56 within the flanges to permit the easy assembly of box 30, while permitting dis-assembly and access to the interior of the box. Rod 36 extends across the interior of the box between the two sides of the inserted portion 52 and at the top thereof to pivotably support a hinged blade 34 via tab 60 so that the bottom end of the blade overlies the end 50 of tube 44 in the absence of applied air pressure to tube 40. The blade is maintained in this position by gravity since mercury switch 32 is fixed to the upper end of blade 34 by means of L-shaped bracket 62. The partially cut out and bent over tab 60 forms a hinge for the blade. The bracket 62 is affixed to the upper end of blade 34 by any suitable means such as one or more rivets 66. The electrical leads 68 coupled to respective terminals 70 of the mercury switch extend from the switch and through a side wall of the box and are insulated from the metal box by means of insulating bushing 72. A third lead 74 is employed for grounding the box via ground connection 76. There is further affixed to end wall 48 of the box, a screw 78 which passes through the end wall from the box exterior with the point of the screw impinging on the blade 34 below the pivot axis as defined by rod 36. The initial angle of inclination, when the system is at rest, as indicated in FIG. 3, may be determined by setting the screw and once this position is determined, the application of putty, epoxy or the like over the screw head locks the screw in that position and determines a first extreme, closed switch position for switch 60, wherein blade 34 overlies opening 50 but is spaced slightly therefrom.

In order to modulate the operation of pressure switch assembly 18, the opposite end wall 79 of box 38 is provided with a circular opening 80 which permits the interior of box 38 to be open to the atmosphere, to an extent determined by the position of a pivotable door 82. Door 82 in plate form is pivotably mounted to end wall 78 by means of rivet 84 to one side of opening 80, such that by rotating the door 82, the opening 80 may be more or less closed off and thus vary the back pressure within the box to the side of the blade 34 opposite that facing opening 50 of duct 44.

In operation, since the enclosure 10 is kept at super-atmospheric pressure, that is, a pressure slightly higher than the atmosphere, the air within the enclosure 10 tends to escape through duct 40 and around the sides of the pivotable blade 34, into the enclosure of box 30 and then through discharge opening 80 to the atmosphere. The developed air flow is indicated in FIG. 4 by arrow 86 such that the blade pivots from a generally vertical position to an inclined position, away from screw 78 and to an extent that the mercury 88 within the mercury switch enclosure 90 flows from switch contacts 70 opening the circuit between the drive motor 22 and the source of electricity such as battery 20 in FIG. 6, thus de-energizing the blower motor. Air pressure is sufficiently high within the enclosure, that for a period of time, depending upon leaks and the number of times occupants enter and leave the enclosure, that air flow of a magnitude sufficient to maintain

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the blade in inclined position as indicated in FIG. 4, occurs in duct 42, although as air pressure drops, the blade moves to less inclined positions and finally to the extent that prior to or at the point where it contacts screw 78, the contacts 70 of the mercury switch 30 close to re-energize the circuit to the blower drive motor 22 to again increase air pressure within the vinyl enclosure 10.

The present system provides flexibility in that during storms and high wind conditions, the air pressure within the enclosure 10 may be suitably increased by pivoting the door 82 to an extent such that the opening 80 formed by the door and the circular cut-out is increased, thus requiring greater developed air pressure to move the blade 34 from a position away from that shown in FIG. 3 to the extent switch contacts 70 close, insuring an increase in the on time versus the off time of the blower operating cycle and resulting in increased air pressure being maintained within enclosure 10. While the switch 32 is illustrated in the present embodiment as constituting a mercury switch, which is subject to gravity, this switch may be replaced by any other conventional switch which is responsive to blade pivoting to and from a nearly closed position relative to the duct opening 50 to as angularly offset position to the plane of this opening, sufficient to effect energization and de-energization of the blower drive motor, respectively.

While the invention has been particularly shown and described with reference to a preferred embodiment thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit, and scope of the invention.

What is claimed is

1. In a pressure air supply system for an air supported plastic film pool enclosure or the like including an electric motor driven air blower operatively coupled to said enclosure for inflating the enclosure by application of superatmospheric pressure thereto and a power supply energizing said air blower motor, the improvement comprising:

means defining an air exhaust path from said enclosure, and

an air pressure operated switch operatively positioned with respect to the air exhaust path from said enclosure and having normally open switch contacts which close at a predetermined minimum air flow, and

means operatively connecting said switch between said air blower motor and said power supply means;

whereby, closure of said switch contacts effects operation of said air blower.

2. The pressure air supply system as claimed in claim 1, further comprising means for modulating said air flow within said exhaust path to vary operation of said switch means.

3. The pressure air supply system as claimed in claim 1, wherein said flow path defining means comprises a duct having ends interior and exterior of said enclosure,

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and a box defines a chamber fluid coupled to said duct exterior of said enclosure, said box includes an air discharge opening leading to the atmosphere, a blade is pivotably mounted within said box and overlies the end of said duct so as to pivot away from said duct opening as a result of air flow acting on said blade and said switch is responsive to inclination of said blade relative to the plane of said duct opening.

4. The pressure air supply system as claimed in claim 3, further comprising: a door pivotably mounted on said box adjacent to said box air discharge opening and movable to variably cover said discharge opening to vary the back pressure within said box.

5. The pressure air supply system as claimed in claim 4, wherein: one end of said blade is pivotably mounted within said box for pivoting about a horizontal axis above said duct opening and said switch comprises a mercury switch and said means for operatively coupling said switch to said blade comprises a bracket fixed to said blade to the side of said blade opposite that of said duct opening.

6. In a pressure air supply system for supplying superatmospheric air to an air supported plastic film enclosure for a pool or the like underlying said enclosure and including an electric motor driven air blower having its discharge end operatively coupled to said enclosure for inflating the enclosure under superatmospheric air pressure, and an electric power supply for energizing said air blower motor, the improvement comprising:

a box defining an air pressure sensing chamber exterior of said enclosure,

duct means opening up into an end wall of said box and having its other end underlying the water tube and opening up into said enclosure,

a flat sheet metal blade having its upper end pivotably mounted for pivoting about a horizontal axis within said box and its free lower end overlying said duct opening.

an inclination responsive switch fixed to said blade on the interior thereof,

an air discharge opening within said duct on the wall opposite that of said duct means, and

a door pivotably fixed to the said of said box adjacent said opening and movable to variably close off said discharge opening to control the back pressure within said box, and

means for electrically connecting said switch to said power supply and to said air blower drive motor, such that the motor is energized when said blade overlies the duct opening and said motor is de-energized when developed air pressure within said enclosure forces said blade to an inclined position with respect thereto.

7. The pressure air supply system as claimed in claim 6, further comprising a screw rotatably carried within said end wall of said box between said duct and said pivot axis with the point of said screw protruding inwardly of said wall and in contact with said blade, such that rotating the screw adjusts the switch closed position of the blade.

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