United States Patent

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[54] **ICE PROTECTION SYSTEM FOR SWIMMING POOLS**
8 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **4/172.15,** 4/172, 126/360
[51] **Int. Cl.** **E04h 3/16,** E04h 3/18
[50] **Field of Search** 4/172, 172.15, 172.16, 172.17, 172.12, 172.11; 126/360

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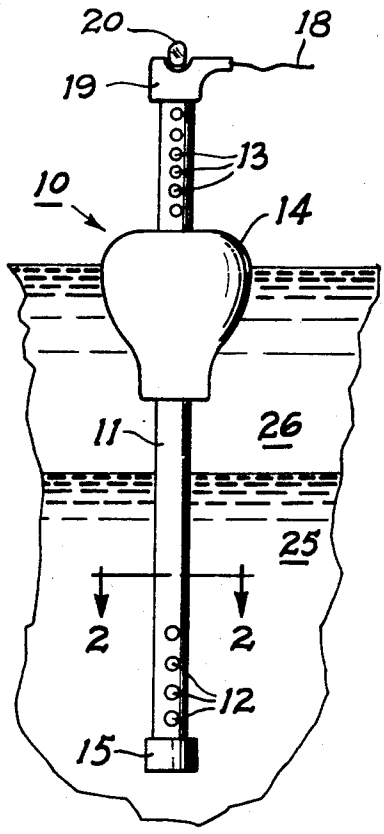
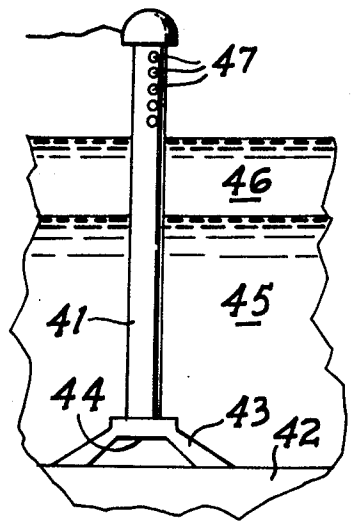
ABSTRACT: A swimming pool is protected from ice damage by an internally heated tube placed to form a water passageway extending above and below the expected ice level so water can be forced up through the tube from below the ice and discharged above the ice to relieve the pool of under-ice pressure.





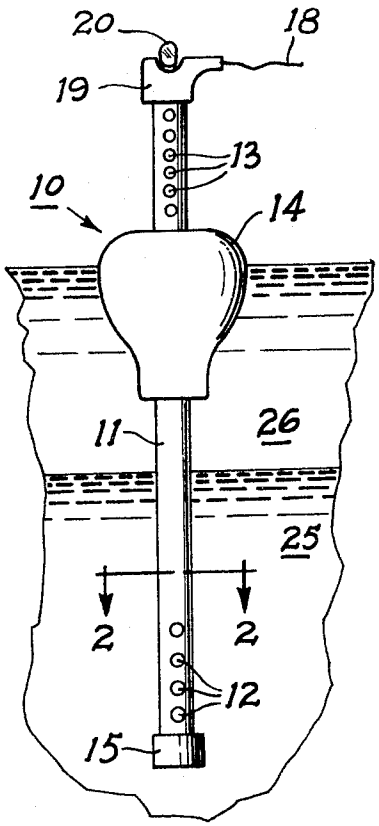


Fig. 1

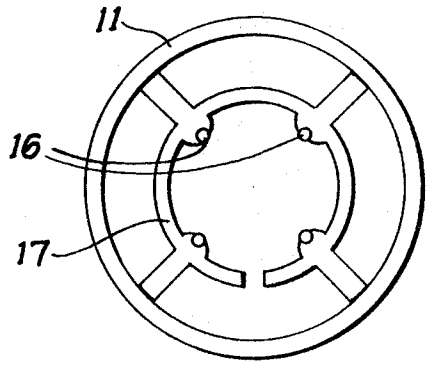


Fig. 2

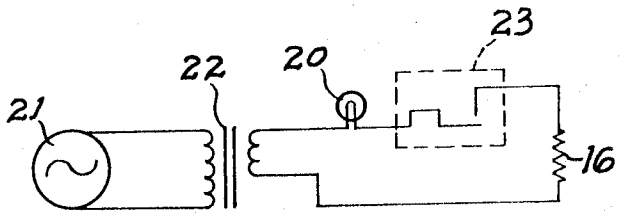


Fig. 3

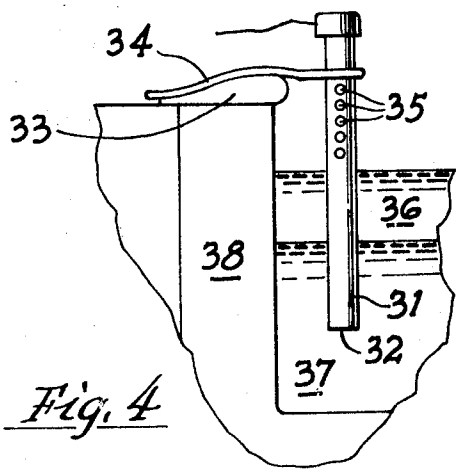


Fig. 4

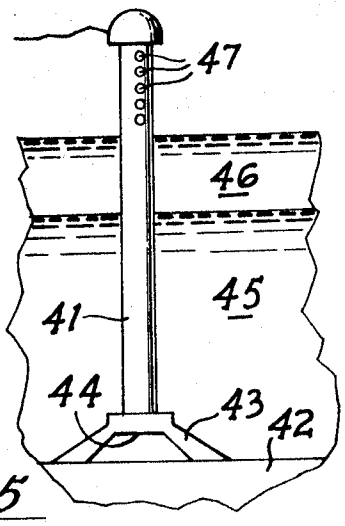


Fig. 5

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ICE PROTECTION SYSTEM FOR SWIMMING POOLS

THE INVENTIVE IMPROVEMENT

Ice in swimming pools has caused considerable damage, and various suggestions have been made to protect swimming pools from ice. These have included compressible or displaceable bodies floating on the pool and means for keeping an open hole in the pool ice, none of which has been completely satisfactory. The invention involves analysis of the cause of pressures and damage to pools from ice and proposes a simple, effective, and reliable solution for the problem. The objects of the invention include economy, reliability, and simplicity in protecting a pool from ice damage.

SUMMARY OF THE INVENTION

The invention recognizes that pool damage is caused by pressures from ice expansion as a strong layer of ice thickens downward into the pool water. The invention suggests a passageway extending from below the expected lower level of ice on the pool to above the level of the ice with means for heating the interior of the passageway to keep it from freezing and with an opening into the passageway in the below-ice region and an opening from the passageway above the ice so that water forced up the passageway from below the ice can escape above the ice. Preferably the passageway is a tube having the proper openings and containing an electric heating element.

DRAWINGS

FIG. 1 is a partially schematic, fragmentary view of a preferred embodiment of the inventive swimming pool ice protection device arranged in a swimming pool;

FIG. 2 is a cross section of the device of FIG. 1 taken along the line 2–2 thereof;

FIG. 3 is a circuit diagram for a preferred embodiment of an electrical heating system for the inventive device; and

FIGS. 4 and 5 are partially schematic elevational views of alternative preferred embodiments of the inventive device.

DETAILED DESCRIPTION

Referring to FIG. 1, the inventive protection device 10 includes a hollow tube 11 forming a water passageway from inlet holes 12 near the bottom of tube 11 to outlet holes 13 bear the top of tube 11. A buoyant body 14 surrounds tube 11 and floats tube 11 in a swimming pool, and a weight 15 at the bottom of tube 11 insures that tube 11 remains vertical in the pool.

As shown in FIG. 2, an electric heating element 16 is supported by a holder 17 inside of tube 11. Tube 11 is preferably formed of a length of polyvinylchloride tubing, and holder 17 is preferably extruded of polypropylene in a suitable cross-sectional shape to support heating element 16 inside tube 11. Of course, other materials and configurations can be used for tube 11, holder 17, and heating element 16.

Heating element 16 is connected to a source of electrical energy through cord 18 and cap 19, and a pilot light 20 is preferably arranged on cap 19 to indicate that heating element 16 is in operation. A preferred circuit for heating element 16 is shown in FIG. 3, where a source 21 of preferably residential 120 volts AC is stepped down by transformer 22 to preferably 12 volts for safety and economy. Pilot lamp 20 is arranged in series with heating element 16 so that inspection can determine that heating element 16 is actually energized. If desired, a thermostatic-controlled switch 23 can also be added in series with heating element 16 to energize heating element 16 only when power is needed.

In operation, the device of FIG. 1 is supported by float 14 vertically in pool water 25 and is made sufficiently long so that bottom inlet holes 12 are below the expected lower level of ice 26 forming on pool water 25. Outlet holes 13 open above float 14 and above ice 26, and heating element 16 keeps the interior of tube 23 from freezing so that a liquid passageway is formed between inlet holes 12 and outlet holes 13.

As ice 26 forms across the top of pool water 25, it gradually forms a structural layer strong enough to resist great pressures. With increasing cold, ice 26 increases in thickness on its under side and, as each increment of water freezes on the under side of ice layer 36, it forms an expanded volume of ice exerting pressure on pool water 25 trapped below ice layer 26. Since water 25 cannot be compressed, something must give as ice layer 26 thickens, and often the walls of the pool are damaged as they yield to the pressure thus created.

However, with the inventive device 10 floating in the pool and energized to maintain a liquid passageway from below the level of ice 26 to above the level of ice 26, the displacement caused by the thickening layer of ice forces water 25 into inlet holes 12 and up through tube 11 for discharge out of outlet holes 13. Such water freezes harmlessly on the upper surface of ice layer 26, and since the passageway through tube 11 is kept open and unfrozen by heating element 16, no pressure can build up on water 25, and the pool walls are protected from damage.

FIGS. 4 and 5 show alternative arrangements for supporting the inventive device. Tube 31 is similar to tube 11 except that it is open at its bottom 32 and is supported on coping 33 by bracket 34 so that outlet holes 35 are above the level of ice layer 36 formed over water 37 held within pool walls 38. When ice layer 36 grows downward into water 37, water 37 is forced upward through heated tube 31 and discharged through outlet openings 35 to prevent any pressure on water 37.

Tube 41 is similar to tubes 11 and 31 and is arranged to stand on pool bottom 42 on support 43 having an opening 44 to admit water 45 to the bottom of tube 41 for passage upward through ice layer 46 and out of discharge openings 47. Tube 41 is heated and operated the same as tubes 11 and 31.

Persons wishing to practice the invention should remember that other embodiments and variations can be adapted to particular circumstances. Even though one point of view is necessarily chosen in describing and defining the invention, this should not inhibit broader or related embodiments going beyond the semantic orientation of this application but falling within the spirit of the invention. For example, tubes forming the inventive passageway can have a variety of inlet and outlet openings and can be formed and supported in many ways, different heating elements can be arranged in different ways inside a tube, and a variety of materials and constructions can be used.

I claim:

1. A system for protecting a swimming pool from ice damage, said system comprising:
   a. means forming a generally enclosed passageway extending from below the expected lower level of an ice structure on said pool to above the upper level of said ice structure;
   b. means for heating the interior of said passageway to prevent freezing of a liquid path through said passageway from below said ice structure to above said ice structure;
   c. said passageway means and said heating means being arranged not to interfere with the general strength and growth of said ice structure;
   d. said passageway means having a liquid inlet opening below said ice structure for admitting water displaced from below said ice structure by the growth of said ice structure so said displaced water can follow said liquid path;
   e. said passageway means having a liquid outlet opening elevated above said ice structure to permit said displaced water forced up said liquid path to escape through said outlet above said ice structure; and
   f. said liquid path and said outlet opening being substantially limited to a size safely large enough to accommodate the maximum expected flow of said displaced water during the most rapid expected growth of said ice structure.

2. The system of claim 1 wherein said passageway means comprises a tube disposed to freeze into said ice structure.

3. The system of claim 2 including buoyant means for floating said tube vertically in said pool.

4. The system of claim 2 including means for supporting said tube on the wall of said pool.

5. The system of claim 2 including means for supporting said tube on the bottom of said pool.

6. The system of claim 2 wherein said heating means comprises an electric heating element arranged inside said tube.

7. The system of claim 6 including a pilot light arranged in the region of the top of said tube to light whenever said heating element is operating.

8. The system of claim 6 wherein an electric circuit for said heating element includes a transformer arranged to step down residential voltage to a lower voltage for said heating element.