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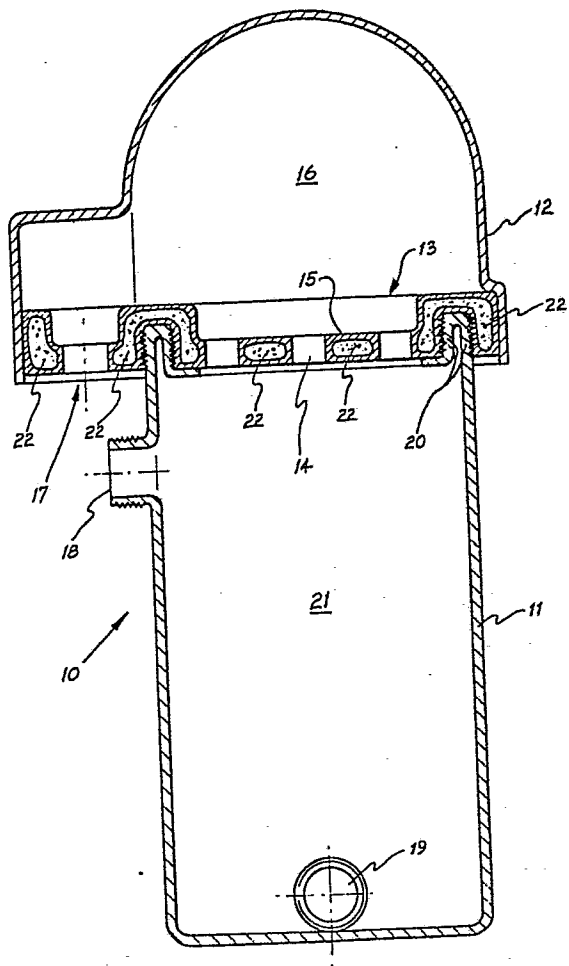
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54 **Liquid heater.**

57 A water heater for pools and spas, the heater including a hollow body of plastics material which is closed by a cap of plastics material, the cap having a plurality of passages which receive and support heating elements which project through the cap into the interior of the body.

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"LIQUID HEATER"

The present invention relates to liquid heaters and more particularly but not exclusively to heaters for spa and swimming pools. The present heater is also applicable to the
5 chemical industry.

In the past, heaters in particular for spas and swimming pools, have not been specifically designed for that environment, and accordingly suffer from several disadvantages due to their expected working conditions.
10 These disadvantages in particular include a short working life due to chemical attack, and loss of efficiency. Additionally these heaters have traditionally been complex in structure and correspondingly expensive to manufacture.

It is an object of the present invention to overcome
15 or substantially ameliorate the above disadvantages.

There is disclosed herein a liquid heating device comprising:

a vessel formed of plastics material and encompassing an open ended cavity to receive the liquid to be heated;

20 a cap of plastics material releasably secured to said vessel so as to close the open end of said cavity, said cap having at least one passage extending through it to provide access to the interior of said vessel; and

at least one heating element supported by said cap
25 and extending through said passage so as to be located in said cavity to heat liquid located therein.

A preferred form of the present invention will now be described by way of example with reference to the accompanying drawing, wherein there is schematically
30 depicted a pool or spa heater.

The heater 10 has a body 11 defining a chamber 21 through which liquid, entering the body 11 by inlet 19 and leaving via outlet 18, may be heated by electric heating elements (not depicted) extending into the chamber 21.
35 Preferably the heating elements are covered by Teflon (Registered Trade Mark) or Fluron (Registered Trade Mark) so as to resist chemical attack. The top of the body 11 is provided with an annular portion 20 having internal and external threads which are adapted to engage a cap 13. The

cap 13 has a plurality of apertures 14 to enable a number of electric heating elements to extend into the chamber 21 to heat the liquid. The body 11 is preferably moulded from polyethylene. More preferably the polyethylene is a randomly cross-linked polyethylene.

In a preferred form of the invention polyethylene granules, such as those marketed under the Registered Trade Mark of Sclair 8409 by DuPont, are ground to a suitable size and subjected to a cross-linking process, according to methods known in the art. The cross-linked polyethylene is then moulded, preferably by a rotation moulding process to form the container.

It has been found that the cross-linked polyethylene exhibits superior properties when subjected to continuous heat and pressure, and generally, such properties are concomitant with the degree of cross-linking. Accordingly, it is preferred that a degree of at least 25% cross-linking is attained. More preferably the containers are moulded from a 50-100% cross-linked polyethylene. Suitable adjuvants known to those skilled in the art may be used in the polyethylene. For example, before grinding the polyethylene, the granules may be extended in extruded admixture with carbon black to yield a black polymer.

The cap 13 is also formed of plastics material and is formed so as to have hollow portions 22 which are filled with an expanded foam to provide the cap 13 with strengths to withstand the heat and pressure within the chamber 21.

Located above the cap 13 and resiliently biased so as to engage the cap 13 is a cover 12 which defines a chamber 16 to receive electrical wiring and control circuitry. The cap 13 has an opening 17 to provide for electrical cabling to enter the chamber 16. Additionally, the cap 13, by having a floor 15 provides for the location of generally U-shaped heating elements in any location pattern that may be required.

CLAIMS

1. A liquid heating device comprising:
a vessel formed of plastics material and encompassing an open ended cavity to receive the liquid to be heated;
a cap of plastics material releasably secured to said vessel so as to close the open end of said cavity, said cap having at least one passage extending through it to provide access to the interior of said vessel; and
at least one heating element supported by said cap and extending through said passage so as to be located in said cavity to heat liquid located therein.
2. The device of claim 1, wherein said vessel has a lip defining the open end of said cavity, said lip being of annular configuration and being threaded, and said cap is provided with a thread adapted to correspond to the thread of said lip so that said cap is threadably secured to said vessel.
3. The device of claim 1, wherein said lip is of U-shaped longitudinal cross-section and is provided with an internal and external configuration and said cap has an annular cavity having internal and external threads adapted to threadably engage the threads of said vessel.
4. The device of any one of claims 1 to 3, wherein said cap is formed of a composite structure comprising a shell defining a plurality of cavities and an expanded foam material located in said enclosed cavities.
5. The device of claim 1, wherein said vessel and cap are moulded from a 25-30% cross-linked polyethylene.
6. A liquid heating device substantially as herein-described with reference to the accompanying drawing.

