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(54) Solar heater

(57) A solar heater is formed from first, second and third sheets (12, 14, 16) of flexible material joined at or near their peripheries. The sheets define a liquid compartment (18) between the first and second sheets (12, 14), and a gas compartment (20) between the second and third sheets (14, 16). Each compartment (18, 20) has at least one closable opening leading into it. An insulative blanket (46) is removably located adjacent the first sheet (12) by suitable locating means (48).

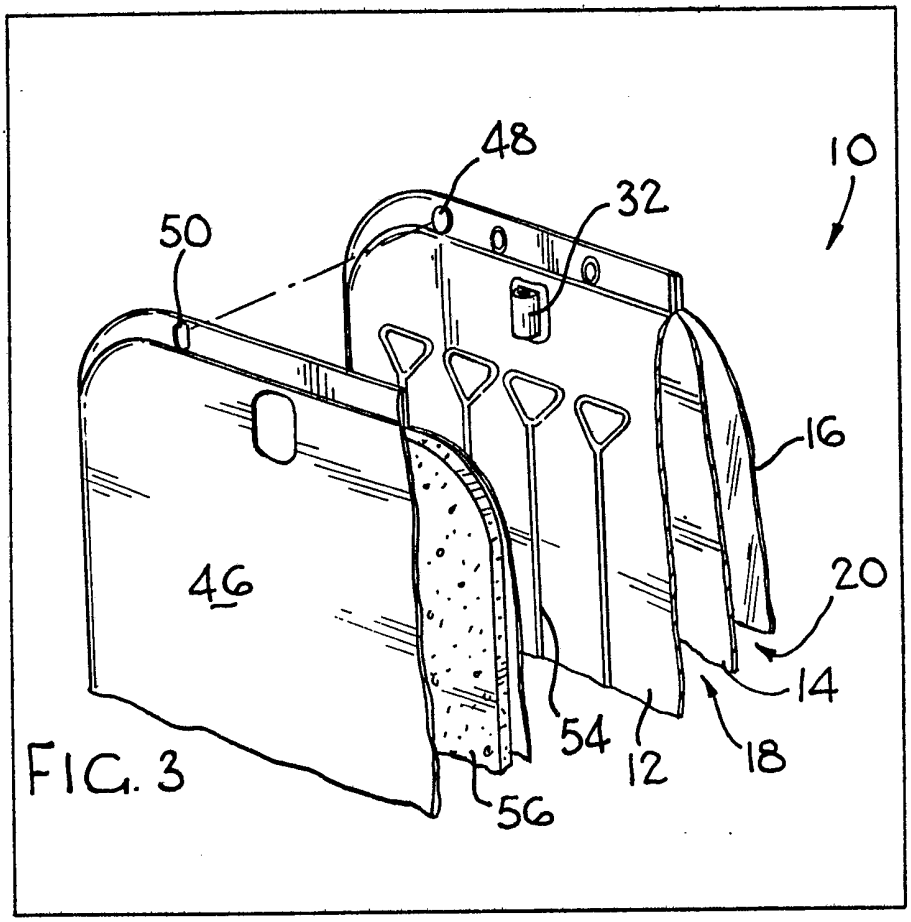

FIG. 3

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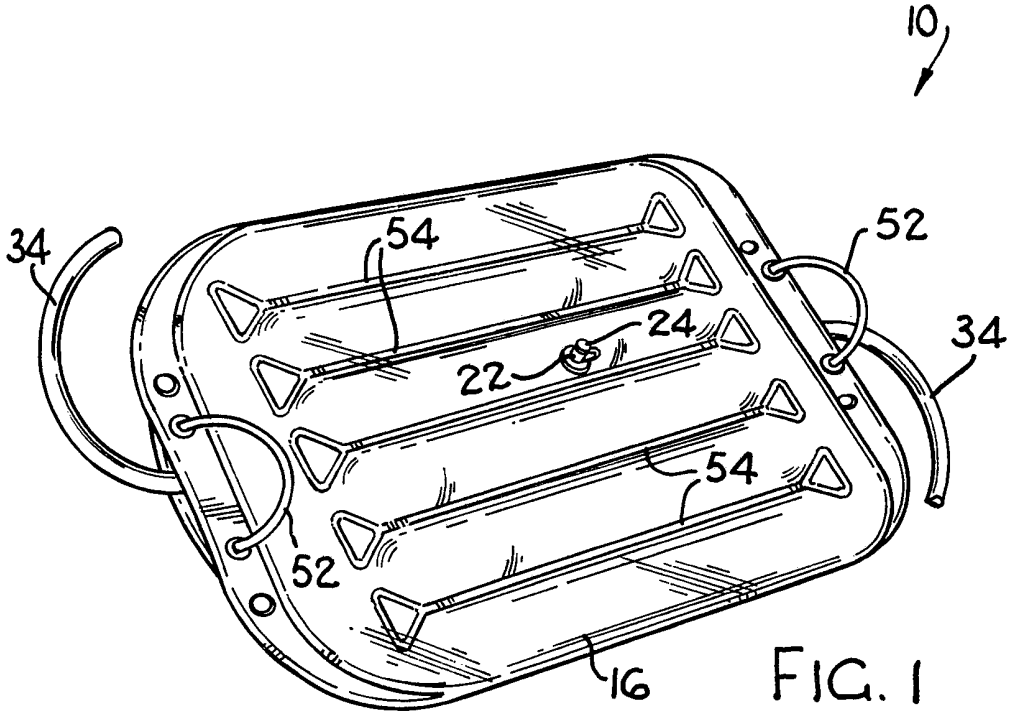

FIG. 1

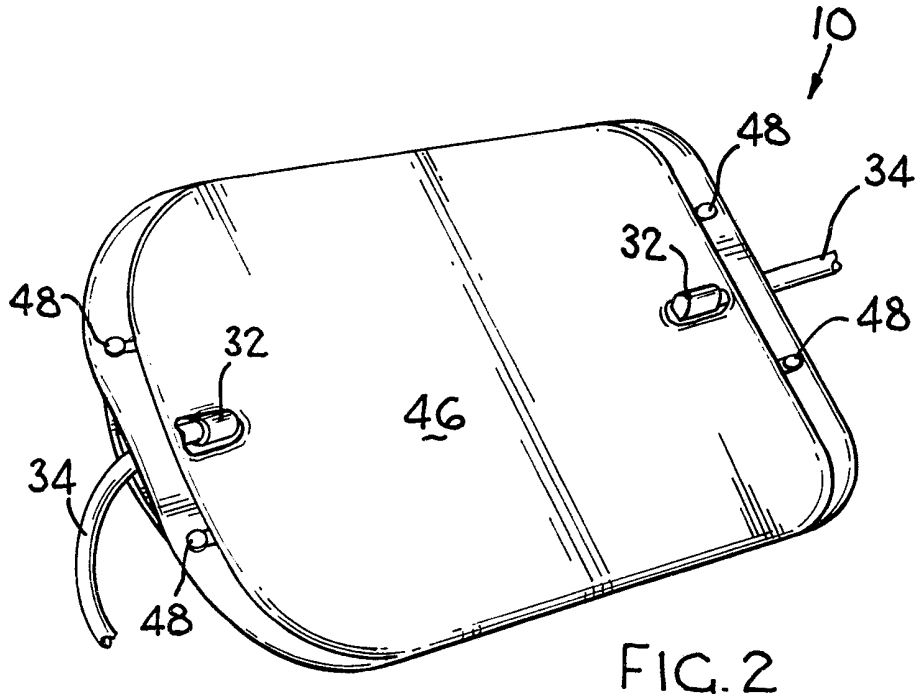

FIG. 2

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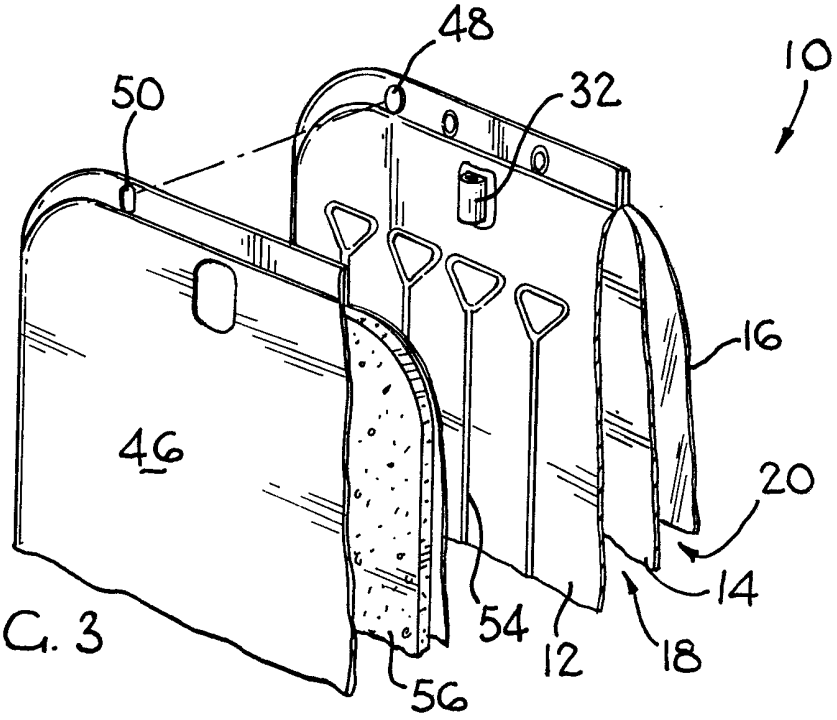

FIG. 3

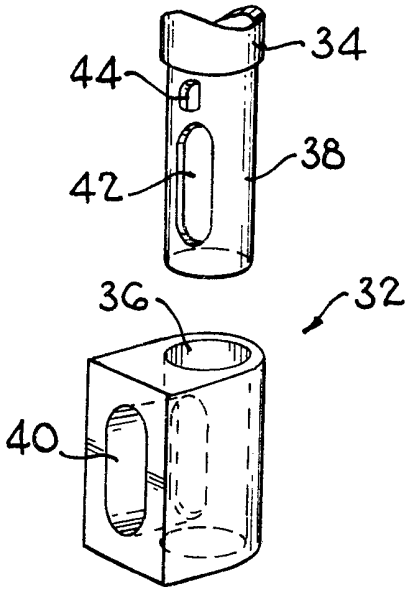

FIG. 4

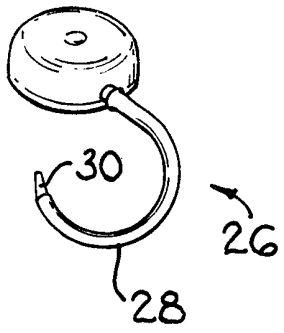

FIG. 5

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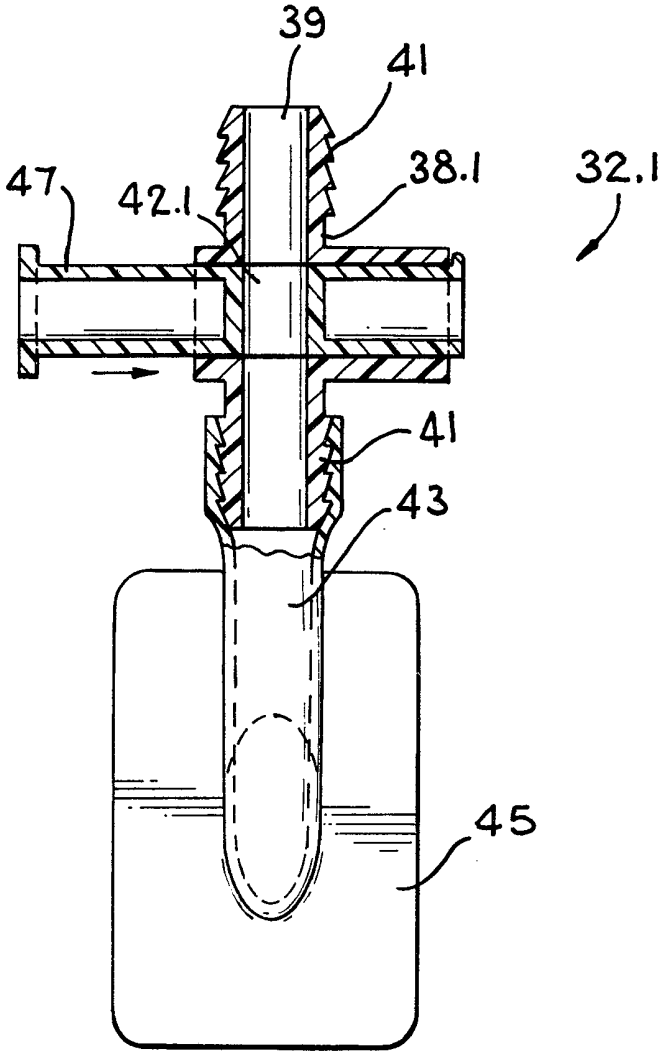

FIG. 6

SPECIFICATION

Solar heater

This invention relates to a solar heater. In particular, it relates to a solar heater of the type suitable for occasional or temporary heating of water.

According to the invention there is provided a solar heater which is formed from first, second and third sheets of flexible material joined at or near their peripheries to define a liquid compartment between the first and second sheets and a gas compartment between the second and third sheets, each comparment having at least one closable opening leading into it, and the solar heater having an insulative blanket removably located adjacent the first sheet by suitable locating means.

A handle may be attached to each of the opposite ends of the solar heater to facilitate portage and suspension of the solar heater. The handles may be flexible handles, e.g. of rope or the like, passed through suitable apertures provided at or near the periphery of the solar heater.

The solar heater may include, as an accessory, a pump which is removably attachable to the closable opening of the gas compartment to permit inflation of the gas compartment. The pump may be a foot or hand operated pump.

The first and second sheets may be further joined at least partially together by at least one joint intermediate their peripheries to minimise turbulence in the liquid compartment.

The third sheet is conveniently of a translucent or transparent material and will in use be directed towards a source of radiant heat such as the sun.

The second sheet is conveniently adapted to absorb radiant heat by being non reflective, e.g. having a dark colour and/or of a non-shiny or matte surface texture.

The solar heater may have any suitable outer shape but is preferably rectangular having opposed major surfaces which are each in area of the order of about one or two square meters.

The sheets of material are conveniently of a synthetic plastics material, the liquid compartment assuming a turgid condition when full and having a depth of about 50 to 200 mm to hold about 20 to 100 litres of liquid.

The liquid compartment may have two closable openings, namely, an inlet and an outlet opening, each controlled by valve means, e.g. a stopcock, tap, or the like. The inlet and outlet openings may be provided at opposed ends of the liquid compartment.

The valve means for the inlet or outlet openings of the liquid compartment may include a socket defining a passage which is in communication with the opening, and a spigot located in the passage, the spigot having an aperture therein and being displaceable between open and closed positions to align and misalign the aperture in the spigot with the passage of the socket.

In one embodiment, the spigot may be fitted transversely in the socket and be displaceable transversely relative to the socket to open and close the passage. In another embodiment, the spigot may be located coaxially with the socket and be rotatably displaceable to open and close the passage.

The socket may have sawtooth formations at its ends to locate its ends in the inlet or outlet opening and in a pipe or the like.

The gas compartment may have a non-return valve in its opening, and, if desired, a closure plug.

An embodiment of the invention is now described by way of example with reference to the accompanying drawings, in which

Figure 1 shows a three dimensional view from above of a solar heater in accordance with the invention;

Figure 2 shows a three dimensional view from below of a solar heater in accordance with the invention;

Figure 3 shows a partly sectioned schematic three dimensional view of the solar heater;

Figure 4 shows, to a larger scale, a three dimensional view of valve means used in the solar heater;

Figure 5 shows a plan view of a pump used with the solar heater; and

Figure 6 shows a partly sectioned plan view of a further form of valve means used in the solar heater.

Referring to the drawings, reference numeral 10 generally indicates a solar heater which is formed from sheets of synthetic plastics material which are foldable to permit storage of the solar heater in a confined space when not in use. The solar heater has a first base sheet 12, a second intermediate sheet 14 and a third translucent sheet 16. The sheets 12, 14 and 16 are all joined together along their peripheries to define a liquid compartment 18 and an air compartment 20.

The air compartment 20 has a closable opening in the form of a nipple 22 which contains a non-return valve (not shown) and has a closure plug 24.

The air compartment is thus inflatable by blowing into the nipple 22 or, if desired, by the use of a foot operated pump 26 as shown in Figure 5. The pump 26 has a flexible pipe 28 terminating in a nozzle 30 which is a neat fit into the nipple 22.

The liquid compartment 18 has two closable openings fitted with valves 32. One form of valve is shown in Figure 4, while another is shown in Figure 6. Each valve 32 has a pipe 34 leading to it and can serve as an inlet or an outlet dependent upon the orientation of the solar heater.

As shown in Figure 4, the valve 32 has a socket 36 into which is received a co-axial spigot 38. The spigot 38 is a friction fit in the socket 36. The socket 36 is in the form of a blind hole having a transverse passage 40 therein. The spigot 38 has a correspondingly shaped transverse aperture 42 so that by rotation of the spigot 38 by means of lugs 44, the aperture 42 can be brought into and out of alignment with the passage 40 to open and close the valve.

One of the pipes 34 which is intended to serve

as an inlet for the liquid compartment 18 conveniently has an attachment (not shown) at its free end to permit ready attachment to a tap.

The valve or tap 32.1 shown in Figure 6 includes a socket 38.1 defining a passage 39. The socket 38.1 has sawtooth formations 41 at each of its ends for connecting it to the outlet or inlet opening of the liquid compartment 18 via piping 43 or to piping 34 similar to the Figure 4 embodiment. A flange 45 at the end of the piping 43 is used to sealingly connect the piping 43 to the intermediate sheet 14 of the liquid compartment.

A spigot 47 has an aperture 42.1 which, when the spigot 47 is moved, is brought into alignment or misalignment with the passage 39 to open or close the valve or tap.

As shown in Figures 2 and 3, an insulative blanket 46 is removably attachable adjacent the base sheet 12 by locating means including studs 48 which are a force fit in elongated apertures 50.

Carrying and suspension handles 52 are provided at opposed ends of the solar heater and which are conveniently of rope-like form.

As shown in Figures 1 and 3, the base sheet 12 and intermediate sheet 14 are joined partially intermediate their peripheries by joints 54. The joints 54 extend over a major portion of the length of the solar heater and define pockets between them. Each pocket has narrow openings at its ends by reason of the triangular shaped joints at the ends of the joints 54. The joints 54 serve as vanes to retain liquid in a restricted area and to minimise turbulence when filling or drawing off water from the liquid compartment 18, and also add to the rigidity of the liquid compartment to minimise ballooning of the liquid compartment when filled with liquid.

The base sheet 12 and intermediate sheet 14 as well as the blanket 46 are conveniently of a dark colour having a non-shiny or matte surface texture. The blanket 46 comprises two sheets of material sandwiching a layer of synthetic plastics foam material 56 therebetween to minimise radiation of heat from the solar heater.

The solar heater is particularly suited for occasional or temporary use, e.g. as an item of camping equipment. While not in use, the solar heater can comprise a tightly rolled bundle for transport and storage. In use, the heater will be unrolled and either placed with its blanket 46 on a surface or be suspended by one or more of the handles 52, preferably at an inclination to the horizontal and facing the sun. Water is introduced into the liquid compartment 18 via one of the pipes 34 to fill it. The gas compartment 20 is then filled with air. After a period of time, water in the liquid compartment will be heated and can be drawn off via one of the pipes 34. The water can be replenished in the liquid compartment 18 from time to time as required and the heater may be moved from time to time to keep the translucent sheet 16 facing towards the sun. When no longer required, the water can be released from the liquid compartment 18 and air from the gas compartment 20 and the heater is rolled up for storage.

CLAIMS

1. A solar heater which is formed from first, second and third sheets of flexible material joined at or near their peripheries to define a liquid compartment between the first and second sheets, and a gas compartment between the second and third sheets, each compartment having at least one closable opening leading into it, and the solar heater having an insulative blanket removably located adjacent the first sheet by suitable locating means.

2. A solar heater as claimed in Claim 1, which includes a handle attached to each of its opposite ends to facilitate portage and suspension of the solar heater.

3. A solar heater as claimed in Claim 2, in which each handle is in the form of a flexible handle located in suitable apertures provided in the periphery of the solar heater.

4. A solar heater as claimed in any one of the preceding claims, having a pump which is removably attachable to the closeable opening of the gas compartment to permit inflation of the gas compartment.

5. A solar heater as claimed in Claim 4, in which the pump is a foot or hand operated pump.

6. A solar heater as claimed in any one of the preceding claims, in which the first and second sheets are further joined at least partially together by at least one joint intermediate their peripheries to minimise turbulence in the liquid compartment.

7. A solar heater as claimed in any one of the preceding claims, in which the liquid compartment has two closable openings, each controlled by valve means.

8. A solar heater as claimed in Claim 7, in which the valve means includes a socket defining a passage which is in communication with the opening, and a spigot located in the passage, the spigot having an aperture therein and being displaceable between open and closed positions to align and misalign the aperture in the spigot with the passage in the socket.

9. A solar heater as claimed in Claim 8, in which the spigot is fitted transversely in the socket and is displaceable transversely relative to the socket to open and close the passage.

10. A solar heater as claimed in Claim 8, in which the spigot is located co-axially with the socket and is rotatably displaceable to open and close the passage.

11. A solar heater as claimed in any one of the preceding claims, in which the gas compartment has a non-return valve and a plug in its opening.

12. A solar heater, substantially as described and as illustrated herein.

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