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(54) **SOLAR PANEL**

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(57) **ABSTRACT**

A solar panel that utilizes the sun's rays to heat a liquid to be used for providing heat or hot water includes front and rear parallel but spaced apart clear plastic panels. Each panel has a front surface, a back surface and left and right side edges. The front panel is intended to face the sun and is substantially transparent so that the sun's rays can pass therethrough. The rear panel has a reflective coating thereon wherein rays from the sun that pass through the front panel and through the space between the panels is reflective back toward the space. Located within the space between the panels are a plurality of conduits formed by a plurality of internal walls that extend between the front and rear panels and between the left and right side edges. Within the conduits is a darkened oily liquid that is heated by the incoming rays of the sun and by the rays reflected by the rear panel. In a preferred embodiment, the front and rear panels and the internal walls are extruded as a single unit.

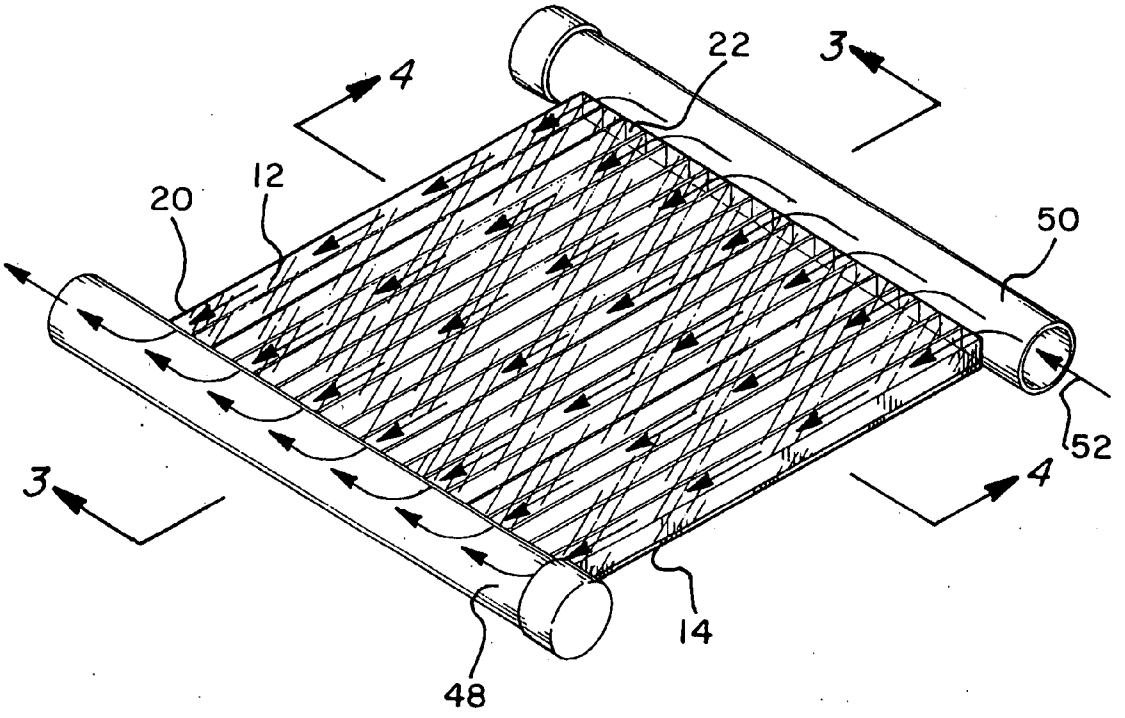


Fig. 1

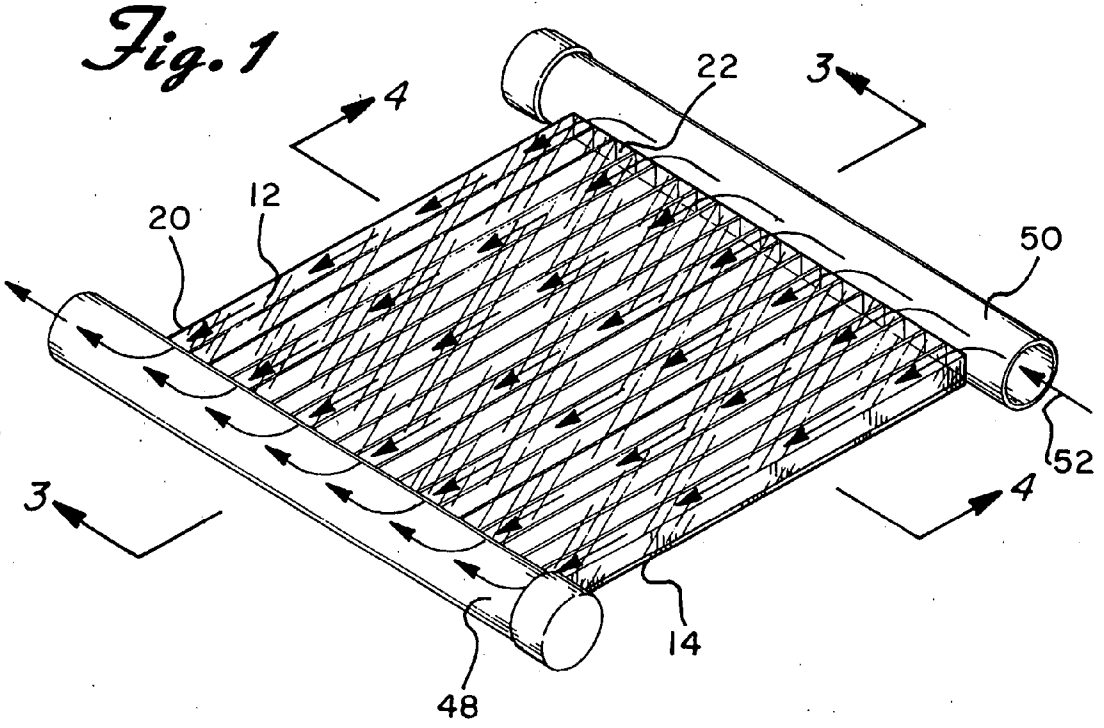


Fig. 2

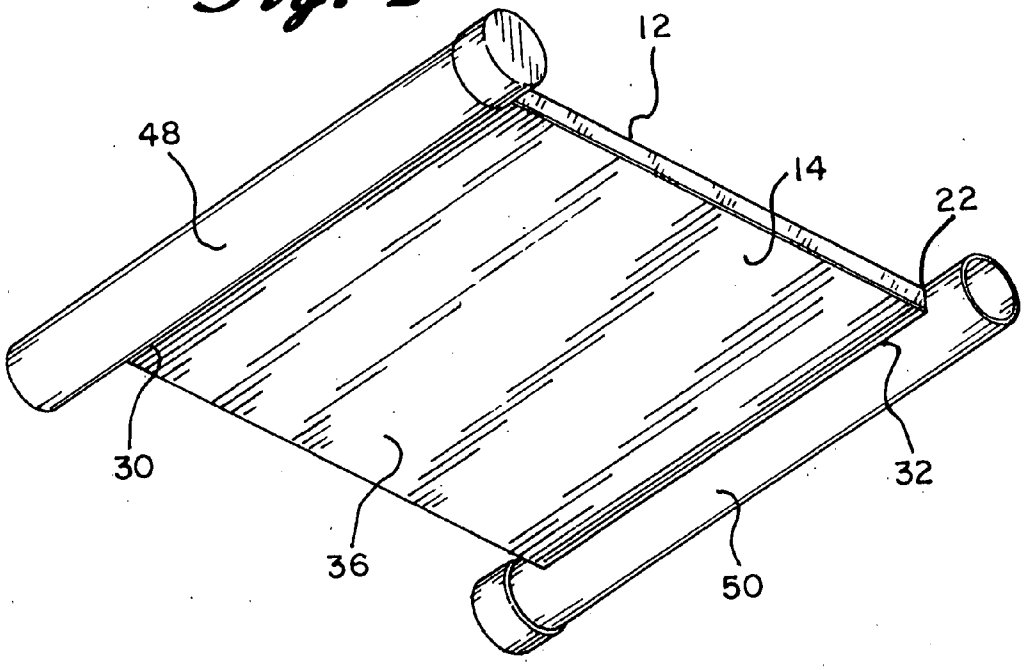


Fig. 3

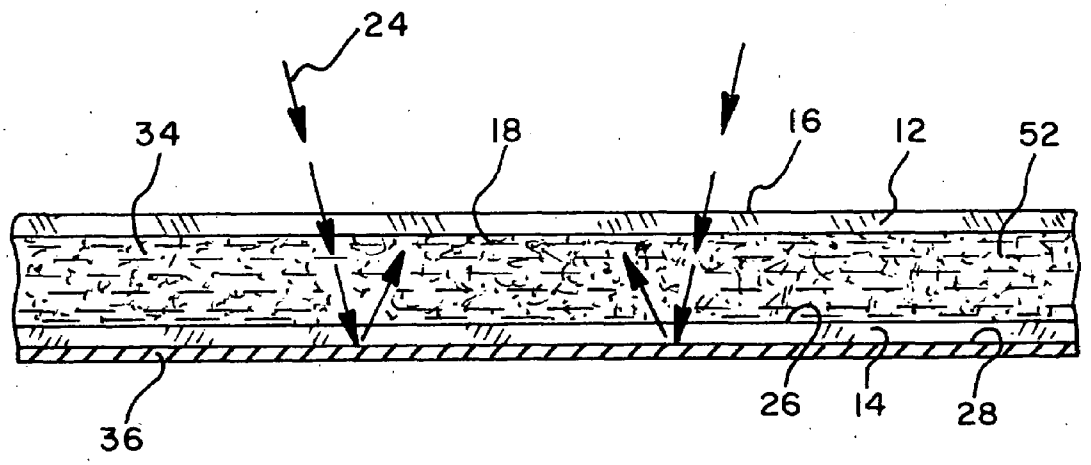
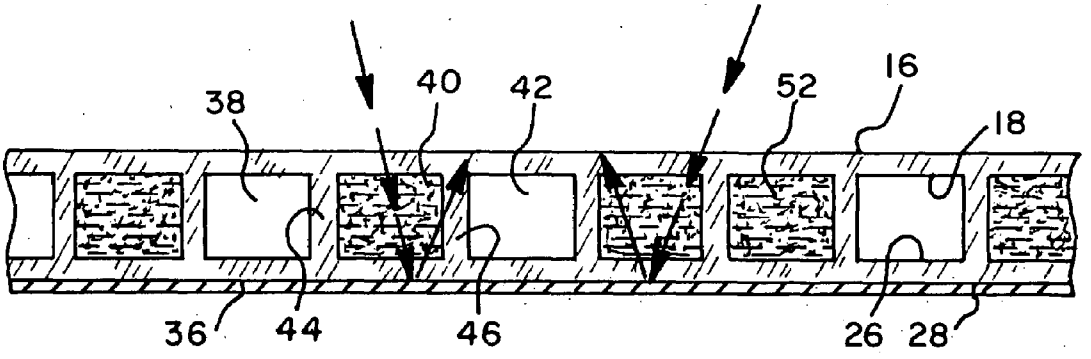


Fig. 4



SOLAR PANEL

BACKGROUND OF THE INVENTION

[0001] The present invention is directed toward a solar panel of the type that utilizes the sun's rays to heat a liquid to be used for providing heat or hot water to a home or other building.

[0002] Solar panels, also known as solar heat collectors, of the type stated generally above have been known for many years. During the 1970s and 1980s a significant number of different solar panels were constructed and used as a result of the intensive energy debate which took place during this period with regard to alternative renewable sources of energy. Many of the solar panels built during that period were manufactured in relatively small production series in an often unprofessional manner, which in time caused problems with water leakage amongst other things.

[0003] The early solar collectors were generally constructed of rigid materials such as glass and metal tubing. Consequently, they were heavy and cumbersome to handle and install, and were also undesirably expensive to construct and to use. Non-rigid solar collectors constructed of plastic materials have also been proposed but none has proven successful.

[0004] In one previously known system, a panel is extruded from a thermoplastic material with a plurality of transparent or translucent channels formed therein. The back surface of the panel is darkened so as to absorb light energy. A liquid flowing through the channels is heated by the sun and by the darkened back panel. While this may be an improvement on other prior art systems, it is still inefficient as much of the energy from the sun's rays is used merely to heat the darkened back panel and is not transferred to the liquid.

[0005] With renewed interest in solar energy because of increasing energy costs and the desire to not to rely on foreign oil, a need exists for an improved light weight and inexpensive solar panel that efficiently transfers energy from the sun's rays to the liquid to be heated.

SUMMARY OF THE INVENTION

[0006] The present invention is intended to overcome the deficiencies of the prior art discussed above. It is an object of the present invention to provide a solar panel that utilizes the sun's rays to heat a liquid to be used for providing heat or hot water.

[0007] It is another object of the present invention to provide a solar panel that utilizes the sun's rays to heat a liquid to be used for providing heat or hot water and that is efficient and inexpensive to produce.

[0008] It is a still further object of the present invention to provide a solar panel that utilizes the sun's rays to heat a liquid to be used for providing heat or hot water, that can be easily mass produced and which requires little or no maintenance.

[0009] In accordance with the illustrative embodiments demonstrating features and advantages of the present invention, there is provided a solar panel that utilizes the sun's rays to heat a liquid to be used for providing heat or hot water. The solar panel includes front and rear parallel but spaced apart clear plastic panels. Each panel has a front surface, a back surface and left and right side edges. The front panel is intended to face the sun and is substantially transparent so that the sun's rays can pass therethrough. The rear panel has a reflective coating thereon wherein rays from the sun that pass through the front panel and through the space between the panels is reflective back toward the space. Located within the space between the panels are a plurality of conduits formed by a plurality of internal walls that extend between the front and rear panels and between the left and right side edges. Within the conduits is a darkened oily liquid that is heated by the incoming rays of the sun and by the rays reflected by the rear panel. In a preferred embodiment, the front and rear panels and the internal walls are extruded as a single unit. The goal of the solar panel of the invention is to absorb eighty percent of the energy on the first pass and the rest as it is reflected back.

[0010] Other objects, features, and advantages of the invention will be readily apparent from the following detailed description of preferred embodiments thereof taken in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] For the purpose of illustration the invention, there are shown in the accompanying drawings one forms which is presently preferred; it being understood that the invention is not intended to be limited to the precise arrangements and instrumentalities shown.

[0012] FIG. **1** is a front perspective view shown somewhat schematically of a solar panel showing my new design;

[0013] FIG. **2** is a rear perspective view thereof;

[0014] FIG. **3** is a cross-sectional view taken through the lines **3-3** of FIG. **1**, and

[0015] FIG. **4** is a cross-sectional view taken through the lines **4-4** of FIG. **1**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] Referring now to the several drawings in detail wherein like reference numerals have been used throughout the various figures to designate like elements, there is shown in FIGS. **1** and **2** a solar panel of the type that utilizes the sun's rays to heat a liquid to be used for providing heat or hot water to a home or other building constructed in accordance with the principles of the present invention and designated generally as **10**.

[0017] The solar panel **10** is comprised essentially of a front panel **12** and a rear panel **14**. As shown most clearly in FIGS. **3** and **4**, the front panel **12** has a front surface **16** and a back surface **18**. It also has a left side edge **20** and a right side edge **22** as shown in FIG. **1**. The front panel **12** is substantially transparent and is intended to face the sun so that they sun's rays **24** can pass therethrough substantially uninterrupted.

[0018] Similarly, the rear panel **14** includes a front surface **26**, a back surface **28** and left and right side edges **30** and **32**, respectively. The rear panel **14** is arranged parallel to but spaced apart from the front panel **12** so as to leave a space **34** in between the two panels. As shown most clearly in FIGS. **3** and **4**, the back surface **28** of the rear panel **14** has a reflective coating **36** thereon. It is possible, however, to have the reflective surface **36** be spaced slightly from the back surface **28** of the rear panel with a air or vacuum in the space in between them. In any case, rays **24** from the sun that pass through the front panel **12** and through the space **34** strike the reflective coating **36** and are reflected back toward the space **34**. The reflective coating **36** can be comprised of a coating known in

the art such as a bright white paint or the like, a silver-mirrored finish or any other material that will reflect impinging light effectively.

[0019] Located within the space **34** between the front and back panels **12** and **14** are a plurality of conduits such as shown at **38**, **40** and **42** (for example) in FIGS. **1** and **4**. The conduits are formed by a plurality of internal walls such as shown at **44** and **46** that extend between the front and rear panels **12** and **14**. These internal walls **44** and **46** also extend to the left and right side edges of the front and right panels.

[0020] As shown in FIGS. **1** and **2**, the side edges of the solar panel are fitted into elongated openings in tubular pipe members **48** and **50**. The side ends of the conduits **38**, **40** and **42**, for example, are open and communicate with the interior of the pipe members **48** and **50**. As a result, and as shown diagrammatically in FIG. **1**, a liquid **52** passing into the interior of the pipe member **50** passes through each of the conduits and out the other end into the interior of the pipe member **48**.

[0021] It should be noted that while the liquid **52** is shown passing through only some of the channels in the solar panel, this is for illustration and clarification only. The liquid **52** will, of course, pass through all of the channels. Furthermore, while the arrangement shown in FIG. **1** has the various channels arranged in parallel so that liquid **52** passes in the same direction through each of them, it is also within the scope of the present invention to arrange the numerous channels in series by connecting alternate ends of the channels together. In this way, the liquid will pass through the first channel in one direction, through the second channel in the other direction and back and forth until it exits.

[0022] The liquid **52** is preferably oil-based liquid which can be, for example, corn oil, soy oil or sunflower seed oil. Other liquids can, however, be substituted. In addition, in order to absorb as much of the sun's energy as possible, the liquid **52** is darkened. This can be done utilizing activated carbon, carbon black or an FDA approved food coloring or dye such as those available from Sensient Technologies Corporation. When utilizing these dyes, it has been found that approximately 1 ounce of coloring or dye is required for each 10 gallons of liquid.

[0023] The front panel **12**, rear panel **14** and the internal walls **44** and **46** etc., preferably formed as one piece by an extrusion process well known in the art. Preferably, all of the components are made from a clear thermoplastic material such as a polycarbonate or polymethyl methacrylate (acrylic) material.

[0024] As should be readily apparent to those skilled in the art, Applicant has schematically shown only the essential features of the solar panel itself. Obviously, seals, mounting hardware, an insulated box and the like will be used as needed. Furthermore, while not specifically shown, the solar panel **10** is intended to be used as part of a closed liquid heating system wherein the darkened liquid **52** heated by the solar panel structure will transfer heat through a heat exchanger in order to provide heat or hot water to a dwelling or other building. In addition, the solar panel **10** can be used alone or in combination with a number of additional similarly constructed panels and can also be part of a building element that forms part of the roof of a building.

[0025] The present invention may be embodied on other specific forms without departing from the spirit or essential attributes thereof and accordingly, reference should be made to the appended claims rather than to the foregoing specification as indicating the scope of the invention.

I claim:

1. A solar panel of the type that utilizes the sun's rays to heat a liquid to be used for providing heat or hot water comprising:

a front panel having a front surface, a back surface, a left side edge and a right side edge, said front panel being substantially transparent and being intended to face the sun so that the sun's rays can pass therethrough;

a rear panel having a front surface, a back surface, a left side edge and a right side edge, said rear panel being arranged parallel to but spaced apart from said front panel so as to leave a space in between said front and rear panels, said rear panel having a reflective coating thereon wherein rays from the sun that pass through said front panel and through said space to said reflective coating are reflected back toward said space;

a darkened liquid within said space and means for moving said liquid into and out of said space.

2. The solar panel as claimed in claim **1** further including a plurality of conduits within said space, said darkened liquid being contained within said conduits.

3. The solar panel as claimed in claim **2** wherein said conduits are formed by a plurality of internal walls extending between said front and rear panels.

4. The solar panel as claimed in claim **3** wherein said plurality of internal walls also extend between said left and right side edges of said front and rear panels.

5. The solar panel as claimed in claim **1** wherein said liquid is comprised of oil.

6. The solar panel as claimed in claim **5** wherein said oil is a vegetable oil.

7. The solar panel as claimed in claim **1** wherein said darkened liquid contains carbon black.

8. The solar panel as claimed in claim **1** wherein said front and rear panels are formed from a clear plastic.

9. The solar panel as claimed in claim **8** wherein said plastic is a polycarbonate.

10. The solar panel as claimed in claim **8** wherein said internal walls are formed of plastic.

11. The solar panel as claimed in claim **10** front and rear panels and said internal walls are extruded as a single unit.

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