

"SOLAR COLLECTOR"

The present invention relates to a solar collector.

Solar collectors typically comprise water inlet means and water outlet means interconnected by a plurality of
5 tube water ways.

However, it is found that in use problems can arise with tube water ways. For example, pressure build-up can occur because the water flow is constrained by the tubes and cannot necessarily find the path of least resistance.

10 The present invention provides a solar collector in which problems with pressure build-up are reduced compared to prior art solar collectors.

In accordance with the present invention there is provided a solar collector comprising first and second

15 panels connected together in spaced, face to face relationship, water inlet means leading into the space between the panels and water outlet means leading from the space between the panels, wherein the second panel is flat and the first panel is formed with an array of
20 dimples defining flow passages in the space between the panels, said flow passages comprising a first set of flow passages extending parallel to one another in one direction and a second set of flow passages extending parallel to one another in another direction and inter-
25 secting the first set of flow passages.

Typically, as in conventional practice, the solar collector of the present invention is disposed at an angle to the horizontal in use to obtain a satisfactory

exposure to solar radiation and to allow convective flow of water within the collector plate. In this case, the inlet means leads into the lower end of the collector and is arranged to supply water which is, as a rule, relatively cold and the outlet means leads from the upper end of the collector to remove water which is, as a rule, relatively hot.

The collector of the present invention may be provided with inlet and outlet headers to assist in distributing the inlet water more evenly across the collector and to assist in removing heated water more evenly from across the collector. However, the use of headers is not essential since the dimples provide lateral and longitudinal flow paths.

15 The dimples could be arranged in a rectangular array so that there are a number of parallel lateral flow passages intersected by a number of parallel longitudinal flow passages. However, the dimples could be arranged in an array so that the flow passages extend in directions having both lateral and longitudinal components i.e. diagonally
20 extending across the face of the collector plate. However, one set of flow passages would still extend parallel to one another in one direction while an intersecting set of passages would extend parallel to one another in another
25 direction. The lower panel of the collector of the present invention is completely flat whilst the upper panel is formed with the dimples. Forming the upper panel with dimples has the advantage of increasing its surface area so increasing its ability to absorb solar radiation.

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Preferably, the summit of each dimple is spot welded to the adjacent area of the opposing plate to assist in holding the plates together. However, the corresponding edges of the panels are also preferably seam welded so that the collector assembly is water tight.

In this connection the panels are preferably formed of metal such as stainless steel. However, the top panel could be formed of other materials such as stainless steel, mild steel, aluminium or copper while the bottom panel is formed of stainless steel or other appropriate material as mentioned above.

Preferably, the metal panels are between 0.5 and 0.7 mm thick. Further, the panel which is uppermost in use typically has a solar radiation absorptive coating and it is preferred to use a selective surface for this purpose.

The solar collector of the present invention may be used for water heating purposes particularly industrial water heating, and space heating and cooling purposes. The present invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is a plan view of a rectangular solar collector plate in accordance with the present invention;

Figure 2 is an elevation of the major side of the collector plate of Figure 1 viewed from the direction of the arrow A.

Figure 3 is an elevation of the minor side of the collector

plate of Figure 1 viewed from the direction of the arrow B; and

Figure 4 is a partial transverse sectional view in the direction of the arrow A through part of the collector of Figure 1.

In the drawings there is shown a rectangular solar collector comprising a casing 10 formed of, for example, aluminium, and comprising a base 12 surrounded by upstanding peripheral walls 14 and having an open top.

The interior of the casing 10 is lined with a layer of insulating material 16 such as polyurethane foam.

A solar collector plate 18 in accordance with the present invention rests on the layer of insulation overlying the base 12. The collector plate 18 comprises a first, lower panel 20 which is flat and a second, upper panel 22 which is formed with a rectangular array of dimples 24.

The dimples 24 are spot welded to the first panel 20 as shown at 26 and the panels 20 and 22 are seam welded together at their peripheries as shown at 28. The seam welding ensures that the volume defined by the first and second panels 20 and 22 is water tight.

Further, the collector plate 18 comprises an inlet 30 at one end and an outlet 32 at the other end. The inlet and outlet communicate with the space between the panels 20 and 22 in conventional manner.

The dimples 24 are arranged in a rectangular array and the rectangular array defines longitudinal flow passages in the direction of the arrow B and lateral flow passages in the direction of the arrow A shown in Figure 1.

- 5 A framework 34 is mounted atop the side walls 14 and surrounds the collector plate 18. The framework 34 provides a mounting for a glass sheet 36 by means of a glazing gasket 38. In use, the collector plate 10 is mounted at a slope with the end having the inlet 30 lowermost. Cooler water enters the
- 10 space between the panels 20 and 22 and becomes heated by solar radiation. In this connection, the panel 22 preferably has a selective coating to enhance the degree of heating achieved. The heated water moves by convection towards the outlet 32. If any of the longitudinal flow passages defined by the dimples
- 15 24 becomes blocked the heated water can readily find another longitudinal passage by moving laterally along a lateral flow passage. Thus, the risk of the collector's efficiency being reduced by corrosion and build up of materials is lowered. Modifications and variations such as would be apparent to
- 20 a skilled addressee are deemed within the scope of the present invention.



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CLAIMS

1. A solar collector comprising first and second panels connected together in spaced, face to face relationship, water inlet means leading into the space between the panels and water outlet means leading from the space between the panels, wherein the second panel is flat and the first panel is formed with an array of dimples defining flow passages in the space between the panels, said flow passages comprising a first set of flow passages extending parallel to one another in one direction and a second set of flow passages extending parallel to one another in another direction and intersecting the first set of flow passages.
2. A solar collector in accordance with Claim 1, which comprises a rectangular casing having a base, peripheral walls and an open top, the open top being closed by a glass sheet wherein the panels are located between the base and the glass sheet.
3. A solar collector in accordance with Claim 2, in which the panels rest on a layer of insulating material overlying the base.
4. A solar collector according to any one of the preceding claims, in which the summits of the dimples are spot welded to the adjacent panel.
5. A solar collector according to any one of the preceding claims, in which the corresponding edges of the panels are seam welded together in water tight manner.
6. A solar collector according to any one of the



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- preceding claims, in which the dimples are formed in a rectangular array so that the first set of flow passages extends laterally and the second set of flow passages extends longitudinally in the space between the panels.
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7. A solar collector substantially as hereinbefore described with reference to the accompanying drawings.
8. A solar water heating apparatus or a solar space heating and cooling apparatus comprising a solar
- 10 collector as defined in any one of the preceding claims.
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