SOLAR PANEL SYSTEM AND METHOD UTILIZING UNFRAMED SOLAR PANELS

A solar panel system and method wherein unframed solar panels are positioned on support beams above a support structure in a configuration that leaves two of the edges of the solar panels unframed. This avoids trapping of water and dirt and the like, which occurs with prior art, framed panels. A liner comprised of a compliant material may be interposed between the support beams and the two panel edges so as to protect those two edges, while leaving the remaining two edges in their original, unframed condition.

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Fig. 1
(prior art)
Fig. 2
(prior art)

Fig. 3
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FIELD OF THE INVENTION

[0001] The present invention relates generally to solar panel systems and methods and, more particularly, to a solar panel and system featuring unframed solar panels.

BACKGROUND OF INVENTION

[0002] Prior art systems and methods for mounting photovoltaic or other types of solar panels meet are intended to hold the solar panels against wind, hail, rain and snow. In a typical prior art installation, four-sided solar panels are shipped from the manufacturer with a metal frame around the four edges of the solar panel. During the manufacturing process, the unframed solar panels may be mounted into the frames by inserting the solar panel into a channel fabricated into the frame. This insertion process must be done carefully to avoid damage to the edges of the glass and is often done by hand at significant expense.

[0003] In the field installation process for a prior art system, a supporting structure may be built consisting of horizontal beams supported by vertical posts. Then, the metal frames of the framed solar panels are attached to the horizontal beams with mounting brackets and mounting hardware, e.g., bolts. (See, e.g., FIGS. 1-2.) The frame around the solar panel protects the edge of the glass and supports the solar panel against the forces of created by the weight of the solar panels, by snow loads and by wind loads. However, the frames can hold water, leading to corrosion and poor reliability. They can also trap dirt along the bottom edge of the solar panel and shade part of the panel from the sunlight, reducing efficiency.

SUMMARY OF THE INVENTION

[0004] In accordance with an embodiment of the present invention, a solar panel system is disclosed. The system comprises, in combination: a liner comprised of a compliant material positionable about two opposing edges of a four edge solar panel; two support beams configured to support the two opposing edges of the four edge solar panel, with the liner interposed between the two support beams and the two opposing edges, and with two remaining edges of the four edge solar panel in an unframed condition; and a support structure for the solar panel system that is adapted to receive thereon the two support beams.

[0005] In accordance with another embodiment of the present invention, a solar panel system is disclosed. The system comprises, in combination: a four edge solar panel; a liner comprised of a compliant material positionable about two opposing edges of the four edge solar panel; two support beams configured to support the two opposing edges of the four edge solar panel, with the liner interposed between the two support beams and the two opposing edges, and with two remaining edges of the four edge solar panel in an unframed condition; wherein the two support beams each comprise a lower horizontal member, an upper horizontal member, a vertical member interposed between the lower horizontal member and the upper horizontal member, and a separator positioned on an upper surface of the upper horizontal member; a top plate coupled to the separator; and a support structure for the solar panel system that is adapted to receive thereon the two support beams.

[0006] In accordance with a further embodiment of the present invention, a method for assembling a solar panel array is disclosed. The method comprises: providing a four edged solar panel; providing a support structure for the solar panel array; positioning on the support structure two support beams; interposing a liner comprised of a compliant material between two opposing edges of the four edge solar panel and the two support beams; and leaving two edges of the four edge solar panel in an unframed condition.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. 1 is a top view of a framed solar panel component of a prior art system, including an inset portion of the panel shown in cross-section from an end thereof.

[0008] FIG. 2 is a perspective view of a prior art solar panel system.

[0009] FIG. 3 is a perspective view of base components of a solar panel system consistent with an embodiment of the present invention.

[0010] FIG. 4 is a perspective view of a solar panel system consistent with an embodiment of the present invention, illustrating an exemplary placement of solar panel support beams.

[0011] FIG. 5 is a perspective view of the solar panel system of FIG. 4, illustrating an exemplary placement of unframed solar panels on the solar panel support beams.

[0012] FIG. 4A is an end view of a solar panel support beam, consistent with an embodiment of the present invention.

[0013] FIG. 5A is an end view of a solar panel support beam, consistent with an embodiment of the present invention, illustrating exemplary coupling of unframed solar panels thereto.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014] Referring first to FIGS. 1-2, an exemplary, ground-installed, prior art solar panel system 100 is illustrated. The prior art system 100 may comprise four vertical supports 102, two horizontal supports 104, each of which is coupled at each opposing end to a vertical support 102, and a plurality of solar panels 106 coupled to and positioned across the horizontal supports 104. Each solar panel 106 includes a frame 108 around an edge portion thereof.

[0015] Referring now to FIGS. 3-5A, assembly of a solar panel system 10 consistent with an embodiment of the present invention is illustrated. The system 10 utilizes at least one and preferably a plurality of solar panels 16. Solar panels 16 are provided without framing therearound.

[0016] In one embodiment, assembly of a system 10 commences with installation of vertical supports 12, followed by the coupling thereto of horizontal supports 14 (see FIG. 3). Support beams 18 may then be coupled to the horizontal supports (see FIG. 4). The support beams 18 will provide support for the solar panels 16, as herein described.

[0017] Referring specifically to FIGS. 4A and 5A, an embodiment of a support beam 18 consistent with an embodiment of the present invention is illustrated. In one embodiment, the support beam 18, when viewed from an end thereof, may have a substantially “T” shape, comprising lower horizontal member 20, upper horizontal member 22, and a vertical member 24 interposed therebetween. Additionally, a separator 26 may be provided on an upper surface of the upper horizontal member 22.
Support beams 18 may be mounted to the horizontal supports 14, in an orientation that will expose the separator 26 at a top of the structure. (Mounting may be accomplished utilizing bolts, screws, or other desired mounting means.) In another embodiment, the support beam 18 may be extruded and the separator 26 at the top of the structure may be an integral part of the extruded support beam. Support beams 18 should be spaced sufficiently far apart so that, as described below, a single solar panel 16 may be installed onto a pair of support beams 18, with an underside of the solar panels 16 along an edge thereof being supported, on two sides thereof, by the upper horizontal member 22. Where a plurality of solar panels 16 are to be installed as illustrated for example in FIGS. 4, 5 and 5A, it can be seen that a single support beam 18 may provide support for edges of two neighboring solar panels 16.

Referring specifically to FIG. 5A, so as to protect the edges of the solar panels 16 that are supported by the support beams 18, a liner 28 may be utilized. The liner 28 is preferably formed of a compliant material, such as butyl rubber, though other materials may also be utilized. In one embodiment, the liner 28 is provided along an underside of the edge of the solar panel 16, above the edge of the solar panel 16, and along the outer edge itself of the solar panel 16.

The portion of the liner 28 located above the solar panel 16 may be substantially flat and may be provided as a separate piece. Alternatively, an entire liner 28, as shown in FIG. 5A, may be provided as a one-piece, substantially "U" shaped assembly, which may be affixed to an edge of the solar panel 16 prior to the positioning thereof on the support beam 18.

After the solar panel 16, with liner 28, is positioned on the support beam 18, it may be desired to securely affix the solar panel 16 in position. Referring to FIG. 5A, in one embodiment, a top plate 30 is coupled to the separator 26. The top plate 30 may be affixed with sheet metal screws or other coupling means.

As described herein, only two opposite edges of the solar panels 16 are held by the liner 28. It should be noted that when solar panels 16 are mounted in a static array, they are usually tilted toward the ground in the southern direction to better capture the sunlight. In a tracking array, they are typically tilted toward the east in the morning and the west in the afternoon. If the solar panel system 10 is oriented with the support beams 18 along the direction of the tilt, it can be seen that the bottom and top edges of the solar panels 16 would be unframed. Thus, there will be no structure on these edges to catch water or dirt. As a consequence, the reliability of the solar panels 16 is improved and the shadowing of the bottom edge by dirt is eliminated.

The solar panel system 10 described above can be assembled by a sequence of steps in which the components are added on top of each other. First, in one embodiment, the support beams 10 and 12 are put in place. Then, the next level of support beams 18 with separators 26 may be placed on top of them. Then, the lower part of the liner 28 may be placed on top of the support beams 18. Finally, the solar panels 16 may be placed on top of the liner 28, the second part of the liner 28 may be placed on top of the solar panels 16, and then the top plate 30 may be placed on top of the liner 28 to hold the liner 28 and solar panels 16 in place. In this embodiment, none of these steps require inserting solar panels into a channel, require any critical tolerancing or apply any significant pressure to the solar panel during the installation process. Such an assembly is relatively quick, inexpensive and unlikely to cause the solar panels 16 to break.

Although particular embodiments of the invention have been described in detail for purposes of illustration, various modifications may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited, except as by the appended claims.

We claim:

1. A solar panel system comprising, in combination: a liner comprised of a compliant material positionable about two opposing edges of a four edge solar panel; two support beams configured to support the two opposing edges of the four edge solar panel, with the liner interposed between the two support beams and two opposing edges, and with two remaining edges of the four edge solar panel in an unframed condition; and a support structure for the solar panel system that is adapted to receive thereon the two support beams.

2. The system of claim 1 wherein the compliant material is butyl rubber.

3. The system of claim 1 wherein the liner has a substantially "U" shape.

4. The system of claim 1 wherein the liner is comprised of a first L-shaped component and a second flat component.

5. The system of claim 1 wherein the two support beams each comprise a lower horizontal member, an upper horizontal member, a vertical member interposed between the lower horizontal member and the upper horizontal member, and a separator positioned on an upper surface of the upper horizontal member.

6. The system of claim 5 further comprising a top plate coupled to the separator.

7. The system of claim 1 further comprising a four edge solar panel.

8. A solar panel system comprising, in combination: a four edge solar panel; a liner comprised of a compliant material positionable about two opposing edges of the four edge solar panel; two support beams configured to support the two opposing edges of the four edge solar panel, with the liner interposed between the two support beams and two opposing edges, and with two remaining edges of the four edge solar panel in an unframed condition; wherein the two support beams each comprise a lower horizontal member, an upper horizontal member, a vertical member interposed between the lower horizontal member and the upper horizontal member, and a separator positioned on an upper surface of the upper horizontal member; a top plate coupled to the separator; and a support structure for the solar panel system that is adapted to receive thereon the two support beams.

9. The system of claim 8 wherein the compliant material is butyl rubber.

10. The system of claim 8 wherein the liner has a substantially "U" shape.

11. The system of claim 8 wherein the liner is comprised of a first L-shaped component and a second flat component.

12. A method for assembling a solar panel array comprising:
providing a four edged solar panel;
providing a support structure for the solar panel array;
interposing a liner comprised of a compliant material
between two opposing edges of the four edge solar panel
and the two support beams; and
leaving two edges of the four edge solar panel in an
unframed condition.
13. The method of claim 12 wherein the compliant material
is butyl rubber.
14. The method of claim 12 wherein the liner comprises a
lower portion configured to be positioned above an opposing
dege of the four edge solar panel and an upper portion con-
figured to be positioned below an opposing edge of the four
dge solar panel.
15. The method of claim 14 wherein the liner has a sub-
stantially “U” shape.
16. The method of claim 14 wherein the lower portion has
an L-shape and the upper portion is flat.
17. The method of claim 12 wherein the two support beams
each comprise a lower horizontal member, an upper hori-
zontal member, a vertical member interposed between the lower
horizontal member and the upper horizontal member, and a
separator positioned on an upper surface of the upper hori-
zontal member.
18. The method of claim 17 further comprising:
positioning on the upper surface of a layer of the upper
horizontal member the lower portion of the liner;
positioning an edge of the four edge solar panel on the
lower portion of the liner;
positioning the upper portion of the liner above the edge of
the four edge solar panel; and
coupling the top plate to the separator above the upper
portion of the liner.
19. The method of claim 12 wherein the liner is first posi-
tioned on the two opposing edges of the four edged solar
panel, and the four edged solar panel, with the liner positioned
thereon, is then positioned on the support beams.
20. The method of claim 14 further comprising:
positioning the lower portion of the liner on one of the
support beams;
positioning one edge of the four-edged solar panel on top of
the lower portion;
positioning the upper portion of the liner on top of the
four-edge solar panel, proximate the one edge thereof,
positioning a top plate over the top portion of the liner; and
securing the top plate to the one of the support beams.

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