BASE SLAB ASSEMBLY

Field of the Invention

The present invention relates to a base slab assembly which is capable of supporting one or more photovoltaic tiles.

Background of the Invention

Roof mounted photovoltaic panels are in increasing use to supplement the electrical energy requirements of a house or building. Such panels convert solar energy to electrical energy which is delivered to an energy management system that usually includes batteries for storing electrical energy and an inverter for converting DC current produced by photovoltaic tiles to AC current. Often such panels are retro fitted to a roof and overlay an existing roof covering. That is, the panels do not in themselves replace or act as a roof covering.

Applicant has previously developed a photovoltaic tile assembly which in addition to converting solar energy to electrical energy, can also act as a roof covering. This improves the economics of the overall system as the cost of the roof covering can be avoided or reduced. Such a tile assembly is comprised of a base tile which can be secured to an underlying roof structure to form a water and weatherproof roof covering, and to which a plurality of photovoltaic panels or tiles are supported and electrically connected. Further details of Applicant's previous photovoltaic tile assemblies and base tiles are described in International Publication No's. WO 2009/048431 and WO 2010/030245.

The present invention arises from further research and development in the area of roof based solar electric energy systems.

Summary of the Invention

The invention provides a base slab assembly capable of supporting at least one photovoltaic tile, the base slab assembly comprising:

a lower surface;

an upper surface provided with at least one group of spaced apart

stripes, the or each group comprising at least a first stripe and a second stripe, the stripes running parallel to each other on the upper surface and between opposite lateral sides of the base slab, the stripes protruding upright from the upper surface and being configured to together support a photovoltaic tile at a first angle of inclination to the lower surface.

A group of stripes may be arranged such that each stripe comprises a portion that lies in a plane inclined at the first angle.

The portion of the first stripe may comprise an upper face of the first stripe where the upper face is inclined at the first angle.

The portion of the second stripe may comprise an upper face of the second stripe where the upper face of the second stripe is inclined at the first angle.

The first stripe may comprise a plurality of first holes formed in a direction perpendicular to a plane of the base slab the first holes being capable of receiving fasteners for fastening a photovoltaic tile to the first stripe.

The base slab assembly may comprise a cavity internal of the base slab assembly and, a plurality of openings formed in the upper surface that lead to the cavity.

The openings may be formed at least partially through the first stripe.

The base slab assembly may comprise a sealing gasket formed about each opening and capable of forming a liquid impervious seal against a photovoltaic tile supported on a first stripe.

The base slab assembly may comprise one or more second holes formed in one of the first stripes, the or each second hole providing a path between the cavity and a space between that first stripe and an associated second stripe in a common group of stripes.

In one embodiment the first stripe has a first transverse width and the second stripe having a second transverse width wherein the first transverse width is greater than the second transverse width.

The base slab assembly may comprise an electrical connection system disposed in the cavity, the electrical connection system comprising a plurality of contacts disposed in the openings and capable of forming respective electrical connections with complimentary connectors of respective photovoltaic tiles supported on a pair of stripes.

The electrical connection system may comprise one or more printed circuit boards, each printed circuit board comprising one or more of the electrical connection system connectors, the electrical connection system connectors configured to seat in respective openings.

The electrical connection system may comprise an external set of conductors which extend through the second holes and run along the path, the external set of conductors capable of electrically connecting the electrical connection system of one base slab assembly with an electrical connection system of an adjacent like base slab assembly.

The electrical connection system may comprise an internal set of conductors internal of the cavity which electrically connect the printed circuit boards together.

The electrical connection system may comprise one or more bypass diodes arranged to provide a bypass electrical path for an inactive photovoltaic tile or a photovoltaic cell of that photovoltaic tile supported on the base slab assembly and electrically connected to the electrical connection system.

The base slab assembly may comprise a plurality of spaced apart groups of first and second stripes, wherein the groups are mutually parallel and spaced from each other such that photovoltaic tiles supported on one group of stripes partially overlies and extends parallel to photovoltaic tiles supported on an adjacent group of stripes and are spaced to form a first air gap between an undersurface of an overlying photovoltaic tile and an upper surface of an underlying photovoltaic tile.

The groups of stripes may be configured to produce a second air gap the under surfaces of the photovoltaic tile supported thereon and the upper surface of the

base slab.

The second air gap may be of a volume greater than a volume of the first air gap.

In one embodiment the cavity defines a third air gap having a volume greater than the volume of the second air gap.

The opening formed in mutually adjacent groups of stripes may be laterally offset from each other.

The base slab assembly may comprise a plurality of recesses formed in the upper surface, each being capable of receiving a hook for supporting a photovoltaic tile on the base slab assembly.

The invention also provides a base slab assembly capable of supporting a plurality of photovoltaic tiles, the base slab assembly comprising:

a bottom surface; and,

an upper surface;

a cavity between the bottom surface and the upper surface creating an air space internal of the base slab assembly, the upper surface being configured to support a plurality of photovoltaic tiles in a plurality of rows wherein the photovoltaic tiles in one row overlie a portion of the photovoltaic tiles in an adjacent row with a first air gap created between an under surface of the overlying photovoltaic tiles and an upper surface of the underlying photovoltaic tiles.

The base slab assembly may comprise:

a cavity between the bottom surface and the upper surface creating an air space internal of the base slab assembly.

The upper surface may be further configured to support the rows of photovoltaic tiles in respective parallel planes, the planes being inclined at a first angle relative to a plane of the bottom surface.

The upper surface may also be provided with a plurality of spaced apart groups of spaced apart stripes, the stripes running parallel to each other on the upper surface and between opposite lateral sides of the base slab, the stripes protruding upright from the upper surface and being configured to together support a photovoltaic tile at a first angle of inclination to the lower surface.

The invention also provides a base slab assembly capable of supporting a plurality of photovoltaic tiles, the base slab assembly comprising:

a lower surface;

an upper surface

an internal cavity formed between the lower surface and the upper surface;

the upper surface being capable of receiving mechanical fasteners for attaching the plurality of photovoltaic tiles can be mechanically fastened, the upper surface provided with a plurality of openings which lead to the cavity; and,

an electrical connection system comprising one or more printed circuit boards housed in the cavity and operable to electrically connect the plurality of photovoltaic tiles together, the or each printed circuit board provided with one or more electrical connections configured to seat in the openings and electrically connect with respective photovoltaic tiles.

The upper surface may be provided with one or more holes that lead to the cavity and a path that extends from the one or more holes to opposite sides of the upper surface; and,

the electrical connection system may comprise an external set of conductors which extend through the one or more holes and electrically connect to the or one of the printed circuit boards, and extend along the path to facilitate electrical connection to an adjacent like base slab assembly.

The base slab assembly the electrical connection system may comprise an internal set of conductors internal of the cavity which electrically connect the printed circuit boards in that cavity together.

The base slab assembly may comprise a bottom plate and a top plate which are coupled together, the bottom plate being provided with the lower surface and the top plate being provided with the upper surface.

The bottom plate may be made of a metal or a metal alloy.

The top plate may be made of any one of a: plastics material; eco-friendly composite material; or fiberglass.

The bottom plate may comprise respective first flanges that extend laterally from each of two adjacent sides of the bottom plate, and respective second flanges that extend laterally from each of two further adjacent sides of the bottom plate, the base slab being configured wherein the first flanges of one bottom plate can be overlaid with a second flange of each of two adjacent like base slabs to form a substantially waterproof seal therebewteen.

Each of the first and second flanges may be provided with at least one hole, the at least one hole being located so that the at least one hole in a first flange registers with the at least one hole in a second flange of and adjacent like base slab, wherein an array of base slabs is attachable to an underlying support structure and to each other by passing fasteners through the registering holes in the overlapping first and second flanges.

The first flanges may be exposed when a top plate is coupled to a bottom plate, and wherein a top plate is removable from a bottom plate of a base slab in the array of attached base slabs wherein the bottom plate remains in the array.

Brief Description of the Drawings

An embodiment of the present invention will now be described by way of example only with reference to the accompanying drawings in which:

Figure 1 is a perspective view of an embodiment of a base slab assembly;

Figure 2 is an exploded view of the base slab assembly shown in Figure 2;

Figure 3 is a perspective view from the top of a top plate of the base slab assembly shown in Figures 1 and 2;

Figure 4 is a perspective view from the bottom of the top plate shown in Figure 3;

Figure 5a is a perspective view from the side of a base slab in accordance with the present invention on which a plurality of photovoltaic tiles is supported;

Figure 5b is a side view of the base slab assembly with photovoltaic tiles shown in Figure 5a;

Figure 5c is an enlarged side view of a portion of the base slab assembly;

Figure 6 is an enlarged view of a portion of a bottom surface of the top plate shown in Figure 4;

Figure 7 is a perspective view from the top of a bottom plate incorporated in the base slab assembly shown in Figures 1 and 2;

Figure 8 is an enlarged view of a portion of the bottom plate shown in Figure 7;

Figure 9a illustrates a plurality of base slab assemblies mounted on a roof;

Figure 9b illustrates detail (A) of Figure 9a;

Figure 10 is a top elevation of a plurality of base plates illustrating how the base plates are attached together and to an underlying roof structure;

Figure 11 is a first cross-sectional view of the base slab assembly illustrating holes for securing the slab assembly to an underlying roof structure; and,

Figure 12 is a further cross-sectional view of the base tile assembly illustrating the structural relationship between the top plate and bottom plate.

Detailed Description of Preferred Embodiment

Figures 5a, 5b, and 5c illustrate an embodiment of the base slab assembly 10 supporting a plurality of photovoltaic tiles 12. The base slab assembly

comprises a lower surface 14 and an upper surface 16. With further reference to Figures 1 and 3, the upper surface 16 is provided with at least one, and in the present illustrated embodiment six, groups G1-G6 of spaced apart stripes (hereinafter referred to in general as "group G"). Each group G comprises a first stripe S1 and a second stripe S2. The stripes S1 and S2 run parallel to each other on the upper surface 16 between opposite lateral sides 18 and 20 of the base slab 10. As shown most clearly in Figures 5a-5c, the stripes S1 and S2 protrude upright from the upper surface 16 and are configured to together support photovoltaic tiles 12 at a first angle of inclination θ to the lower surface 14. The angle θ may be in the order of about 4°-10° and in one particular embodiment in the range of about 5°-7°.

In this particular embodiment, in order to achieve the inclination of the photovoltaic tiles 12, each of stripes S1 and S2 comprises a portion that lies in a plane inclined at the angle θ. The plane corresponds with the plane of photovoltaic tile 12 when coupled to a base slab 10. Moreover, stripe S1 and stripe S2 have respective upper faces 22 and 24 which are inclined at the first angle θ. Thus, when a photovoltaic tile 12 is coupled to a group G of stripes S1 and S2 with the tile 12 abutting each of the stripes, the tile 12 is inclined at the angle θ relative to lower surface 14 of the base slab 10. Further, by appropriately positioning successive groups G of stripes S1 and S2, first air gaps 26 are formed between an under surface 28 of an overlying photovoltaic tile 12 and an upper surface 30 of an underlying photovoltaic tile 12. The provision of the first air gaps 26 also reduces the likelihood of tiles 12 in successive rows touching each other during installation thereby minimizing risk of damage to the tile 12.

In addition to first air gaps 26 being created by the groups of stripes, second air gaps 27 are formed between the under surface of tiles 12 and the upper surface 16 of base slab 10. The total volume of the second air gaps 27 may be arranged to be larger than the total volume of the first air gaps 26.

In the present embodiment, each first stripe S1 has a first width W1 which is greater than a second width W2 of each second stripe S2. That is, stripes S1 are wider than stripes S2 measured in their respective transverse directions.

As shown most clearly in Figure 2, the base slab assembly 10 is an assembly comprising a top plate 32 coupled to a bottom plate 34. A cavity 36 is formed between top and bottom plates 32 and 34. Cavity 36 forms an enclosed, substantial sealed air space and houses an electrical connection system 38 which electrically couples photovoltaic tiles 12 supported on the common base 10 together. The cavity 36 may also be considered to be a third air gap. Further the volume of this third air gap may be arranged to be larger than the total volume of the second air gaps 27. A resilient weatherproof gasket 40 forms a seal between the top and bottom plates 32 and 34 when they are coupled together to form the base slab 10. Gasket 40 also enables differential expansion and contraction of top and bottom plates 32 and 34 while maintaining a seal. In this regard, in one embodiment, top and bottom tiles 32 and 34 are made from different materials and accordingly have different thermal expansion and contraction characteristics.

In one example, top plate 32 may be made from a plastics material such as Alkyd; Diallyl phthalates; Expoxies; Melamines; Phenolics; Polybutadienes; Polyesters; Silicones; Ureas; ABS; Acetals; Acrylics; Aramids; Cellulosics; Ionomers; Low permeability thermoplastics; Nylons; Parylenes; Polyaryl ether; Polyaryl sulfone; Polycarbonates; Polyesters; Plyethersulfone; a combination of Polyethylenes, Polypropylenes, Polyallomers and Polyimides; a combination of Polyimides and Polyamideimides; Polymethyl pentene; Polyphenylene oxides; Polyphenylene sulfides; Polstyrenes; Polysulfones; Vinyls; or any other equivalent ECO friendly material such as a Bamboo Composite; a Fibre Reinforced Composite (FRC); a Glass Reinforced Epoxy Composite; or a highly fire resistant Fiberglass Phenolic.

In contrast, bottom plate 34 can be made from a metal or metal alloy such as iron, copper, aluminium alloy, zinc alloy or a magnesium and aluminium alloy.

To further compensate or allow for differential expansion of the top and bottom plates 32,34 a small clearance or gap is provided between prospective rims of the top and bottom plates.

With particular reference to Figures 1, 3, 4 and 9b each stripe S1 is provided with a plurality of holes 42 which are formed in a direction perpendicular to the plane of the base slab 10. The holes 42 are used to receive fasteners for

attaching photovoltaic tiles 12 to respective first stripes S1. In one example, threaded metal sleeves may be moulded into the top plate 32 at the location of holes 42 to enable threaded engagement with screws used for attaching photovoltaic tiles 12 to a base slab 10.

A plurality of openings 44 are also formed in base slab 10 and more particularly top plate 32 which leads to the cavity 36. Openings 44 are of a rectangular shape and are formed partially through respective first stripes S1. As most evident from Figure 3, openings 44 on mutually adjacent stripes S1 are laterally offset from each other. More particularly, openings 44 on each alternate stripe S1 are mutually aligned. A sealing gasket 46 is formed about opening 44. The gasket 46 forms a seal against an underside of a photovoltaic tile 12 coupled to the stripe S1. Further, as explained in greater detail below, the electrical connection system 38 electrically couples to a photovoltaic tile 12 through openings 44.

Figure 9b also illustrates the provision of second holes 48 formed in a first stripe S1. Holes 48 extend in a direction substantially parallel to a plane of base slab 10 and thus perpendicular to holes 42. Most conveniently, holes 48 are contained in a lowermost stripe S1 on a base slab 10. In order to form holes 48, corresponding axially aligned holes 50 are formed in a corresponding second stripe S2. Thus, for example, in order to form holes 48, a drill is aligned to drill holes 50 through stripe S2 and subsequently drill corresponding holes 48 into stripe S1. Holes 48 also lead to the cavity 36. An external set of conductors 52 and 54 pass through holes 48 into cavity 46 and connect to the electrical connection system 38 of base slab 10. The external conductors 52 and 54 then extend along a space 56 formed between stripe S1 and the adjacent stripe S2 in the same group G to facilitate electrical connection to an adjacent base slab 10.

Base slab 10, and in particular top plate 32, is also formed with a plurality of bosses 58 each provided with a recess 60 for receiving a hook (not shown) which may be used to provide additional support to a photovoltaic tile 12. The bosses 58 are located on the side of a stripe S2 opposite a stripe S1 of the same group G, and in alignment with openings 44 of the associated first stripe S1. More particularly, the bosses 60 are integrally formed with stripes S2.

A plurality of holes is also formed about the peripheral edge of top plate 32. These holes are divided into two sets. A first set of holes comprises four holes 62 which are arranged so that two holes 62 are on each of two adjacent sides 18 and 64 of top plate 32 (see Figure 3). A second set of holes 66 is distributed evenly about all of the sides of top plate 32. In particular, one hole 66 is formed adjacent each corner of top plate 32 and two evenly spaced further holes 62 are provided on each side of top plate 32 between the corner holes 66. Holes 62 are formed with a greater diameter than the holes 66. Further, as shown in Figures 4 and 11 a cylindrical collar 68 surrounds each of the holes 62 and depends from an underside 70 of top plate 32.

Staying with Figure 4, the underside 70 of top plate 32 is provided with a peripheral rim 72 which depends downwardly from underside 70 to a same distance as sleeves 68. Rim 72 provides structural strength for top plate 32. In addition a matrix of perpendicular ribs 74 and 76 extend across the underside 70 between the rim 72. In this embodiment, the ribs 74 and 76 are thinner than the rim 72 and protrude a shorter distance from underside 70 than the rim 72. In Figure 6 a pair of secondary thicker ribs 78 extend along the underside 70 parallel to the direction of stripes S1 and S2 and intersect with ribs 76. Support posts 80 depend from each of the thickened ribs 78 at two spaced apart locations coincident with the intersecting of two ribs 76. Thus, in total, top plate 32 comprises four depending posts 80.

With further reference to Figure 6, underside 70 is also provided with a plurality of slots 82 adjacent each of the openings 44. Provision of slots 82 reduces overall weight, and volume of material needed for manufacture, of top plate 32. Further slots 82 provide structural enhancement to top plate 32. In addition, a round boss locator 84 is also formed on underside 70 adjacent selected openings 44 for use in locating printed circuit boards utilised in the electrical connection system 38.

Figures 7, 8 and 10 illustrate an upper surface 90 of bottom plate 34. Upper surface 90 faces the underside 70 of top plate 32. Longitudinal lower flanges 92 and 94 extend laterally from two mutually adjacent sides of bottom plate 34. As shown in Figure 7 longitudinally extending overhanging flanges 96 and 98 extend laterally from the remaining two adjacent sides of bottom plate 34. As shown in Figure 10, when a plurality of base slabs 10 are coupled together on a

roof structure flanges 96 and 98 overhang flanges 92 and 94 of mutually adjacent bottom plates 34 to form a weatherproof covering for the roof structure. To assist in forming a weatherproof seal between adjacent base slabs 10, resilient sealing strips 100 are provided on the flanges 92 and 94 as shown in Figures 7 and 8. Alternately, or additionally, similar sealing strips may be formed on an under surface of the overhanging flanges 96 and 98,as shown in Figure 7. Further, as shown in Figure 8 a corner 102 of bottom plate 34 is provided with an extended pocket 104, while a corner 106 of bottom plate 34 is provided with an extended pad 108. Corner 102 corresponds with a top right hand corner when base slab 10 is orientated so that a stripe S1 is uppermost and lies in a substantially horizontal plane. This configuration is shown in Figure 1. Consequently, corner 106 is a bottom right hand corner of base slab 10 when in the abovementioned orientation. The pocket 104 and pad 108 are relatively configured so that when adjacent bottom plates 34 are arranged on a roof structure with flanges 96 and 98 overhanging flanges 92 and 94, a pad 108 of one bottom plate 94 seats in a pocket 104 of an adjacent bottom plate 34 to form an airtight and watertight fixture or seal in the vicinity of where the corner of four adjacent bottom plates 34 (ie, four adjacent base slabs 10) meet.

As shown in Figure 8, an upstanding rim 110 extends about the sides of bottom plate 34 inboard of the outer peripheral edges of the bottom plate. Rim 110 is formed with a plurality of curves or diversions about holes 112 and 114 formed about bottom plate 34. As shown in Figure 10, holes 112 are formed only along flanges 96 and 98 of bottom plate 34 and align with holes 62 in top plate 32. Holes 114 are formed about all sides of bottom plate 34 and align with holes 66 in top plate 32. In addition, holes 116 are formed in the flanges 92 and 94. Holes 116 in one bottom plate 34 are positioned to align with holes 112 in two adjacent joined bottom plates 34. More particularly, holes 116 in flange 92 of a first bottom plate 34 will align with holes 112 in flange 96 of a second bottom plate 34, while holes 116 in flange 94 of the first bottom plate 34 will align with holes 112 of flange 98 in a third adjacent bottom plate 34.

With reference with Figure 7 a matrix of supporting ribs 118 and 120 extend along upper surface 90 inside of, and connecting to the rim 110. Four upstanding support posts 122 are provided at four intersecting points of two of the ribs 118 with two of the ribs 120. The posts 122 are located to align with the posts 80 formed on top plate 32.

Figure 11 depicts the alignment of various holes in base slabs 10 when coupled together on an underlying structure. As previously mentioned, holes 112 of say an overhanging flange 98 of one plate 34 will align with holes 116 of a flange 94 of a below adjacent base slab 10. Hole 112 is of a larger diameter than hole 116 to assist in locating a fastener such as a nail or screw through respective aligned holes 116 and 112. In addition, sleeve 68 of a top plate 32 seats within a curved portion of rim 110 extending about a hole 112. This assists in correctly locating a top plate 32 on a bottom plate 34 as well as aligning hole 62 with holes 112 and 116.

As seen most clearly in Figure 1, when top plate 32 is assembled with bottom plate 34, the flanges 92 and 94 of base slab 10 are uncovered. However when a plurality of slabs 10 are coupled together to form a roof covering as shown, for example, in Figure 9a, the flanges 92 and 94 are overlayed by flanges 96 and 98 so that top plates 32 of adjacent base slabs 10 are very close to each other or in abutment. Fasteners which pass through the mutually aligned holes 62, 112 and 116 are intended to also extend into an underlying support structure to effectively fasten the slabs 10 to the structure. A second set of fasteners is provided which extend through mutually aligned holes 66 in top plate 32 and 114 in bottom plate 34 to couple top plate 32 to bottom plate 34. These fasteners need not pass into any underlying roof support structure.

By virtue of this arrangement it is possible after installation of a roof covering composed of a plurality or array of mutually connected and abutting base slabs 10 to remove a top plate 10 of a particular base slab 10 independently of the corresponding bottom plate 34. Accordingly the weatherproof covering formed by the slabs 10 is not compromised by removing a top plate 32. This arises because a top plate 32 is removed by removing the fasteners from the holes 62 and 66 of that top plate 32. But when this occurs flanges 92 and 94 of the corresponding bottom plate are still overlaid and held in place by flanges 96 and 98 of two different abutting base slabs 10.

When a base slab 10 is assembled with top plate 32 attached to bottom plate 34, posts 80 align with and abut posts 122 as shown in Figure 12 to provide increased rigidity for a slab 10, and to assist in spreading load and pressure exerted on top plate 32 to the stronger bottom plate 34.

With particular reference to Figure 2, the electrical connection system 38 comprises a plurality of electrical circuits formed on respective printed circuit boards (PCB) 124a and 124b (hereinafter referred to in general as "PCB 124"). Each PCB 124 comprises a plurality of connectors or plugs 126 which are configured to seat in respective openings 44 to enable electrical connection with respective photovoltaic tiles 12 supported on and connected to an associated base slab 10. In this particular example, each PCB 124 is provided with three connectors or plugs 126 to seat in each of the three openings 44 formed in respective first stripes S1. Conductors are formed on the PCBs 124 to electrically connect plugs 126 together thereby creating a series connection between adjacent photovoltaic tiles 12 supported on a particular first stripe S1. The electrical circuits on each PCB 124 can also comprise bypass components 128 such as diodes or transistors that operate to bypass an inactive photovoltaic tile 12 or a group of one or more inactive cells in each tile 12. A separate PCB 124 is provided for each stripe S1. PCBs 124a and 124b are laterally offset from each other commensurate with the offsetting of openings 44 in adjacent stripes S1. This in turn arises from an offsetting of photovoltaic tiles 12 supported on one stripe S1 relative to an immediately adjacent stripe S1.

In order to electrically connect the outputs from each of the photovoltaic tiles 12 supported on a base slab 10, the plurality of internal conductors (not shown) is provided to connect mutually adjacent PCBs 124 in a series connection. As illustrated in Figure 9a, in order to electrically connect the output from respective base slabs 10, conductors 52 and 54 are attached to a bottommost PCB 124 in a base slab 10 and extend along space 56 to be electrically connected with complementary conductors in an adjacent base slab 10. To this end, conductors 52 and 54 may be provided with complementary plugs to facilitate easy connection and disconnection with corresponding conductors 52 and 54 of adjacent base slabs 10.

In the present embodiment, base slab 10 is provided with six first stripes S1 each provided with three openings 44. As one opening 44 is required for each photovoltaic tile 12, base slab 10 is able to support eighteen photovoltaic tiles 12. Electrical connection plugs on an underside of each photovoltaic tile 12 electrically connect with the plugs 126 of PCBs 124 in a manner so that the output of all photovoltaic tiles 12 on a base slab 10 are connected in series.

The output from one base slab 10 can be connected in series with the output of one or more base slabs 10. Due to the configuration of the stripes S1 and S2 in each group G, the photovoltaic tiles 12 supported on one stripe S1 overlie a portion of photovoltaic tiles 12 attached to an immediately underlying stripe S1. This is shown most clearly in Figure 5b. In addition and as previously explained, a first set of air gaps 26 is formed between the overlying photovoltaic tiles 12. Each of the first air gaps 26, second air gaps 27 and the air gap created or defined by cavity 36 act as respective acoustic and thermal insulating layers. Indeed the three air gaps collectively form an air silencer to provide acoustic insulation. Thus in effect when photovoltaic tiles 12 are coupled to a base slab 10, the resulting assembly provides three air acoustic and thermal insulating layers.

In application of embodiments of the base slab 10 on say a house in a geographic location which is prone to snow fall, forming the bottom plate 34 from a metal or metal alloy enables transmission of heat from the house to air within the cavity 36 and 26 to assist in melting snow and preventing build up of excessive loads on an associated roof.

Now that an embodiment of base slab 10 has been described in detail, it will be apparent to those skilled in the relevant arts that numerous modifications and variations may be made without departing from the basic inventive concepts. For example, each group G of stripes is currently described as comprising a first wide stripe S1 and a second narrow stripe S2. However alternate numbers of stripes may be provided in each group. For example, the group may comprise a third stripe of the same width as stripe S2 and spaced from S2 on a side opposite stripe S1. In a further variation, a single stripe S1 may be provided in each group having an upper face inclined at the angle θ. In such an embodiment, a lowermost stripe on a base slab 10 may be provided with a groove to perform the same function as space 56 in the current embodiment along which the external conductors 52 and 54 can extend. In a further variation, the portion of second stripe S2 which abuts an overlying photovoltaic tile 12 need only be an edge of stripe S2 rather than its full upper face 24. Also the number of photovoltaic tiles 12 that may be supported on a base slab 10 can be varied dependent on the relative size of base slab 10 and photovoltaic tiles 12. Also, while the electrical connection system is described as comprising a plurality of PCBs 124, a single or integrated PCB comprising an

amalgamation of the separate PCBs 124 may be used.

All such modifications and variations together with others that would be obvious to persons of ordinary skill in the art are deemed to be within the scope of the present invention the nature of which is to be determined from the above description and the appended claims.

Claims:

1. A base slab assembly capable of supporting at least one photovoltaic tile, the base slab assembly comprising:

a lower surface;

an upper surface provided with at least one group of spaced apart stripes, the or each group comprising at least a first stripe and a second stripe, the stripes running parallel to each other on the upper surface and between opposite lateral sides of the base slab, the stripes protruding upright from the upper surface and being configured to together support a photovoltaic tile at a first angle of inclination to the lower surface.

2. The base slab assembly according to claim 1 wherein the or each group of stripes is arranged such that each stripe comprises a portion that lies in a plane inclined at the first angle.

3. The base slab assembly according to claim 2 wherein the portion of the first stripe is an upper face of the first stripe and wherein the upper face is inclined at the first angle.

4. The base slab assembly according to claim 2 or 3 wherein the portion of the second stripe is an upper face of the second stripe and wherein the upper face of the second stripe is inclined at the first angle.

5. The base slab assembly according to any one of claims 1 to 4 wherein the first stripe comprises a plurality of first holes formed in a direction perpendicular to a plane of the base slab, the first holes being capable of receiving fasteners for fastening a photovoltaic tile to the first stripe.

6. The base slab assembly according to any one of claims 1 to 5 comprising a cavity internal of the base slab assembly and, a plurality of openings formed in the upper surface that lead to the cavity.

7. The base slab assembly according to claim 6 wherein the openings are formed at least partially through the first stripe.

8. The base slab assembly according to claim 6 or 7 comprising a sealing

gasket formed about each opening and capable of forming a liquid impervious seal against a photovoltaic tile supported on a first stripe.

9. The base slab assembly according to any one of claims 6 to 8 comprising one or more second holes formed in one of the first stripes, the or each second hole providing a path between the cavity and a space between that first stripe and an associated second stripe in a common group of stripes.

10. The base slab assembly according to any one of claims 1 to 9 wherein the first stripe has a first transverse width and the second stripe having a second transverse width wherein the first transverse width is greater than the second transverse width.

11. The base slab assembly according to any one of claims 6 to 10 comprising an electrical connection system disposed in the cavity, the electrical connection system comprising a plurality of contacts disposed in the openings and capable of forming respective electrical connections with complimentary connectors of respective photovoltaic tiles supported on a pair of stripes.

12. The base slab assembly according to claim 11 wherein the electrical connection system comprises one or more printed circuit boards, each printed circuit board comprising one or more of the electrical connection system connectors, the electrical connection system connectors configured to seat in respective openings.

13. The base slab assembly according to claim 11 wherein the electrical connection system comprises an external set of conductors which extend through the second holes and run along the path, the external set of conductors capable of electrically connecting the electrical connection system of one base slab assembly with an electrical connection system of an adjacent like base slab assembly.

14. The base slab assembly according to claim 12 or 13 wherein the electrical connection system comprises an internal set of conductors internal of the cavity which electrically connect the printed circuit boards in that cavity together.

15. The base slab assembly according to any one of claims 10 to 14 wherein the electrical connection system comprises one or more bypass diodes arranged to provide a bypass electrical path for an inactive photovoltaic tile or a photovoltaic cell of that photovoltaic tile supported on the base slab assembly and electrically connected to the electrical connection system.

16. The base slab assembly according to any one of claims 1 to 15 wherein the base slab assembly comprises a plurality of spaced apart groups of first and second stripes, wherein the groups are mutually parallel and spaced from each other such that photovoltaic tiles supported on one group of stripes partially overlies and extends parallel to photovoltaic tiles supported on an adjacent group of stripes and are spaced to form a first air gap between an undersurface of an overlying photovoltaic tile and an upper surface of an underlying photovoltaic tile.

17. The base slab assembly according to claim 16 wherein the groups of stripes are configured to produce a second air gap the under surfaces of the photovoltaic tile supported thereon and the upper surface of the base slab.

18. The base slab assembly according to claim 17 wherein the second air gap is of a volume greater than a volume of the first air gap.

19. The base slab assembly according to claim 18 when appended to any claims which depend form claim 6 wherein the cavity defines a third air gap having a volume greater than the volume of the second air gap.

20. The base slab assembly according to any one of claims 16 to 19 when appended to any one of claims 6 to 15 wherein the opening formed in mutually adjacent groups of stripes are laterally offset from each other.

21. The base slab assembly according to any one of claims 1 to 20 comprising a plurality of recesses formed in the upper surface, each being capable of receiving a hook for supporting a photovoltaic tile on the base slab assembly.

22. A base slab assembly capable of supporting a plurality of photovoltaic tiles, the base slab assembly comprising:

a bottom surface; and,

an upper surface;

a cavity between the bottom surface and the upper surface creating an air space internal of the base slab assembly, the upper surface being configured to support a plurality of photovoltaic tiles in a plurality of rows wherein the photovoltaic tiles in one row overlie a portion of the photovoltaic tiles in an adjacent row with a first air gap created between an under surface of the overlying photovoltaic tiles and an upper surface of the underlying photovoltaic tiles.

23. The base slab assembly according to claim 22 comprising:

a cavity between the bottom surface and the upper surface creating an air space internal of the base slab assembly.

24. The base slab assembly according to claim 22 or 23 wherein the upper surface is further configured to support the rows of photovoltaic tiles in respective parallel planes, the planes being inclined at a first angle relative to a plane of the bottom surface.

25. The base slab assembly according to claim 24 wherein the upper surface is provided with a plurality of spaced apart groups of spaced apart stripes, the stripes running parallel to each other on the upper surface and between opposite lateral sides of the base slab, the stripes protruding upright from the upper surface and being configured to together support a photovoltaic tile at a first angle of inclination to the lower surface.

26. A base slab assembly capable of supporting a plurality of photovoltaic tiles, the base slab assembly comprising:

a lower surface;

an upper surface

an internal cavity formed between the lower surface and the upper surface;

the upper surface being capable of receiving mechanical fasteners for attaching the plurality of photovoltaic tiles can be mechanically fastened, the upper surface provided with a plurality of openings which lead to the cavity;

and,

an electrical connection system comprising one or more printed circuit boards housed in the cavity and operable to electrically connect the plurality of photovoltaic tiles together, the or each printed circuit board provided with one or more electrical connections configured to seat in the openings and electrically connect with respective photovoltaic tiles.

27. The base slab assembly according to claim 26 wherein:

the upper surface is provided with one or more holes that lead to the cavity and a path that extends from the one or more holes to opposite sides of the upper surface; and,

the electrical connection system comprises an external set of conductors which extend through the one or more holes and electrically connect to the or one of the printed circuit boards, and extend along the path to facilitate electrical connection to an adjacent like base slab assembly.

28. The base slab assembly according to claim 26 or 27 wherein the electrical connection system comprises an internal set of conductors internal of the cavity which electrically connect the printed circuit boards in that cavity together.

29. The base slab assembly according to any one of claims 1 to 28 comprising a bottom plate and a top plate which are coupled together, the bottom plate being provided with the lower surface and the top plate being provided with the upper surface.

30. The base slab assembly according to claim 29 wherein the bottom plate is made of a metal or a metal alloy.

31. The base slab assembly according to claim 29 or 30 wherein the top plate is made of any one of a: plastics material; eco-friendly composite material; or fiberglass.

32. The base slab assembly according to any one of claims 29 to 31 wherein the bottom plate comprises respective first flanges that extend laterally from each of two adjacent sides of the bottom plate, and respective second flanges that extend laterally from each of two further adjacent sides of the bottom plate,

the base slab being configured wherein the first flanges of one bottom plate can be overlaid with a second flange of each of two adjacent like base slabs to form a substantially waterproof seal therebewteen.

33. The base slab assembly according to claim 32 wherein each of the first and second flanges is provided with at least one hole, the at least one hole being located so that the at least one hole in a first flange registers with the at least one hole in a second flange of and adjacent like base slab, wherein an array of base slabs is attachable to an underlying support structure and to each other by passing fasteners through the registering holes in the overlapping first and second flanges.

34. The base slab assembly according to claim 30 wherein the first flanges are exposed when a top plate is coupled to a bottom plate, and wherein a top plate is removable from a bottom plate of a base slab in the array of attached base slabs wherein the bottom plate remains in the array.