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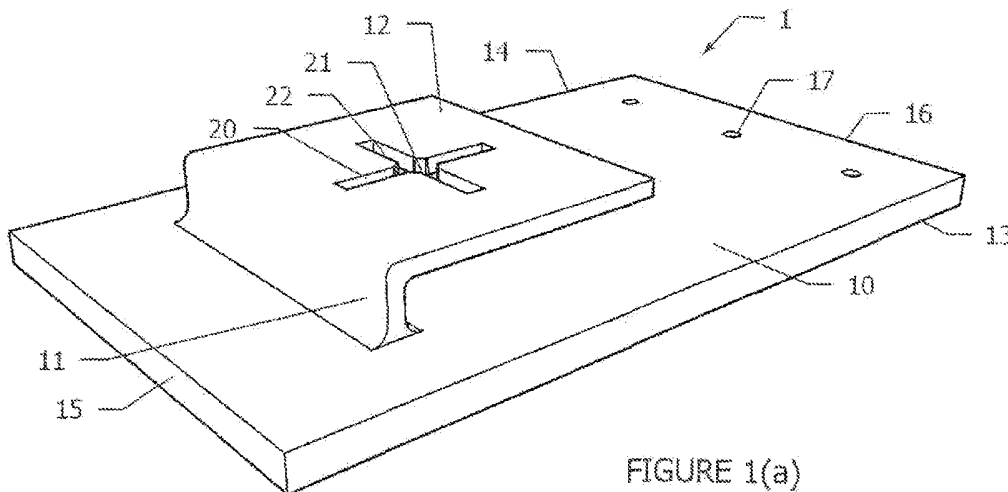
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(54) Title of the Invention: **Roof tile and roof tile assembly**
Abstract Title: **Roof tile with attachment for fixing additional accessories to the roof**

(57) A roof tile with a tile body and attachment flange are described, the flange preferably extends parallel to the tile surface and may have two slots intersecting in a cross shape for attachment. An attachment unit for attaching to a tile to enable additional equipment to be fixed to the roof is also disclosed. The additional accessories or equipment may be fixed to the attachment flange by a support member or a connector assembly. The attachment flange may be adjustably mountable to the tile. The attachment flange allows solar panels, satellite receivers, scaffolding and other additional fixtures to be easily fitted to a rooftop. Wedge shaped members may be mounted to the roof via the attachment flange to support platforms or installations at specified angles to the roof surface.



21 02 11

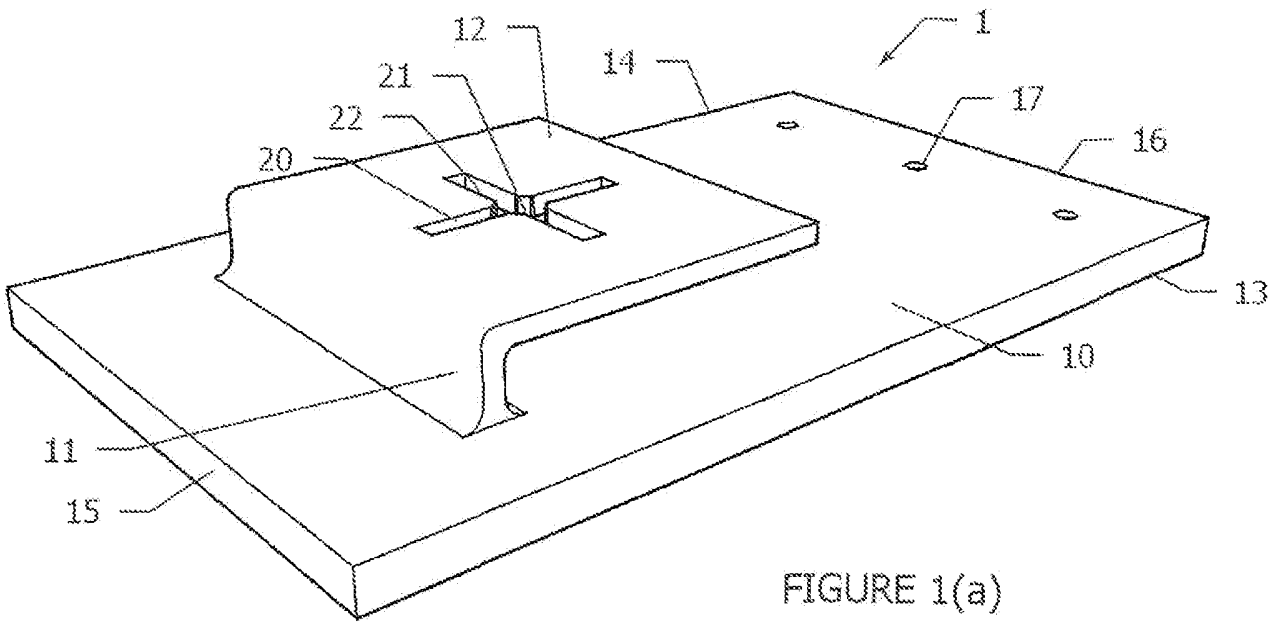
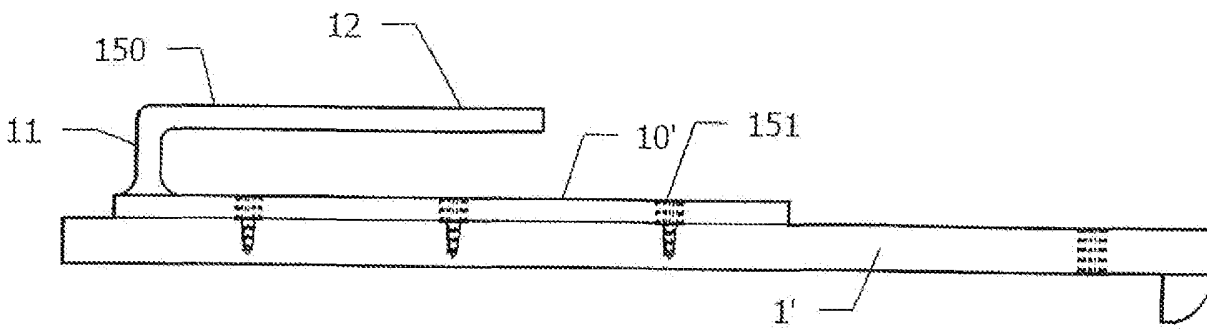
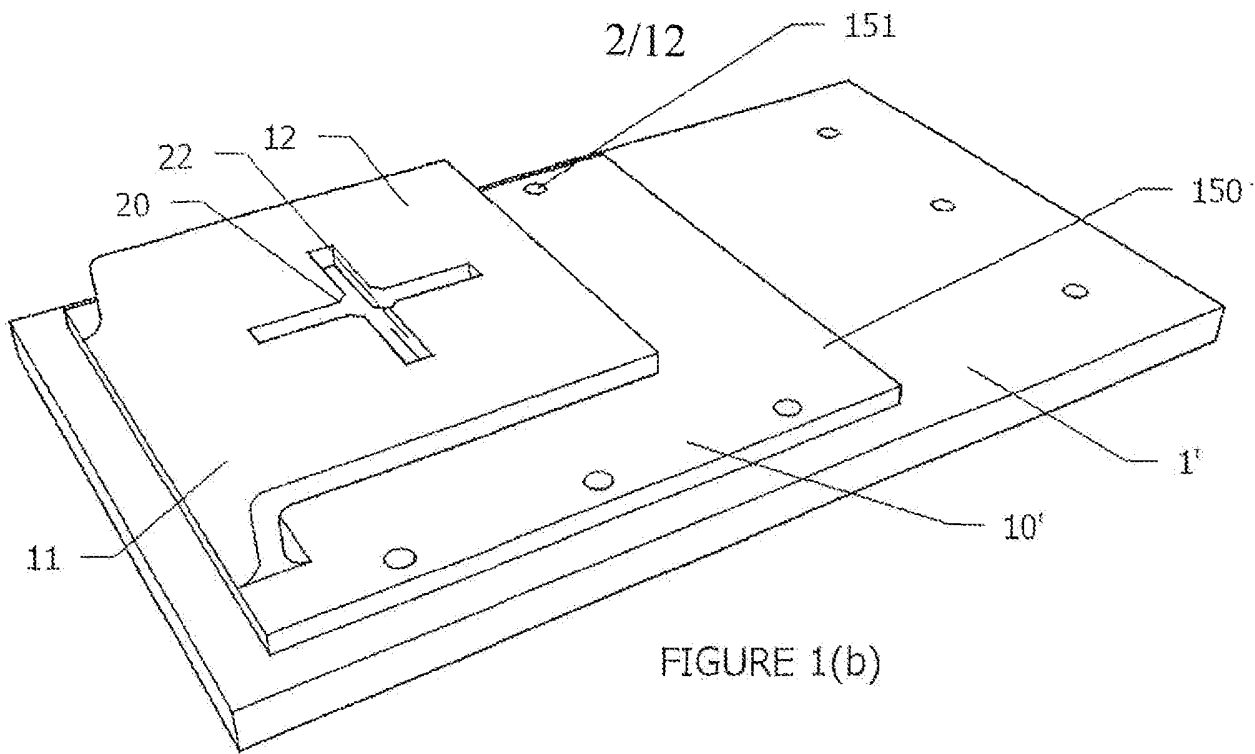


FIGURE 1(a)

21 02 11



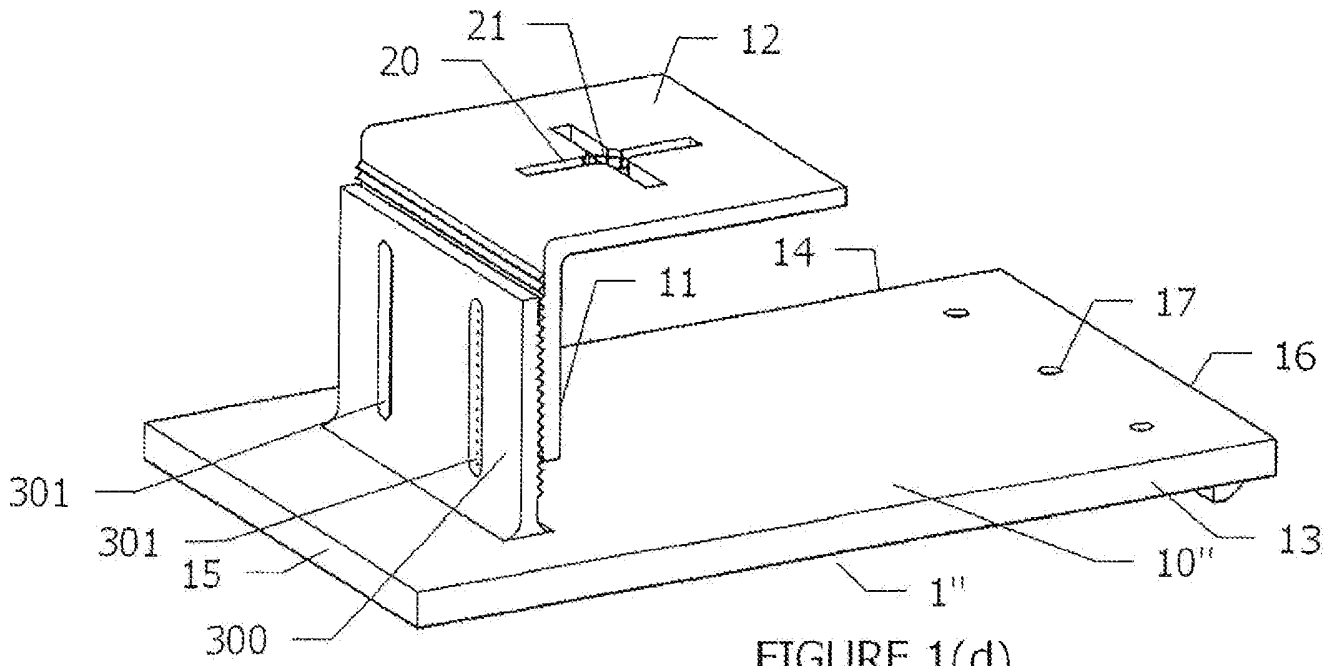


FIGURE 1(d)

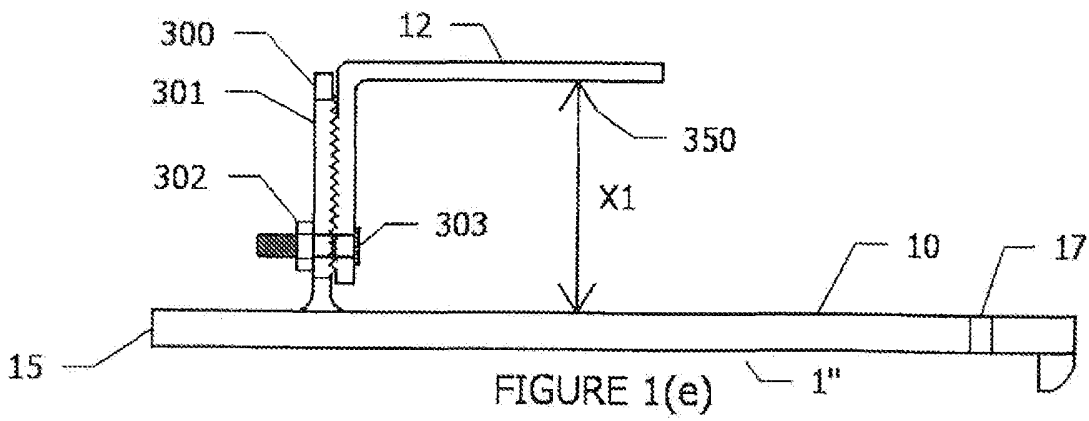


FIGURE 1(e)

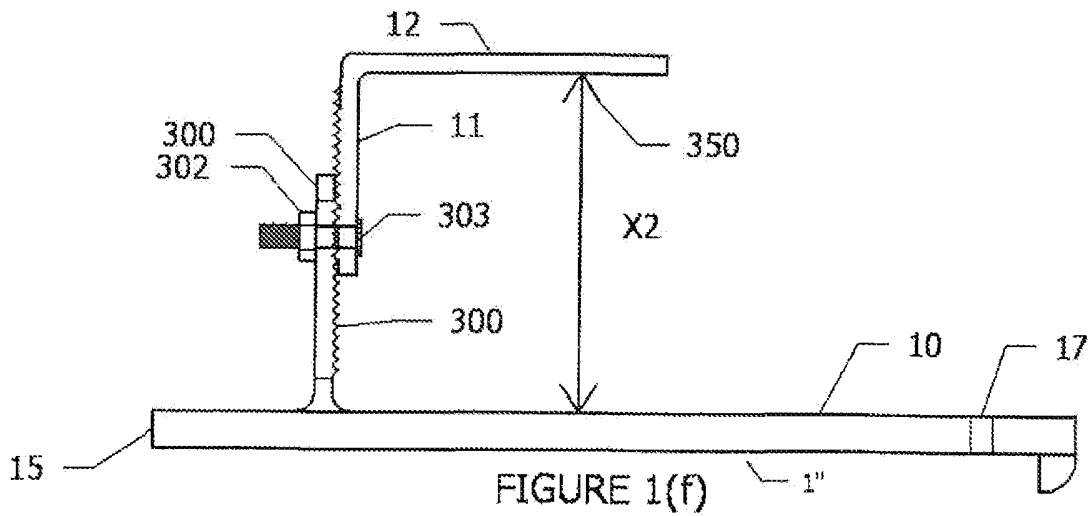


FIGURE 1(f)

21 02 11

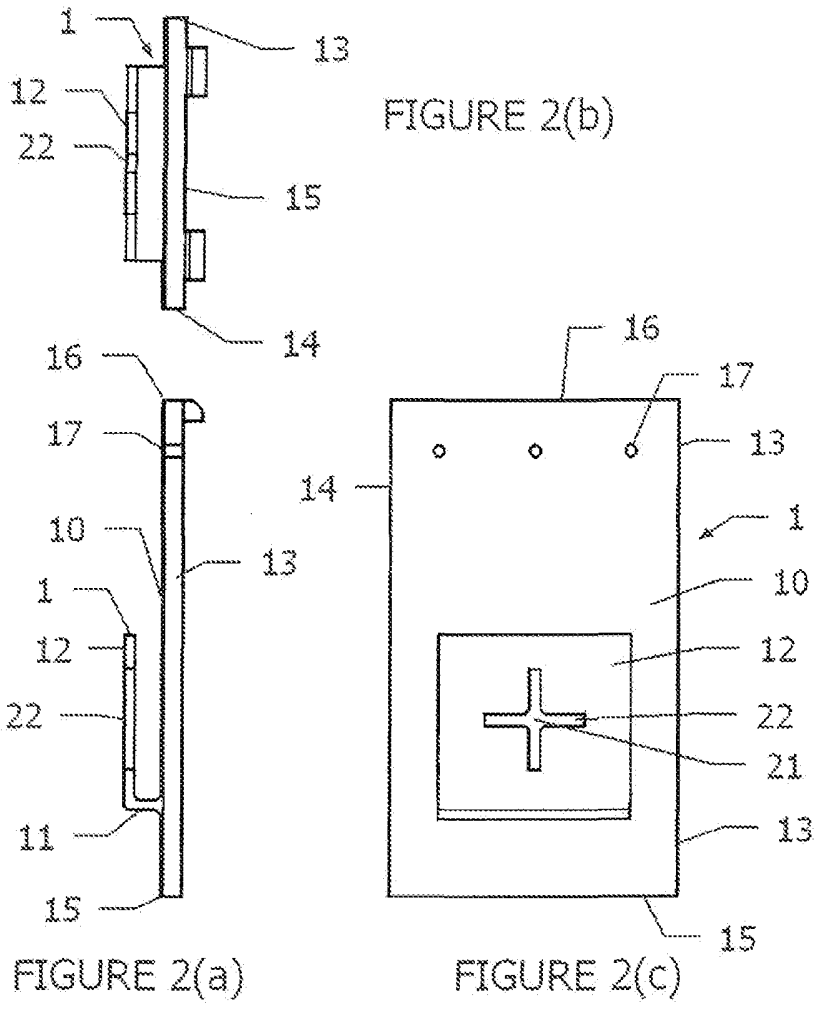


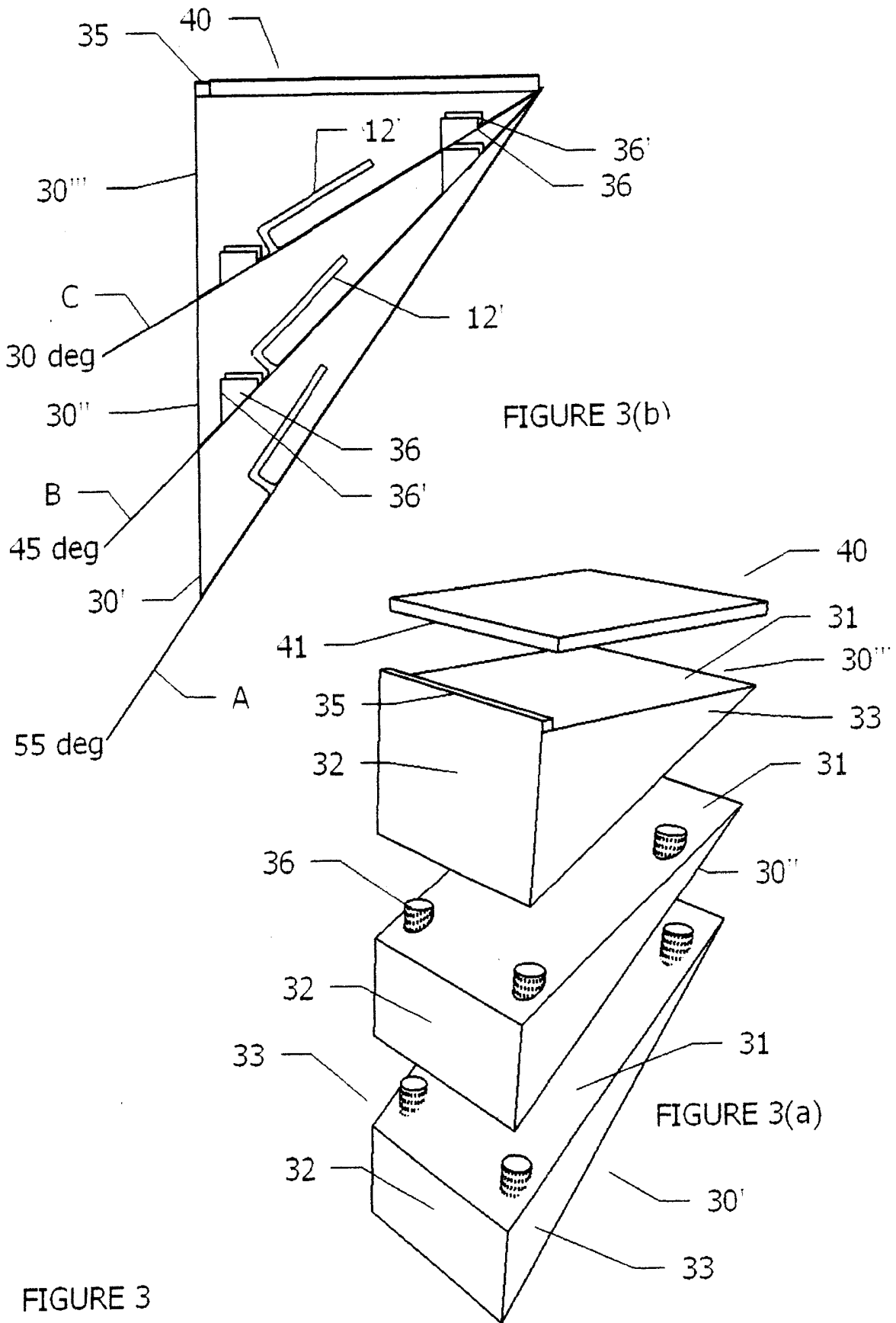
FIGURE 2(a)

FIGURE 2(b)

FIGURE 2(c)

FIGURE 2

28 04 11



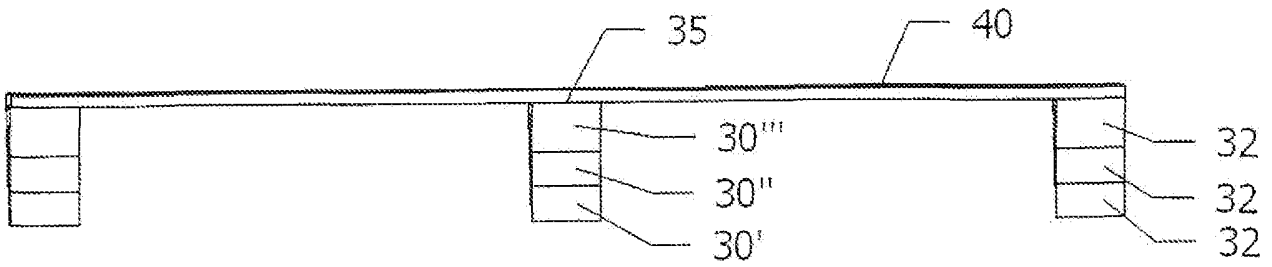


FIGURE 4(b)

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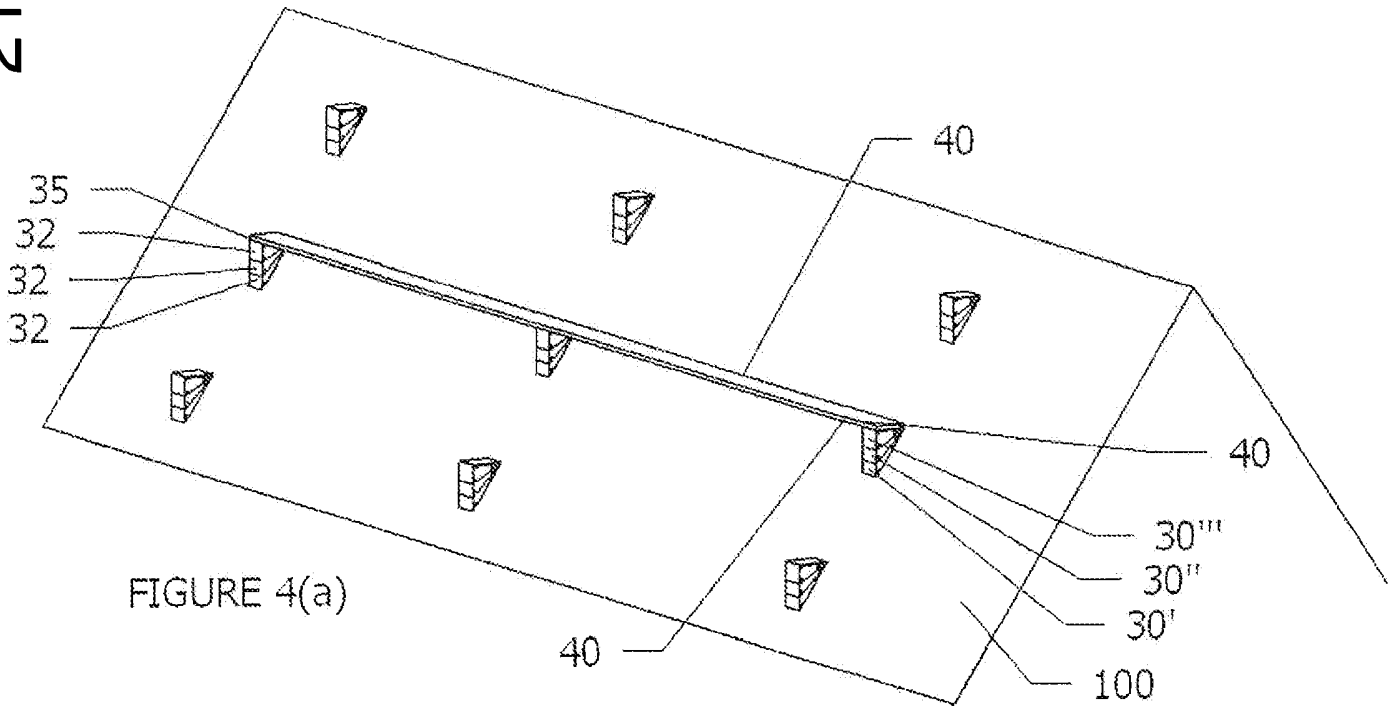


FIGURE 4(a)

FIGURE 4

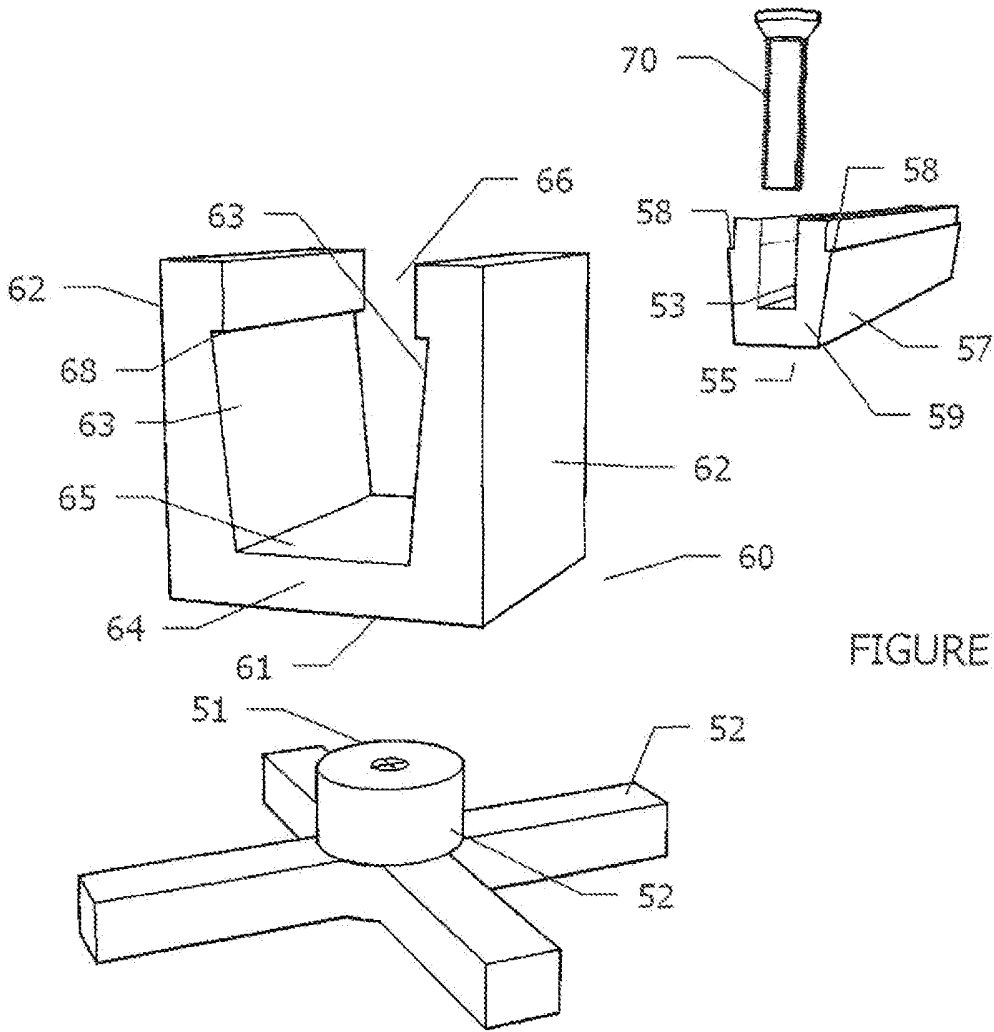


FIGURE 5

26 04 11

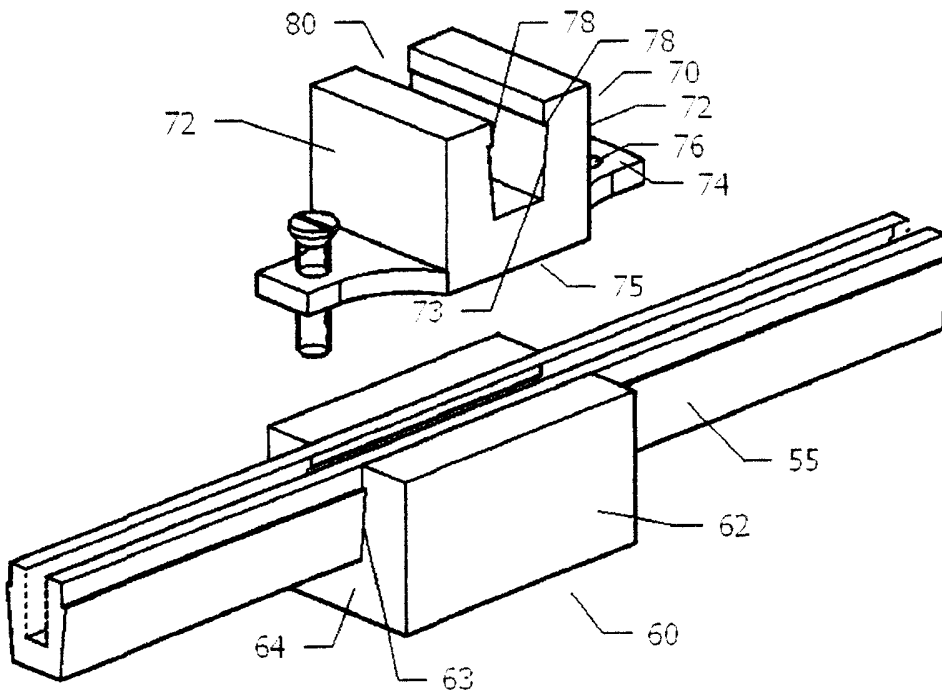


FIGURE 6

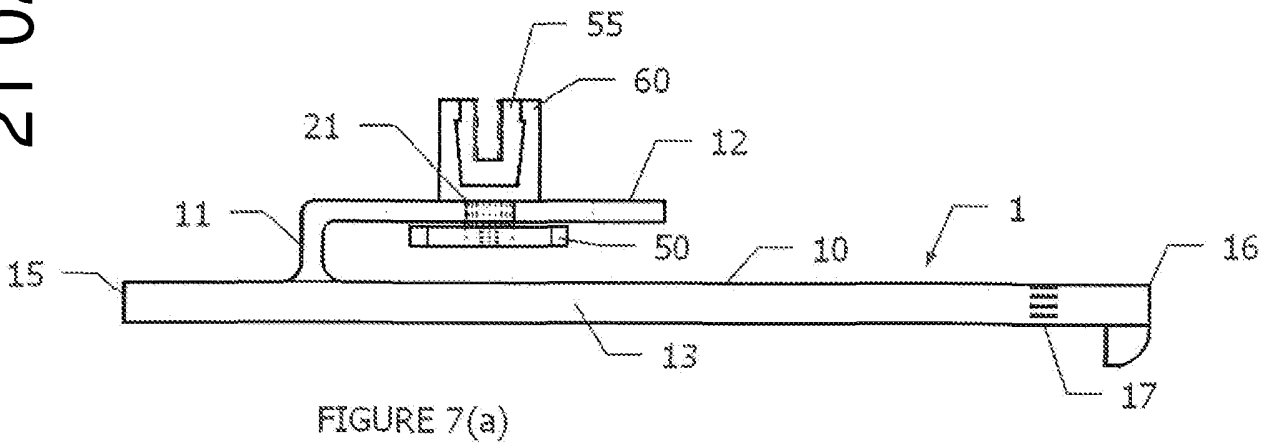
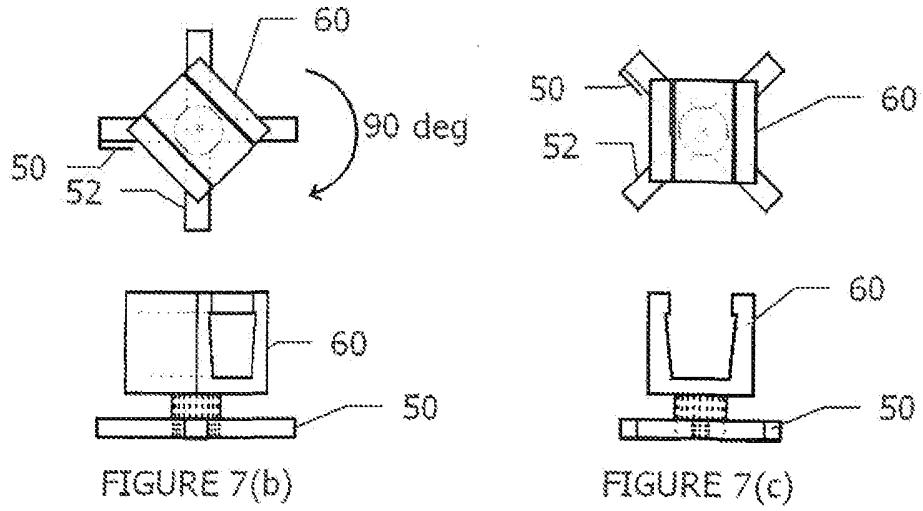


FIGURE 7

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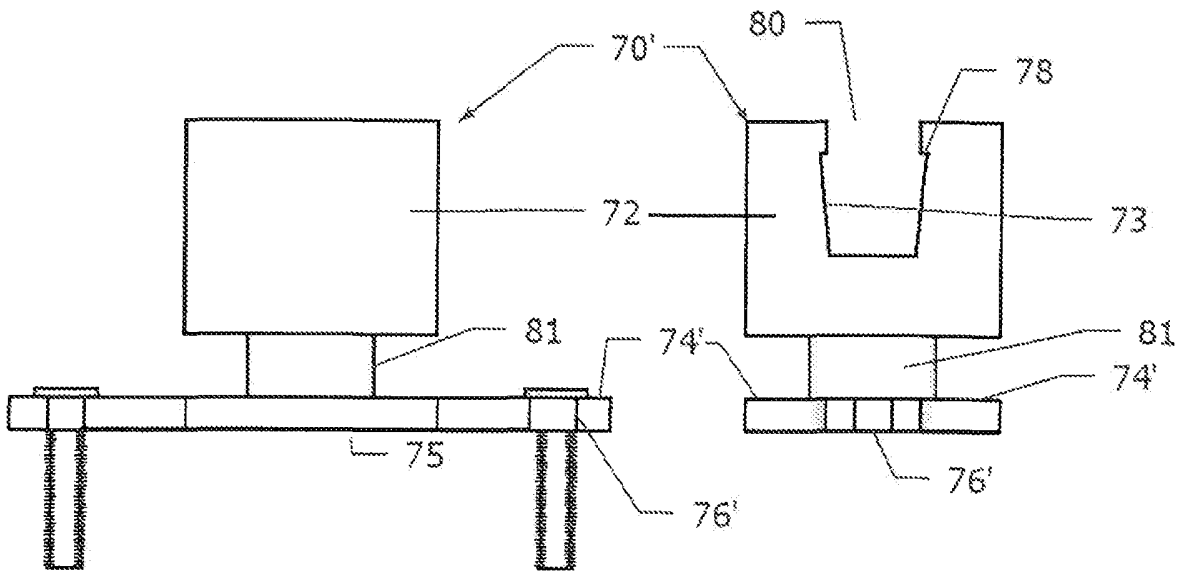


FIGURE 8(a)

FIGURE 8(b)

FIGURE 8

26 04 11

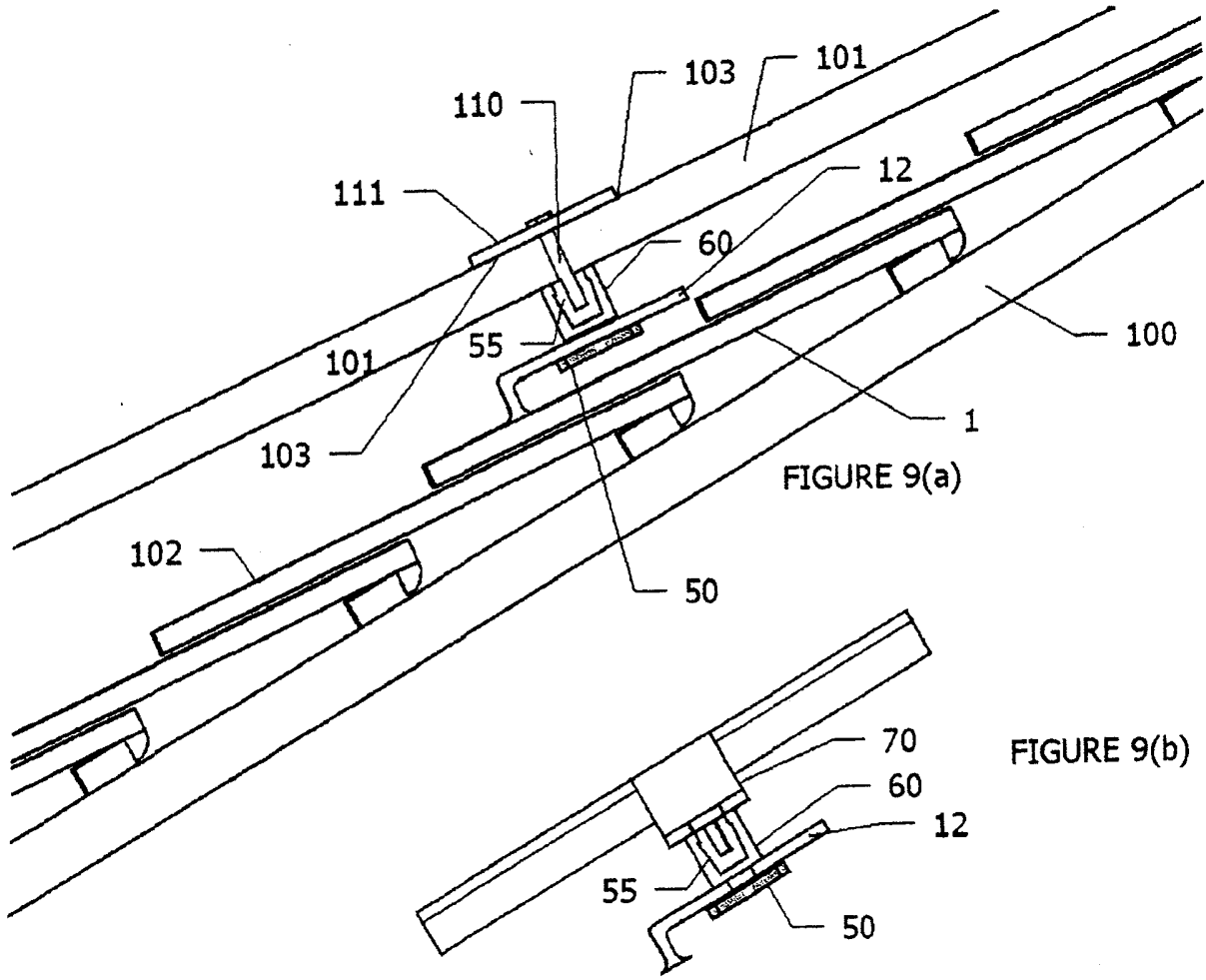


FIGURE 9

FIGURE 9(b)

FIGURE 9(a)

21 02 11

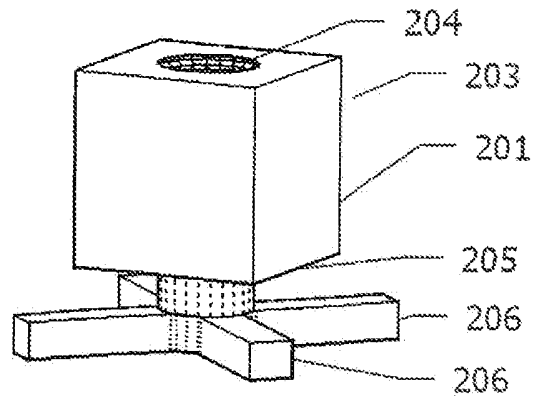
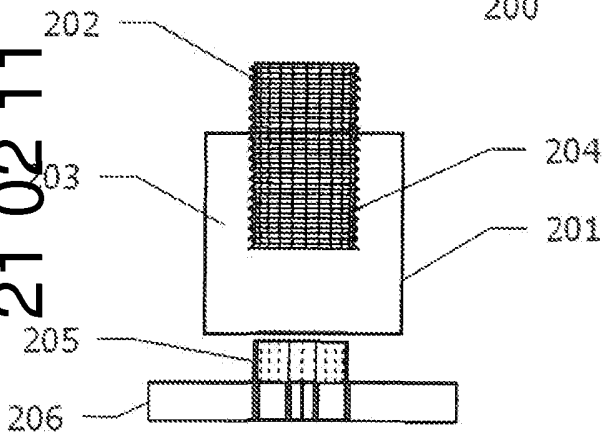
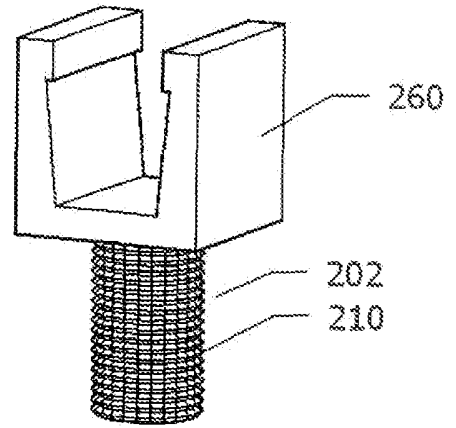
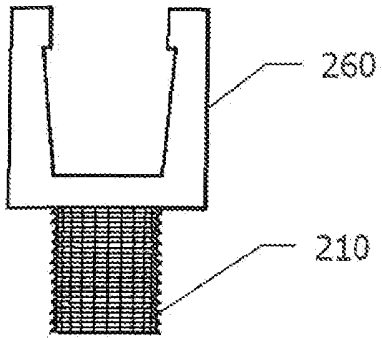


FIGURE 10(a)

FIGURE 10(b)

FIGURE 10

ROOF TILE AND ROOF TILE ASSEMBLY

This invention relates to an improved roof tile suitable for attaching additional structures such as solar panels to a rooftop, and a roof tile assembly used for attaching such additional structures. The invention also relates to a roof tile assembly for supporting a platform on which a worker may stand whilst working on a roof top.

Currently, in relation to buildings both residential and commercial, there may be occasions when it is necessary to affix additional structures to the roof of the building, for example, solar panels or satellite receiver dishes, or scaffolding to enable work to be performed on the roof.

For example, in modern new build houses there is a trend to install solar panels on the roof to allow a householder to generate some or all of their electricity. Currently, fixing the solar panels to the roof may be complex and require a lot of additional fixtures and fittings as well as requiring several man hours to ensure the panels are correctly fitted and secured to the roof. The same houses may also generally require a satellite dish to also be provided.

According to the invention there is provided a roof tile comprising a tile body to be positioned on a roof and attachment means for attaching additional fixtures to said roof

In a preferred embodiment of the invention said attachment means is an attachment flange connected to said tile body by a joining section.

In a further preferred embodiment of the invention said attachment flange includes an orifice and said additional fixtures are inserted into or over said orifice.

Preferably, said orifice includes at least one substantially rectangular slot, and is also preferably centrally located.

Preferably, said centrally located orifice includes two or more substantially rectangular slots extending from a central section, said two or more slots being evenly spaced from each other.

Further preferably, said centrally located orifice includes four substantially rectangular slots extending from a central section arranged at 90° to each other.

In a preferred embodiment said attachment flange is parallel to said tile body, and furthermore said attachment flange is the same size or smaller than said tile body.

In a further preferred embodiment said tile body includes securing means for securing said tile body to said roof.

According to the invention, there is provided an attachment for a roof tile comprising; a base section for securing the attachment to said tile, a joining section extending upwardly from said base section and an attachment section extending from said joining section, wherein, in use said attachment is secured to said tile, and said attachment means are configured so that an additional fixture can be secured to said roof tile.

According to the invention there is also provided a roof tile assembly with a roof tile or roof tile attachment as describe above wherein said additional fixture comprises at least one support member for supporting supplementary supporting means to said roof; said support member being inserted over said orifice and said attachment flange.

In a preferred embodiment said support member includes one or more engaging protrusions for engaging further support members. Preferably, said support member has a triangular cross section.

Preferably, said triangular cross section also has a right angle at a base of the support member and a wedge angle between 5-45° at a top of the structure.

In a preferred embodiment said roof tile assembly includes at least two support members and wherein said wedge angle is the same or greater for successive support members.

In an embodiment of the invention said additional fixture comprises an orifice shaped fixture member, a connector member connectable to, or formed integrally with said fixture member and a connector rail member for insertion into said connector member, which combine for supporting a secondary fixture to said roof.

Preferably, said additional fixture further comprises lattice connector means for insertion into said rail member to support said secondary fixture to said roof.

Preferably, said roof tile is made of a flexible plastic material, typically a polymer material

Said additional fixture is also preferably made of flexible material such as rubber

In a preferred embodiment said secondary fixture is a solar panel, or scaffolding

Preferred embodiments of the invention will now be described, by way of example only with reference to the accompanying drawings in which

Figure 1(a) shows a perspective view of roof tile with an integral attachment flange;

Figure 1(b) shows a perspective view of an alternative embodiment of the invention in which a tile hook comprising a base section and an attachment flange are formed separately from a roof tile;

Figure 1(c) is a cross sectional view of the tile and tile hook shown in figure 1(b);

Figure 2(a) shows a cross sectional view of the roof tile of figure 1;

Figure 2(b) shows an end view of the roof tile of figure 1;

Figure 2(c) shows a top view of the roof tile of figure 1;

Figure 3(a) shows a perspective view of 3 roof wedges and a top fixing section, figure 3 (b) shows a cross sectional view of the wedges of figure 3(a) when positioned on a rooftop;

Figure 4(a) shows a rooftop with the roof wedges of figure 3 in position and supporting a support platform, figure 4(b) shows a front view of the central section of figure 4(a) showing the roof wedges and support platform;

Figure 5 shows the orifice fixture member, connector member and rail member which cooperate to engage with the engagement flange of the roof tile of figure 1;

Figure 6 shows a modified connector member and rail member to that shown in figure 5;

Figure 7 illustrates how the assembly of figure 5 engages with the roof tile of figure 1, in particular;

Figure 7(a) shows a cross-sectional view of a roof tile engaged with the connecting assembly of figure 5;

Figure 7(b) is a side and top view of the connector assembly with the rail member and positioned in a first position with respect to the orifice;

Figure 7(c) is a side and top view of the assembly in figure 7(b) after the rail has been rotated through 45° to a second locking position with respect to the orifice;

Figure 8(a) is a cross-sectional view of the lattice connector member of figure 6 connected to a rail member in an alternative fashion;

Figure 8(b) is an end view corresponding to the side view of figure 8(b);

Figure 9(a) shows a solar panel fitted on a roof with the rail connector of figures 5 and 7;

Figure 9(b) shows a solar panel fitted on a roof with the rail connector of figures 6 and 8;

Figure 10(a) shows a side view of a height adjustable rail connector;

Figure 10(b) shows a perspective view of the connector of figure 10(a).

Figure 1(a) shows a perspective view of a roof tile 1. Figures 2(a), (b) and (c) show side, end and top views respectively of roof tile 1.

The tile 1 comprises a tile body 10, joining section 11 and attachment flange 12. As illustrated, the tile body 10 is rectangular in shape, but other shapes may be contemplated, for example, but not limited to, square or square with rounded corners. Tile body 1 has sides 13, 14, a bottom end 15 and top end 16. There are also holes 17 for fixing the roof tile 1 to a roof using nails, screws etc...

The attachment flange 12 includes a central orifice 20 with a X shaped cross-section. The cross section has a circular centre 21, with four straight slots 22 extending from the circular centre, each of the slots are at 90° to the neighbouring slots. The circular orifice may have more or less than four slots extending from the central section, preferably arranged symmetrically around the centre, also the centre section 21 may be any shape, but the preferred embodiment is circular.

The roof tile 1 is generally made from waterproof plastic material with a good degree of flexibility, such as commonly available polymer materials for example although it may be made from other materials more commonly used for roof tiles.

Figures 1(b) and (c) show an alternative embodiment of the invention where the attachment flange is formed as part of a separate hook structure 150 which can then be secured to a roof tile 1'.

The hook structure 150 has a base section 10', and like figure 1(a), a joining section 11 and an attachment flange 12. The orifice 20 is formed in the same way as for figure 1(a), and so the same reference numerals are used for the circular centre 21 and slots 22.

In this embodiment base section 10' includes holes 151 for securing the base section 10' to the roof tile 1' by screws or nails for example. Adhesive may also be used to provide additional securing of the base 10' to the tile 1.

The hook structure may be made of various different materials such as plastic or metal, or ceramic. If the structure is made of metal, then it maybe that base section 10' can be embedded into a plastic roof tile to secure it in position rather than being securing by nailing or screwing. Also, if the base is secured in this manner, that base section could be made of a metal mesh, which would be easy to embed in the body of a plastic tile whilst providing reinforcement of the strength of the tile.

In both of the above embodiments, the attachment flange 12 is rectangular, and is smaller than the tile body 10, but other shapes may be contemplated and the flange may also be any size up to or greater than the size of the tile body 10, or the base section 10'.

Furthermore, although, in the embodiments above the roof tiles are all shown as flat, it is envisaged that the invention can be used with ridged or curved tiles , as long as the attachment flange can be sufficiently well secured to the tile (either when it is formed integrally as in figure 1(a) or separately as in figure 1(b).,

Figure 3(a) shows three roof wedges 30', 30'' and 30''', all of slightly different sizes and a support platform 40. Figure 3(b) shows a cross sectional view of the wedges 30', 30'', 30''' and support platform 40 on roofs of varying pitch angles, to allow work to be carried out on a roof, such as installing solar panels for example.

Wedges 30'.30'' and 30''' have a triangular cross-section and a substantially flat top surface 31. They also have a substantially vertical end face 32 and two substantially vertical side faces 33. Preferably side faces 33 are parallel. Engaging protrusions 36 are located adjacent to each of the corners of the top surface 31 on the wedges 30', 30'', although other

arrangements of the engaging protrusions may alternatively be used. The top wedge 30''' does not have any engaging protrusions but instead has an engagement lip 35 protruding substantially vertically up from the corner where the bottom end face joins the top surface.

Engagement lip 35 abuts against end surface 41 of fixing section 40 to ensure section 40 is held securely in place on the roof top.

On the underside of each of the wedge 30', 30'', 30''' (shown later in figure 3(b) is a flange receiver 12' that matches the profile of the attachment flange 12 so that when one of wedges 30', 30'', 30''' is positioned over flange 12 the flange engages with the flange receiver and wedge 30' is held securely in position. Also on the underside of each of wedges 30 are circular depressions 36' for receiving and engaging the engaging members 36 to assist in holding the wedge members in position.

Figure 3(b) shows a cross-sectional view of the wedges 30', 30'' and 30''' and platform 40 on a rooftop 100. Line A illustrates a roof with a pitch of 55°, line B illustrates a roof with a pitch of 45°, and line C illustrates a roof with a pitch of 30°. For brevity all three alternatives are shown on this picture.

The use of wedges on a 55° roof will now be described. Wedge member 30' is placed over attachment flange 12 of roof tile 1. As discussed above, wedge member 30' is secured in place by flange 12 engaging with flange receiver 12' on the underside of the wedge member 30'. Then wedge member 30'' is placed onto of wedge 30'. Engaging protrusions 36 of wedge member 30' are received in depressions 36' on the underside of wedge member 30''. No part of wedge member 30 will connect with flange receiver 12' of wedge member 30''. Similarly wedge member 30''' is placed on top of wedge member 30'' and secured in a similar fashion.

Typically these three wedges will be placed at regularly spaced intervals along a rooftop (see figure 4), and a support platform 40 will be placed on top of wedge 30'' and held in place by engaging lip 35 of wedge member 30'''. It is anticipated that platform 40 will be able to support one or more workers who need access to the rooftop.

Once the wedges 30', 30'', 30''' and support platform 40 are in place they can be used for a worker to stand on whilst he installs solar panel 101 for example, higher up the rooftop, again using roof tile 1, or a standard tile plus hook structure 150 to attach the solar panel to the roof.

For a roof with a 45° pitch, then wedges 30'' and 30''' are used, but installed as described above with platform 40 positioned on top of wedge 30'''. Similarly for a roof with a 30° pitch then only wedge 30''' is needed to support platform 40. In each case, the pitch of the roof will determine how many wedge members are needed to ensure that support platform 40 lies substantially horizontal. If more than three are needed then more wedges should be used. The most important fact is to provide a stable support platform to allow work to be easily carried out.

Figure 4(a) shows a rooftop 100 with a series of wedges 30', 30'', 30' and support platform 40 running along most of the length of centre of the roof. There are also a series of wedges 30', 30'' and 30'' lower down the roof that do not yet have a support panel on. The support panel 40 as shown can be used to enable access to the topmost part of the roof, for installing solar panels or velux windows for example. The platform can also be used to support workers whilst they perform other maintenance tasks for example. Figure 4(b) is a front view of the central section of figure 4(a). Normally, the wedges and support platform will only be temporary structures, to be on the roof whilst work is being carried out, and then removed once the work is completed. Nevertheless it is possible that the wedges and platform may remain permanently on the roof in which case additional fixing such as gluing etc. may be used to further secure the wedges and platform on the roof,

Turning now to a further embodiment of the invention, Figure 5 is an example of a connector for connecting articles such as a solar panel to the attachment flange 12 of roof tile 1 or of hook structure 150. The assembly of figure 5 comprises orifice shaped fixture member 50, rail member 55 and rail connector 60. Orifice fixture member 50 has a central section 51 with four arms 52 extending outwardly from the central section. Each arm is at 90° to the neighbouring arms. Of course, fixture members with different numbers of arms configured in alternative ways may also be used, as long as they match the configuration of the orifice in the attachment flange. Central section 51 of fixture member 50 has a circular mating portion 52 extending substantially vertically upwards that mates with circular hole 61 in the base of rail connector 60.

Connector 60 also has base 64 and side arms 62 extending upwards from base 64. The inner walls 63 of side arms 62 and upper inner surface of base 64 define an opening 66 for receiving rail 55. The inner profile of rail connector 60 matches the outer profile of rail 55 to ensure a good fit. In particular, inner lips 68 of connector 60 protrude inwardly from each of

sidewalls 63, and when rail 55 is press fitted into opening 66 ledges 58 on the outer walls 57 of arms 59 engage with lips 68 to prevent rail 55 being pulled upwards out of connector 60. Once rail 55 is inserted into connector 60 it is then secured by screw 70 which screws the two together. In this way, additional fixtures such as solar panels can be attached by using the opening 56 in rail 55 (to be described later). Also the inner side walls 53 of rail 55, which define part of the opening, may have a serrated profile to ensure that when something is inserted into the opening, as look as it is a snug fit with the opening, it is grabbed by the serrated walls to ensure it is tightly held and cannot be easily removed.

In this specific embodiment, fixture member 50 and rail connector 60 are formed as two separate part, however in an alternative embodiment (not shown), fixture member 50 and connector 60 may be formed as a single integrated moulded item, with arms 52 extending horizontally outwards from the base 64 of connector 60.

Figure 7 illustrates how the connector assembly of figure 5 co-operates with the attachment flange 12 to secure an article such as a solar panel to the roof tile.

Figure 7(a) shows a fixture member 50, rail 55 and connector 60 positioned in place on the attachment flange 12 of roof tile 1. Figures 7(b) and (c) show how the fixture member 50, rail 55 and connector 60 are locked into position in the orifice of the attachment flange 12, once they have been connected together as described with respect to figure 5, although for clarity, the attachment flange is not shown on the figure.

As will be understood from figure 7(b), arms 52 and central section 51 of fixture member are inserted into the corresponding parts of the orifice, namely slots 22 and circular centre 21. This is a snug fit, and due to the size of upwardly extending section 51 of the fixture member the arms 52 rest below the bottom of flange 12 under slots 22 when the orifice fixture is fully inserted.

To ensure that the fixture member 50, rail 55 and connector 60 are fully secured, they are then turned through a pre-set angle, (as illustrated in figure 7(c)) in this case 45°, although any angle which ensures that the arms 52 are no longer below slots 22 will be sufficient. Once arms 22 are firmly below main body of the attachment flange 12 then the entire assembly is secure. The rail 55 cannot be removed from the connector without the application of substantial force and the connector 60 cannot be removed from the tile unless it is rotated through 45°, which is prevented due to the rail being fixed substantially vertically or

horizontally to more than one connector thereby preventing the rail 55 and attached connector 60 from revolving clockwise/anti-clockwise..

Figure 6 is an illustration of an additional connector to be inserted onto the assembly of figure 5. The connector 60 and rail 55 are the same as previously described with reference to figure 5. Figure 6 also shows additional lattice connector 70. Typically, lattice connector 70 has substantially the same construction as connector 60, that is, it has a base 75, side arms 72 extending substantially vertically upwardly from said base, inner sidewalls 73 and, inner lips 78 protruding substantially horizontally inwardly from each of sidewalls 73. Connector 70 has additional fixing flanges 74, protruding substantially vertically outwardly from either side of base 75 at the bottom of each arm 72, within each flange is a hole 76 that is used for securing the lattice connector 70 to the rail 55. In operation, lattice connector 70 is placed on top of and in line with the opening 56 in rail 55, with an opening 80 within lattice connector 70 perpendicular to the opening 56. Screws are then inserted into holes 76 to secure lattice connector 70 to rail 55.

It should be noted that in this embodiment of the invention the connector 60 is connected to the attachment flange 12 in the same manner as the figure 5 embodiment.

Figures 8(a) and (b) show end and cross sectional views of a modified lattice connector 70' (modified relative to the embodiment shown in figure 6). Corresponding features, such as base 75, sidewalls 73 etc. have been given the same number. However in this modified embodiment of the invention, fixing flanges 74' extend outwardly from the front and back of base 75, in line with opening 80, rather than from the bottom of sidewalls 73, so in this case they are located in a position perpendicular to the position of fixing flanges 74 in the figure 6 embodiment. They are also provided with screw holes 76' to allow the modified lattice connector 70' to be screwed to rail 55. . In this case, modified lattice connector 70' is inserted into the opening 56 in rail 55, with the opening 80 within lattice connector 70' parallel to the opening 56

Figures 9(a) and (b) show how the roof tile and various connectors described herein are used to mount solar panels on a rooftop.

Figure 9 (a) is a cross sectional view of two solar panels 101 mounted one above the other on a roof top using roof tile 1 and the connector assembly of figures 5 and 7. The figure shows a roof tile 1, which has simply been inserted in place of a standard roof tile 102, and then rail

55, connector 60 and orifice fixture member 50 have been inserted in the attachment flange as described with respect to figures 5 and 7. Additional fixing post 110 is inserted into rail 55 where it is securely held in position by serrated sidewalls 53 of rail member 55. The solar panels are positioned so that a part of their longest edge abuts the fixing post 110. Panel clamps 111 (preferably metal clamps but other materials may be used) are placed over the longest edges of solar panel 101 and secured in place when fixing post 110 is secured in position. The underside of panel clamps 111 abut the top surface 103 of solar panels 101 and are screwed down by fixing post 110 to hold the solar panels firmly in position. The bottom end of the lower solar panel and the top end of the topmost solar panel (not shown) are also secured in a similar fashion. The solar panels will be fully secured in this way across the roof, with the solar panel being secured along its longest side. In this case the solar panel will generally have its longest side parallel to the length of the roof. In this embodiment fixing post 110 is a stainless steel bolt which will be selected prior to installation of the solar panel to have a length which matches the length required to secure the solar panel.

Figure 9 (b) is a cross sectional view of a solar panel mounted on a roof top using roof tile 1 and the connector assembly of figures of 6 and/or 8. In this figure only the attachment flange 12 of roof tile 1 is shown, but the remainder of the rooftop is as shown in figure 9(a). Like figure 9(a), the rail 55, connector 60 and orifice fixture member 50 have been inserted in the attachment flange as described with respect to figures 5 and 7. However, then modified lattice connector 70, as shown in figure 6 and 8 is then inserted into the opening of rail 55 as previously described. An additional rail member 55 is then inserted into connector 70 for receiving a solar panel 101 and fixing post 110 as described above with respect to figure 9(a). However in this case, the solar panel will have its longest edge at 90° relative to the embodiment shown in figure 9(a).

Finally, figures 10(a) and 10(b) show a height adjustable rail connector 200. Figure 10(a) is a cross-sectional view of the connector 200, and figure 10(b) is a perspective view. The height adjustable connector 200 comprises integrated fixture and connector member 201 and threaded rail connector 202. The integrated connector 201 has a square connector base 203 with internal circular threaded section 204. Extending from the bottom surface 205 of square connector base are four arms 206, at 90° to each other. In operation, arms 206 cooperate with the orifice 20 in attachment flange 12 as described previously with regard to figures 5 and 7. As in the figure 5 embodiment, the number and arrangement of arms is not fixed, so there may be more or less than four arms, arranged in any number of configurations around the

bottom surface of connector base 203. Also, like in the figure 5 embodiment, the fixture and connector member may be formed as two separate components, rather than as an integrated unit.

In operation, integrated member 201 is fixed to tile 1 or tile hook structure 150, as previously described. Threaded rail connector 202 comprises a threadbolt 210 and rail connector 260. The threadbolt 210 is screwed into threaded circular section 204 and held firmly in position. In this embodiment rail connector 260 located on the top of threaded connector 202 works in exactly the same manner as rail connector 60 describe above, and so solar panels etc. can be fitted in exactly the same way as described above. The advantage of this embodiment is that the threadbolt 210 of threaded connector 202 can be any length up to approx. 200mm and so allows the rail connector to be positioned significantly above the rooftop. The threadbolt 210 is simply cut to the desired length before it is fitted into the integrated connector 201

In all of the herein described embodiments it will be understood that roof tile 1 can be used as a replacement tile for one of more standard rooftop tiles, and as such can be constructed to look the same as any such commercially available tile, by being substantially the same size, shape and colour, as well as having any corresponding textural qualities to ensure a sympathetic match. Although roof tile 1 is preferable made of plastic it may also be made of the same material as the roof tile it is intended to replace to ensure a complete match with the pre-existing tiles on the roof. Furthermore, although the description has been written with regard to fitting solar panels on a roof top, the roof tile and tile assembly can of course be used to most a wide variety of other articles on a roof top, for example, scaffolding, or television satellite receivers for example.

Claims

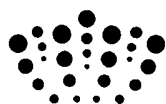
1. A roof tile comprising a tile body to be positioned on a roof and attachment means for attaching additional fixtures to said roof.
2. A roof tile according to claim 1 wherein said attachment means is an attachment flange connected to said tile body by a joining section.
3. A roof tile according to claim 2 wherein said attachment flange includes an orifice and said additional fixtures are inserted into or over said orifice.
4. A roof tile according to claim 3 wherein said orifice includes at least one substantially rectangular slot
5. A roof tile according to claim 3 or claim 4 wherein said orifice is centrally located.
6. A roof tile according to claim 5 wherein said centrally located orifice includes two or more substantially rectangular slots extending from a central section, said two or more slots being evenly spaced from each other
7. A roof tile according to claim 6 wherein said centrally located orifice includes four substantially rectangular slots extending from a central section arranged at 90° to each other.
8. A roof tile according to any of claims 2 to 7 wherein said attachment flange is parallel to said tile body.
9. A roof tile according to any of claims 2 to 8 wherein said attachment flange is the same size or smaller than said tile body.
10. A roof tile according to any of claims 2 to 9 wherein said attachment flange and/or said tile body is substantially rectangular.
11. A roof tile according to any preceding claim wherein said tile body includes securing means for securing said tile body to said roof.
12. A roof tile according to claim 11 wherein said securing means are one or more screw holes to allow said tile body to be screwed or nailed to said roof.
13. An attachment for a roof tile comprising; a base section for securing the attachment to said tile, a joining section extending upwardly from said base section and an attachment section extending from said joining section, wherein, in use said attachment is secured to said tile, and said attachment means are configured so that an additional fixture can be secured to said roof tile.
14. An attachment for a roof tile according to claim 13 wherein said attachment means is an attachment flange connected to said tile body by a joining section.

15. An attachment for a roof tile according to claim 14 wherein said attachment flange includes an orifice and said additional fixtures are inserted into or over said orifice.
16. An attachment for a roof tile according to claim 15 wherein said orifice includes at least one substantially rectangular slot
17. An attachment for a roof tile according to claim 15 or 16 wherein said orifice is centrally located
18. An attachment for a roof tile according to claim 17 wherein said centrally located orifice includes two or more substantially rectangular slots extending from a central section, said two or more slots being evenly spaced from each other
19. An attachment for a roof tile according to claim 18 wherein said centrally located orifice includes four substantially rectangular slots extending from a central section arranged at 90° to each other.
20. An attachment for a roof tile according to any of claims 14 to 19 wherein said attachment flange is parallel to said tile body.
21. An attachment for a roof tile according to any of claims 14 to 20 wherein said attachment flange is the same size or smaller than said base section.
22. An attachment for a roof tile according to any of claims 14 to 21 wherein said attachment flange and/or said base section is substantially rectangular.
23. An attachment for a roof tile according to any of claims 14 to 22 wherein said attachment is entirely made of metal.
24. An attachment for a roof tile according to any of claims 14 to 22 wherein said attachment is entirely made of plastic.
25. An attachment for a roof tile according to any of claims 13 to 24 wherein said base section includes securing means for securing said base section to said roof tile.
26. An attachment for a roof tile according to claim 25 wherein said securing means are one or more screw holes to allow said base section to be screwed or nailed to said roof tile.
27. An attachment for a roof tile according to claim 23 wherein said tile is made of plastic material and said base section can be secured to said tile by embedding said base section in said tile during fabrication of said tile.
28. A roof tile assembly including either a roof tile according to any of claims 1 to 13, or a standard roof tile with an attachment according to any of claims 14 to 27, wherein said additional fixture comprises at least one support member for supporting a

secondary fixture to said roof; said support member being inserted over said orifice and said attachment flange.

29. A roof tile assembly according to claim 28 wherein at least one of said support members includes one or more engaging protrusions for engaging further support member.
30. A roof tile assembly according to claim 29 wherein said one or more engaging protrusions are each located at or adjacent to a corner of a top surface of said support member.
31. A roof tile assembly according to any of claims 28 to 30 wherein said support member has a triangular cross section.
32. A roof tile assembly according to any of claims 28 to 31 wherein said support member has a substantially flat top surface, and a substantially vertical end face.
33. A roof tile assembly according to claim 31 or 32 wherein said triangular cross section has a base wedge angle at a base of the wedge member of less than 90° and a top wedge angle between 5-45° at the top.
34. A roof tile assembly according to claim 3 including at least two support members and wherein said top wedge angle is the same or less for successive support members.
35. A roof tile assembly according to claim 34 wherein said top most support member has a retaining lip protruding substantially vertically from said end face
36. A roof tile assembly according to claim 35 wherein supplementary support means are positioned above said top most support member and abut said retaining lip so said supplementary support means are secured in position.
37. A roof tile assembly according to any claim 36 wherein said supplementary support means has a rectangular cross section and lies substantially horizontally with respect to said roof.
38. A roof tile assembly including either a roof tile according to any of claims 1 to 13, or a standard roof tile with an attachment according to any of claims 14 to 27, wherein said additional fixture comprises an orifice shaped fixture member, a connector member connectable to, or formed integrally with said fixture member and a connector rail member for insertion into said connector member, which combine for supporting a secondary fixture to said roof.
39. A roof tile assembly according to claim 38 wherein said additional fixture further comprises lattice connector means for insertion into said rail member to support said secondary fixture to said roof.

40. A roof tile assembly according to claim 38 or claim 39 wherein said connector rail member has a threaded section extending vertically from the base of said member and said connector member includes an internal threaded section for receiving and securing said threaded section.
41. A roof tile assembly according to claim 40 wherein said threaded section has a length of 200mm or less.
42. A roof tile according to any preceding claim wherein said roof tile is made of a flexible plastic material.
43. A roof tile according to claim 42 wherein said flexible plastic material is a waterproof polymer material
44. A roof tile assembly according to any of claims 28 to 43 wherein said additional fixture is made of flexible material
45. A roof tile assembly according to claim 44 wherein said flexible material is rubber
46. A roof tile assembly according to any of claims 28 to 45 wherein said secondary fixture is a solar panel.
47. A roof tile assembly according to any of claims 28 to 45 wherein said secondary fixture is scaffolding.
48. A roof tile substantially as herein described with reference to figures 1(a) and 2 of the accompanying drawings.
49. A roof tile assembly substantially as herein described with reference to figures 3 to 10 of the accompanying drawings
50. An attachment for a roof tile substantially as herein described with reference to figures 1(b) and (c) of the accompanying drawings



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Claims searched: 1 to 12

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Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-6,8-12	CH652161 A SCHWEIZER see figures
X	1-5,8-12	EP1845319 A OTTO LEHMANN see figures
X	1-5,8-12	DE20304099 U FLECK see figures
X	1-4,9-12	JP2004027843 A YANE GIJUTSU KENKYUSHO see figures
X	1-3,9-12	FR1260974 A MAESTRI et al. see figures

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

Worldwide search of patent documents classified in the following areas of the IPC

E04D; E04G; H01Q

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI

International Classification:

Subclass	Subgroup	Valid From
E04D	0001/30	01/01/2006