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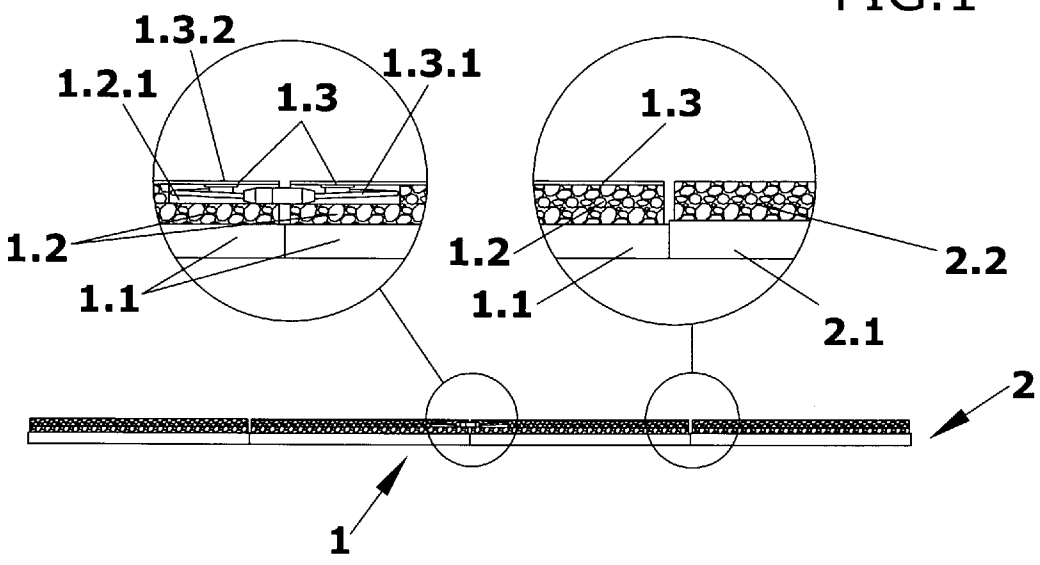
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Published:
— *with international search report*
— *with amended claims*

(54) **Title:** PHOTOVOLTAIC SOLAR ROOF

FIG.1



(57) **Abstract:** The object of the present invention is a photovoltaic solar roof in which the photovoltaic panels comprise insulating and drainage slabs finished in a photovoltaic laminate, which rest on the roof by means of their base which comprises plates made from insulating material in such a way that there are no attachments which pass through the waterproofing system of the building roof, and with the central part provided with a layer of porous concrete through which water drains from any rainfall on the roof, in addition to other porous con- crete slabs with an insulating base intercalated with photovoltaic solar slabs, such that wind suction force is reduced on the porous concrete slabs with an insulating base, preventing them from being lifted.

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PHOTOVOLTAIC SOLAR ROOF

DESCRIPTION

OBJECT OF THE INVENTION

The object of the present invention is a photovoltaic solar roof in which the photovoltaic panels comprise insulating and drainage slabs finished in a photovoltaic laminate, which rest on the roof by means of their base which comprises plates made from insulating material in such a way that there are no attachments which pass through the waterproofing system of the building roof.

The central part is provided with a layer of porous concrete through which water is drained from any rainfall on the roof.

Due to its special configuration, the photovoltaic solar roof is provided with porous concrete slabs with an insulated base intercalated with photovoltaic solar slabs so that wind suction force is reduced on the porous concrete slabs with insulating base and thus the slabs are not lifted, and this also prevents the solar slabs from lifting as there is no lateral zone where the wind can enter.

In this way, the drainage porous concrete slabs with insulating base may be configured in such a way that the external surface is at the same height as the external surface of the photovoltaic solar slab, creating a continuity on the roof which facilitates transit thereon, should this be required, as the solar

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slabs are provided with an upper vitreous covering which is resistant to weight.

BACKGROUND TO THE INVENTION

Systems for laying photovoltaic panels on a roof are well known in the state of the art, where the panel is fixed on a support which has a specific inclination with respect to the roof, with the support fixed in turn to the framework or structure of the building.

In addition, photovoltaic panels are known which are fixed directly on the roof and which are anchored to the structure of the building.

In both these systems the means for fixing the panels pass through the waterproofing system of the roof, thus creating critical points where they may produce heat leakage through thermal bridges, and also providing entry for water into the building.

In other systems, the photovoltaic panel adheres to the roof, so that when the wind blows on the photovoltaic panels, there is a risk that through the suction force of the wind, the slabs are lifted up, with the consequent deterioration of the installation and potential risk of the panels becoming detached.

The wind suction is exercised in a normal direction on the surface of the panel. In order to reduce the risk of lifting the panels a weight is placed over them to stop them lifting. However, in the case of a side wind, if the sides of the panel are unprotected, the panel is lifted due to the force of the wind from the side, in which case it would be necessary to place a

border round the edges of the end panels which is higher than the panels in order to avoid the lateral force of the wind.

The present invention resolves all the aforementioned disadvantages by providing a photovoltaic solar roof in which there are no fixation means passing through the roof's waterproofing system, and in addition, being sufficient to counteract the suction force of the lateral force of the wind, without any need to place lateral borders on the group of panels.

DESCRIPTION OF THE INVENTION

The present invention refers to a photovoltaic solar roof which enables photovoltaic panels to be placed against the roof of the building in such a way that the fixation means do not pass through the roof of the building, while at the same time supporting the suction force and the lateral force of the wind.

The photovoltaic solar roof is provided with solar slabs with photovoltaic solar panels in their external face and insulating and drainage slabs with porous concrete in their external face.

Any of the previous slabs are provided on their interior face with an insulating base which rests on the waterproofing membrane on the roof.

On top of the insulating base a layer of porous concrete is laid, which, in the solar slab, is provided with grooves to house the connections of the photovoltaic solar panels.

The photovoltaic panel is connected to the

porous concrete by adherence, so that there are no attachment means which are required to pass through the layer formed by the insulating base.

The layer of porous concrete, both in the solar slab and the insulating drainage slab removes water from rainfall on the roof.

In this way the force of wind suction is reduced on the porous concrete slabs with insulating base preventing their lifting, as due to the fact that they are at least of the same height as the solar slabs, these cannot be lifted either, as there is no lateral zone into which the wind can enter.

Furthermore, the roof permits transit over the whole surface, should this be necessary, as the photovoltaic solar slabs are provided with a vitreous upper covering which is resistant to the weight of persons walking thereon.

The photovoltaic solar slabs and the insulating and drainage slabs may be placed on roofs with any type of inclination, including in vertical zones.

DESCRIPTION OF THE DRAWINGS

The present report is complemented with a set of plans which are illustrative of a preferred embodiment but which however, are not in any way restrictive of the invention.

Figure 1 shows an upright view of an embodiment of the photovoltaic solar roof of the present invention detailing the various parts of the two types of slab.

Figure 2 shows a plan view of the photovoltaic solar roof in Figure 1.

PREFERRED EMBODIMENT OF THE INVENTION

In the light of the foregoing, the present invention refers to a photovoltaic solar roof which presents two types of slabs (1), solar slabs formed by an insulating base (1.1) which rests on the waterproof membrane of the roof, providing the requisite thermal insulation, with a layer (1.2) of porous concrete arranged on this base (1.1) and provided with grooves (1.2.1) where the connections (1.3.1) of a photovoltaic solar panel (1.3) will be arranged once this (1.3) adheres to the layer (1.2) of porous concrete.

The roof is also provided with a second type of insulating drainage slab (2) comprising an insulating base (2.1) which rests on the waterproof membrane of the roof, providing the requisite thermal insulation, with a layer (2.2) of porous concrete arranged on this insulating base (2.1) which is exposed on the surface of the slab, in such a way that the thickness of the base (2.1) of the insulating and drainage slabs (2) is greater than the thickness of the base (1.1) of the solar slabs (1), with the thickness of the layer (1.2) of concrete of the photovoltaic solar slab (1) and the thickness of the layer (2.2) of concrete of the insulating and drainage slab (2) such that the total thickness of both slabs (1.2) is the same.

In this way, the external surface of the roof is continuous, which enables transit over the whole roof, as the solar slabs (1) are covered with an upper

vitreous layer (1.3.2) which is resistant to weight.

Thus the photovoltaic solar roof is provided with slabs (1,2) with fixation which does not pass through the roof waterproofing, so that both the insulating and drainage slabs (2) and the photovoltaic solar slabs (1) are deposited on the waterproof membrane, possessing sufficient weight which, together with the impossibility of the wind suctioning the surface of the layer of porous concrete (2.2), also prevents the wind from lifting the photovoltaic solar panels(1.3) installed on the roof of the building.

The essential nature of this invention is not altered by any variations in materials, form, size and arrangement of the component elements, described in a manner which is no way restrictive but which is sufficient for its reproduction by an expert.

CLAIMS

1.- Photovoltaic solar roof characterised in that it is provided with at least a first type of photovoltaic solar slab (1) formed by an insulating base (1.1) with a layer of porous concrete (1.2) arranged on this insulating base (1.1) on which a photovoltaic solar panel (1.3) is placed, in addition to at least one type of insulating and drainage slab (2) of at least the same height as the photovoltaic solar slab (1) formed by an insulating base (2.1) which is that which rests on the waterproofing membrane of the roof, providing the requisite thermal insulation, with a layer of porous concrete (2.2)exposed on the surface of the slab arranged on this insulating base (2.1), in which said insulating bases (1.1, 2.1) are laid on the roof of the building and the layers of porous concrete (2.2) prevent the suction force and the lateral force of the wind from lifting the photovoltaic solar slabs (1).

2.- Photovoltaic solar roof according to claim 1, characterised in that the thickness of the base (2.1) of the insulating and drainage slabs (2) is greater that the thickness of the base (1.1) of the solar slabs (1), with the thickness of the layer of concrete (1.2) of the photovoltaic solar slab (1) and the thickness of the concrete layer (2.2) of the insulating and drainage slab (2) such that the total thickness of both slabs (1, 2) is the same.

3.- Photovoltaic solar roof according to claim 1, characterised in that the layer of porous concrete (1.2) is provided with grooves (1.2.1) in which the connections (1.3.1) of a photovoltaic solar panel (1.3) are placed.

4.- Photovoltaic solar roof according to claim 1, characterised in that the solar slabs (1) are provided with an upper vitreous covering (1.3.2) which is resistant to weight.

5.- Photovoltaic solar roof according to claim 1, characterised in that the photovoltaic solar slabs (1) and the insulating and drainage slabs (2) may be placed on roofs with any type of inclination, including in vertical areas.

AMENDED CLAIMS
received by the International Bureau on 20 November 2008 (20.11.08)

1.- Photovoltaic solar roof characterised in that it is provided with

- at least a first type of photovoltaic solar insulating and drainage slab (1) formed by
  - an insulating base (1.1) which rests on a waterproofing membrane on the roof providing a thermal insulation wherein the insulation base (1.1) has
  - a layer of porous concrete (1.2) arranged on this insulating base (1.1)
  - on which a photovoltaic solar panel (1.3) is adhered, in addition
- to at least one type of insulating and drainage slab (2) of at least the same height as the photovoltaic solar slab (1) formed by
  - an insulating base (2.1) which is that which rests on the waterproofing membrane of the roof, providing the requisite thermal insulation,
  - with a layer of porous concrete (2.2) exposed on the surface of the slab arranged on this insulating base (2.1),

in which said insulating bases (1.1, 2.1) are laid on the roof of the building and the layers of porous concrete (2.2) prevent the suction force and the lateral force of the wind from lifting the photovoltaic solar slabs (1).

2.- Photovoltaic solar roof according to claim 1, characterised in that the thickness of the base (2.1) of the insulating and drainage slabs (2) is greater that the

thickness of the base (1.1) of the solar slabs (1), with the thickness of the layer of concrete (1.2) of the photovoltaic solar slab (1) and the thickness of the concrete layer (2.2) of the insulating and drainage slab (2) such that the total thickness of both slabs (1, 2) is the same.

3.- Photovoltaic solar roof according to claim 1, characterised in that the layer of porous concrete (1.2) is provided with grooves (1.2.1) in which the connections (1.3.1) of a photovoltaic solar panel (1.3) are placed.

4.- Photovoltaic solar roof according to claim 1, characterised in that the solar slabs (1) are provided with an upper vitreous covering (1.3.2) which is resistant to weight.

5.- Photovoltaic solar roof according to claim 1, characterised in that the photovoltaic solar slabs (1) and the insulating and drainage slabs (2) may be placed on roofs with any type of inclination, including in vertical areas.

AMENDED SHEET (ARTICLE 19)

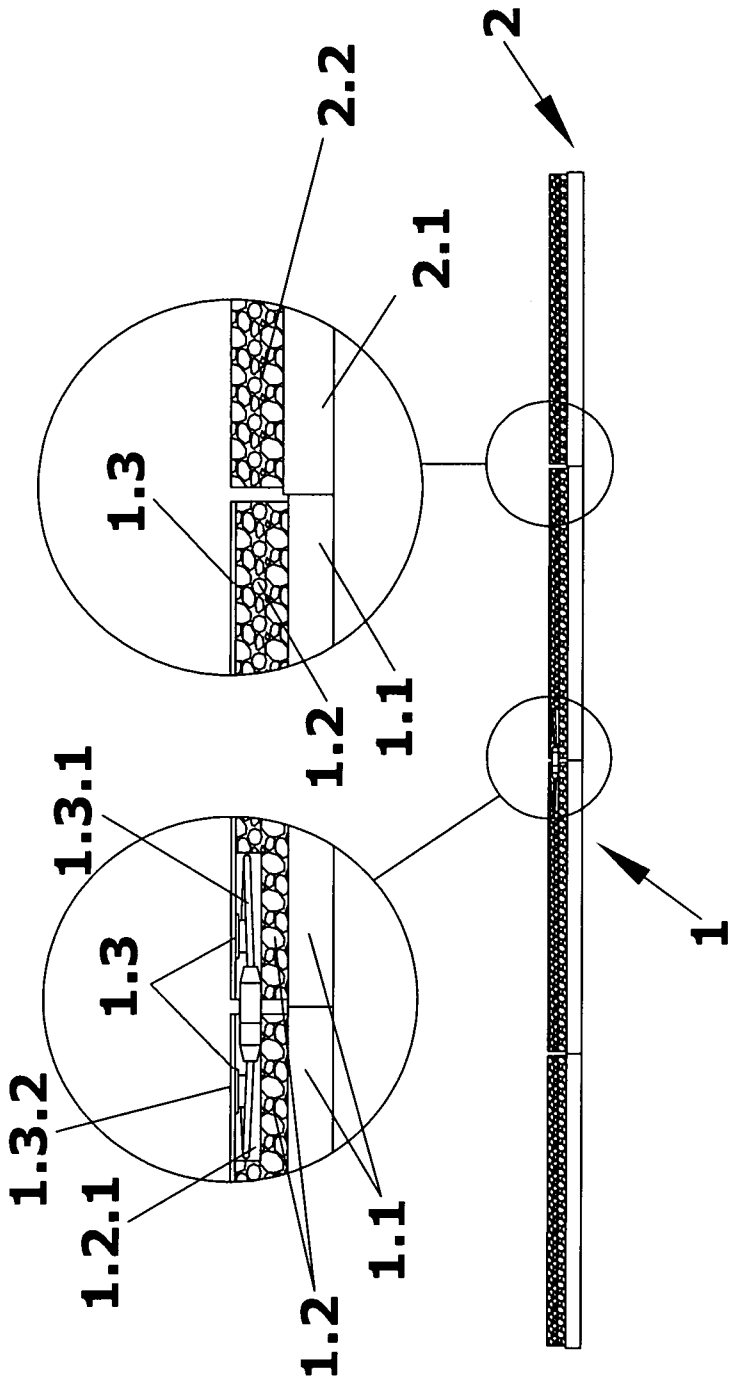


FIG.1

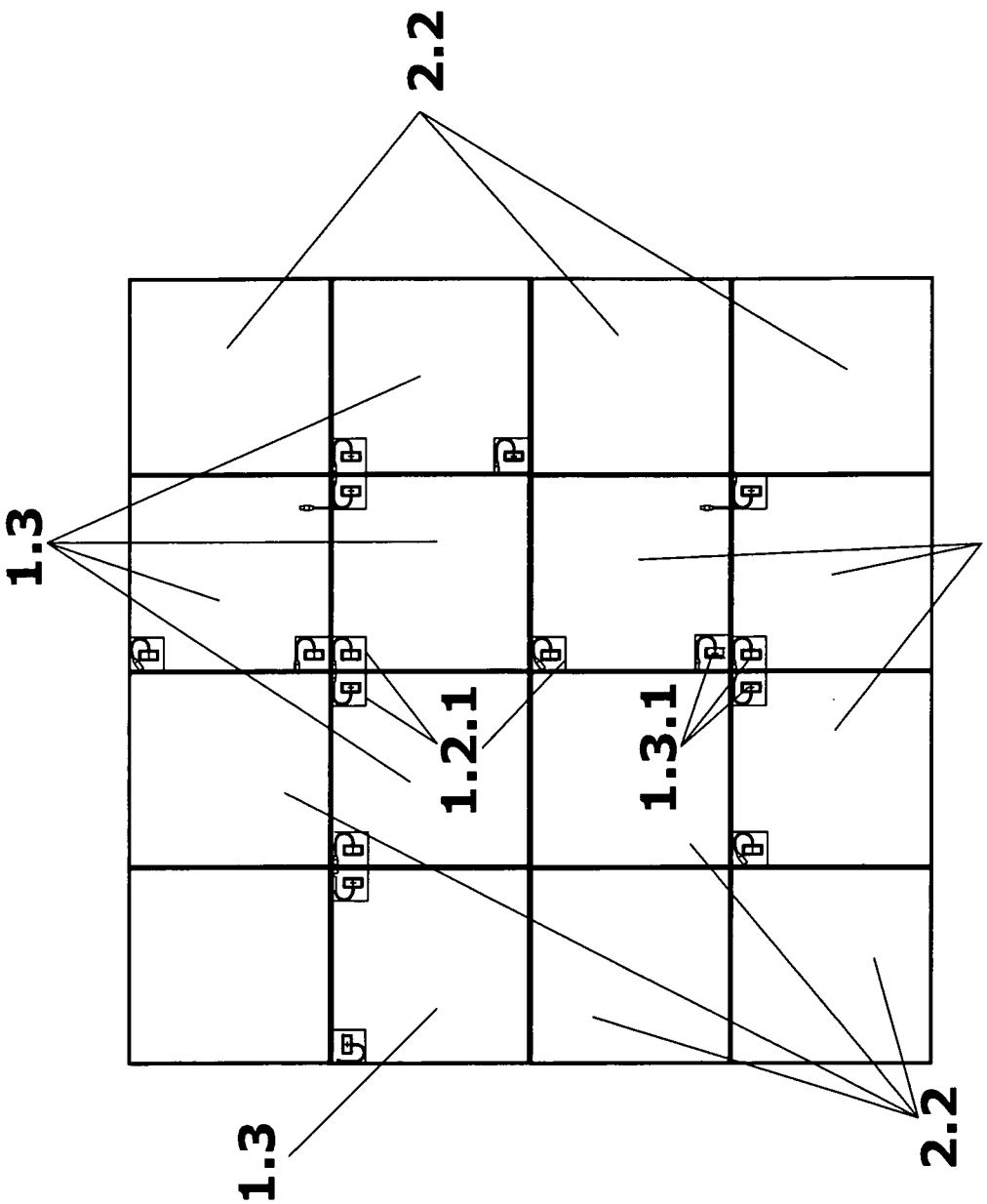


FIG.2

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2007/010857

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01L31/048

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	DE 201 08 106 U1 (DROESCHEL HARALD [DE]) 28 February 2002 (2002-02-28)	1-5

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
8 September 2008	12/09/2008

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Heising, Stephan

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2007/010857

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2007/010857

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