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(71) Applicant and

(72) Inventor: **BOSSELAAR, Jacob, Adriaan** [NL/NL];
Jonkvrouw van Naaldwijklaan 8, NL-3131 NP Vlaarding-
gen (NL).

(74) Agents: **VAN WESTENBRUGGE, Andries** et al.; Ned-
erlandsch Octrooibureau, P.O. Box 29270, NL-2502 LS
The Hague (NL).

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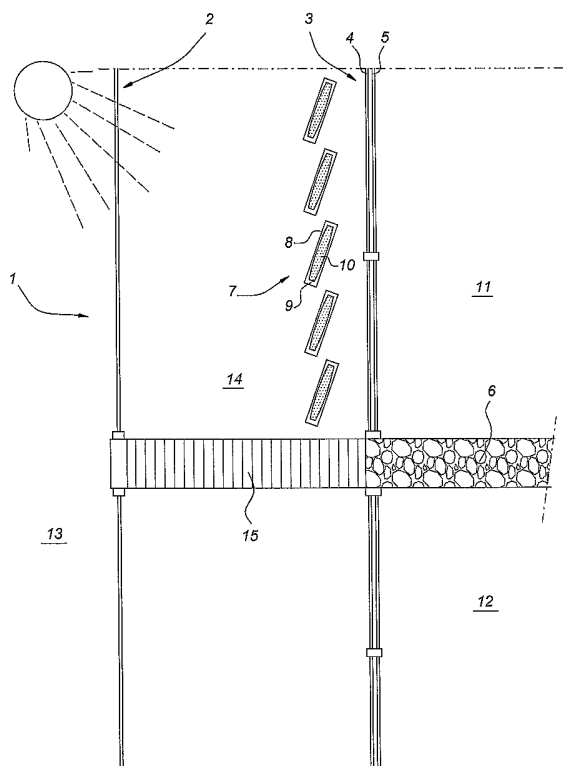
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ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: BUILDING CONSTRUCTION



(57) Abstract: Building construction consisting of a number of rooms positioned one above the other, where the barrier to the surroundings is formed by an inner skin and an outer skin. These consist of transparent material and a sun-blind, preferably made up of a number of lamellae in which a PCM is incorporated, is incorporated in the gap between the inner skin and outer skin. Preferably the phase change consists of the transition from solid-liquid at a temperature of approximately 12 - 18 °C. Further heat-absorbing capacity can be obtained by ventilating the gap between the first and second outer wall.

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Building construction

The present invention relates to a building construction comprising a room, a barrier between said room and the surroundings and a sun-blind arranged adjacent to said room, which sun-blind is made of a material that absorbs solar heat and releases solar heat.

A building construction of this type is disclosed in US 4 739 748. In this publication an outer wall is described where there is a sun-blind, in which a heat-buffering material has been incorporated, behind the window, that is to say in the room to be screened. This material is preferably a PCM (Phase Change Material). As a result when a specific temperature is exceeded heat can be absorbed and when the temperature falls again heat will be released. Because the aim with this construction is to release heat into the room it is necessary that the sun-blind which contains the PCM is also inside such a room. As a result the effect of the sun-blind will be restricted because, after all, radiation into the room is blocked when the material acts as a sun-blind and is not blocked outside the room. As a result, although optimum release of heat from the PCM into the room concerned is possible, the sun screening properties are restricted by the set-up used.

The aim of the present invention is to provide heat control for a building in a more effective manner, where both absorption of heat and release of heat can be optimised.

This aim is realised with the building construction described above in that there is a further transparent barrier arranged between said sun-blind and said room and wherein said barrier is common to a number of separate rooms arranged one above the other.

The present invention proposes a building construction with an inner skin and an outer skin. Such constructions are generally known per se in the state of the art. It is known that an appreciable improvement in the climate is obtained by this means and that the users of the various rooms have the option of opening a window, even in higher buildings, without this leading to inadmissible draught or other problems.

The climate conditions that prevail in the gap between the inner skin and outer skin differ from the conditions that prevail in the room concerned. According to the invention it is now proposed to install the heat-buffering capacity in the gap between the inner skin and the outer skin. Furthermore, this heat buffering acts as a sun-blind.

With this arrangement, on the one hand, the effect is obtained that, in the effective position of the sun-blind, solar radiation through the inner skin into the room concerned is prevented. As a result effective blocking of energy in said room is avoided so that it is not

or only occasionally necessary to provide additional cooling capacity.

Because the buffer is arranged in a gap between the inner skin and the outer skin a completely different pattern of absorption and release of heat is obtained. After all, the temperature requirements imposed on the gap between the inner and outer skin are less stringent than the requirements imposed in the room. That is to say the temperature between the inner and outer skin may vary over a broader range than the temperature in the room. As a result it is possible to choose other, more effective materials to act as buffer. One example of these are materials with phase change in a specific temperature range. Because the temperature variations can be greater in the gap between the inner and outer skin than in the working/living room, such materials with phase transition can be used more effectively. In particular, such materials comprise those materials that have a solid/liquid transition at approximately 12 - 18 °C. More particularly, materials that are liquid at approximately 15 °C or higher and solidify again at 15 °C or lower are used for this purpose. Such materials are generally known in the state of the art.

The invention also relates to a method for controlling the temperature in a building construction, which building construction comprises a number of individual rooms positioned one above the other and being adjacent to one another, wherein each room is provided with a window and the windows of the room form a first outer wall, as well as a second outer wall made of transparent material positioned spaced from the first outer wall and common to said rooms, wherein the temperature in the building construction is controlled by controlling the temperature between said first and second outer wall, wherein the control comprises the absorption and release, respectively, of heat in said gap.

More particularly, it is possible by means of the invention to influence the temperature in the gap between the first and second outer wall and thus the buffering capacity thereof. Thus, it is possible (by means of forced ventilation) for example to make the temperature in the gap between first and second outer wall fall below the solidification point of the PCM during the night, as a result of which a buffer capacity for the following day is provided.

The invention will be explained in more detail below with reference to an illustrative embodiment shown in the drawing. In the drawing:

Fig. 1 shows, diagrammatically, a building construction according to the present invention with effective sun screening;

Fig. 2 shows the construction according to Fig. 1 during the night; and

Fig. 3 shows an alternative embodiment of the building construction according to the invention.

In Fig. 1 a building construction is indicated in its entirety by 1. This is also termed a second skin facade. The actual living rooms are indicated by 11 and 12 and are separated by a storey floor 6. This floor is extended by a grating 15. The screening from the surroundings consists of a so-called outer skin 2 and an inner skin 3. In the example shown in Figs 1 and 2 the inner skin 3 is made of double glazing 4, 5, within which an insulating gas layer has been arranged. The outer skin has been made as single glazing, but it will be understood that numerous variations of inner and outer skin are possible. Fig. 3, for example, shows an embodiment where the outer skin has been made as double glazing 4, 5 and where the inner skin 3 has been made as single glazing; such a set-up is also referred to as a climate wall. What is important is that both the inner and outer skin are transparent. There can optionally be windows and the like in the inner skin 3. The surroundings are indicated by 13.

A sun-blind 7 is arranged in the gap 14 between the inner skin and outer skin. This sun-blind 7 consists of a number of tiltable lamellae 8. Each tiltable lamella is provided with a cavity 9 in which a PCM has been introduced. However, it is also possible to arrange the PCM material in another way. This material with phase change at approximately room temperature can be accommodated in cassettes in accordance with any other manner known in the state of the art and is available as standard. Such a material has an appreciable heat-buffering effect as a result of the phase transition solid-liquid-solid. The gap 14 is provided with ventilation means which enable heat exchange with the surroundings.

The situation where the sun-blind is closed if the sun is shining is shown in Fig. 1. As a result no heat is introduced into the rooms 11 and 12. The incoming heat is accumulated in PCM 10.

The situation during the night is shown in Fig. 2. The sun-blind 7 is then opened in that the lamellae 9 are placed in the horizontal position. In this state cooling of the gap 14 between inner skin 3 and outer skin 2 will be produced. In the present example the material 10, which has been made liquid, will solidify when the temperature falls to approximately 15°, an appreciable amount of heat being liberated. This heat will circulate within gap 14. This fall in temperature can, for example, be achieved during the night by means of the ventilation means, by introducing colder ambient air into the gap 14. As a result of this

buffer effect further lowering of the temperature in gap 14 is counteracted in the majority of cases. The temperature in the room 11 is also prevented from falling appreciably during the night by this means. As a result an appreciable saving in energy for cooling and/or heating can be obtained.

5 It will be understood that by arranging it in a sun-blind a particularly large surface area for material 10 is available. Moreover, the "thickness" of the lamellae determines the volume of material 10 that can be present.

10 The construction described above is particularly simple to implement and can be fitted or adapted at a later date. It is possible that not all lamellae are provided with material, but only specific lamellae, in particular the lower lamellae. Furthermore, it is possible to perforate the higher lamellae so that even when the sun-blind is closed some light always still penetrates into the room 11, 12.

15 Furthermore, the lamellae 8 can be provided with photovoltaic cells 16 on the side facing the surroundings; see Figure 3. Photovoltaic cells have a reduced efficiency at high temperatures. One advantage of the installation of photovoltaic cells on lamellae in which a PCM has been arranged is that the temperature of these cells can be kept restricted by means of the PCM, so that the efficiency of the cells improves. With this arrangement the current from the photovoltaic cells can, for example, be tapped off by means of electric wiring at a side edge of the respective lamella.

20 Although the invention has been described above with reference to a preferred embodiment, it will be immediately understood by those skilled in the art that numerous modifications can be made without going beyond the scope of the present invention. For instance, it is possible to use a wide variety of special types of materials 10 in order to provide specific heating/cooling characteristics of the gap 14. These further modifications
25 fall within the scope of the appended claims.

CLAIMS

1. Building construction (1) comprising a room (11, 12), a barrier (2) between said room and the surroundings (13) and a sun-blind arranged adjacent to said room (11, 12), said sun-blind (7) being made of a material (10) that absorbs solar heat and releases solar heat, characterised in that there is a further transparent barrier (4) arranged between said sun-blind (7) and said room and wherein said barrier (2) is common to a number of separate rooms (11, 12) arranged one above the other.
2. Building construction according to Claim 1, wherein said (further) barrier comprises a double-walled substrate (3) with insulation.
3. Building construction according to one of the preceding claims, wherein said sun-blind comprises a number of adjacent tiltable lamellae (8), wherein each lamella contains a heat-absorbing/releasing material (10).
4. Building construction according to Claim 3, wherein the lamellae (8) are provided with photovoltaic cells (16) on the side facing the surroundings (13).
5. Building construction according to one of the preceding claims, wherein said heat-absorbing/releasing material is a material with phase change.
6. Building construction according to Claim 5, wherein said material with phase change has a melting/solidification range.
7. Building construction according to Claim 6, wherein the melting/solidification temperature is approximately 12 - 20 °C.
8. Method for controlling the temperature in a building construction, which building construction comprises a number of individual rooms (11, 12) positioned one above the other and adjacent to one another, wherein each room is provided with a window and the windows of the room form a first outer wall, as well as a second outer wall made of transparent material positioned some distance away from the first outer wall

and common to said rooms (11, 12), wherein the temperature in the building construction is controlled by controlling the temperature between said first and second outer wall, characterised in that the control comprises the absorption and release, respectively, of heat in said gap.

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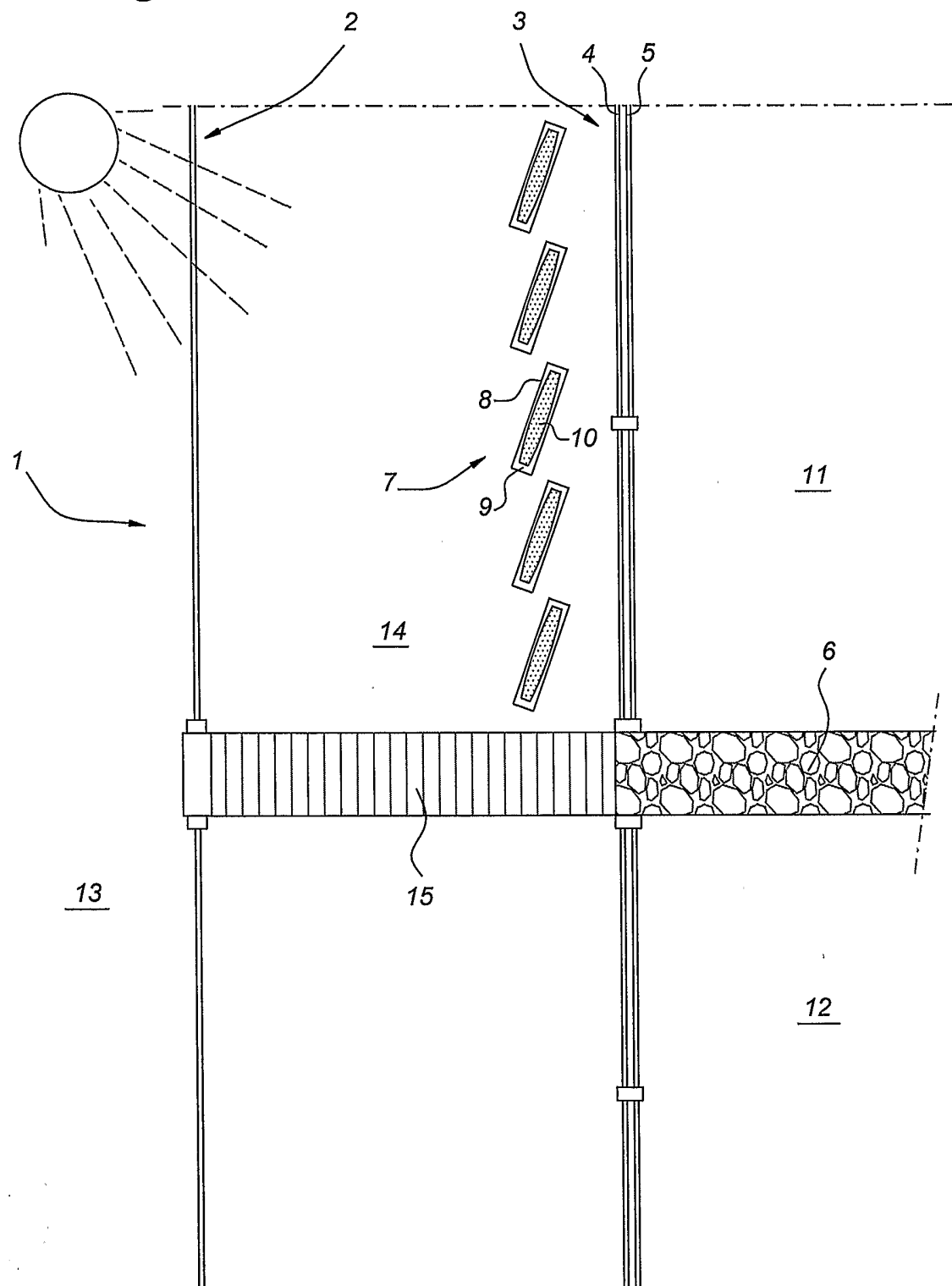
9. Method according to Claim 8, wherein the absorption and release of heat comprises a phase transformation.

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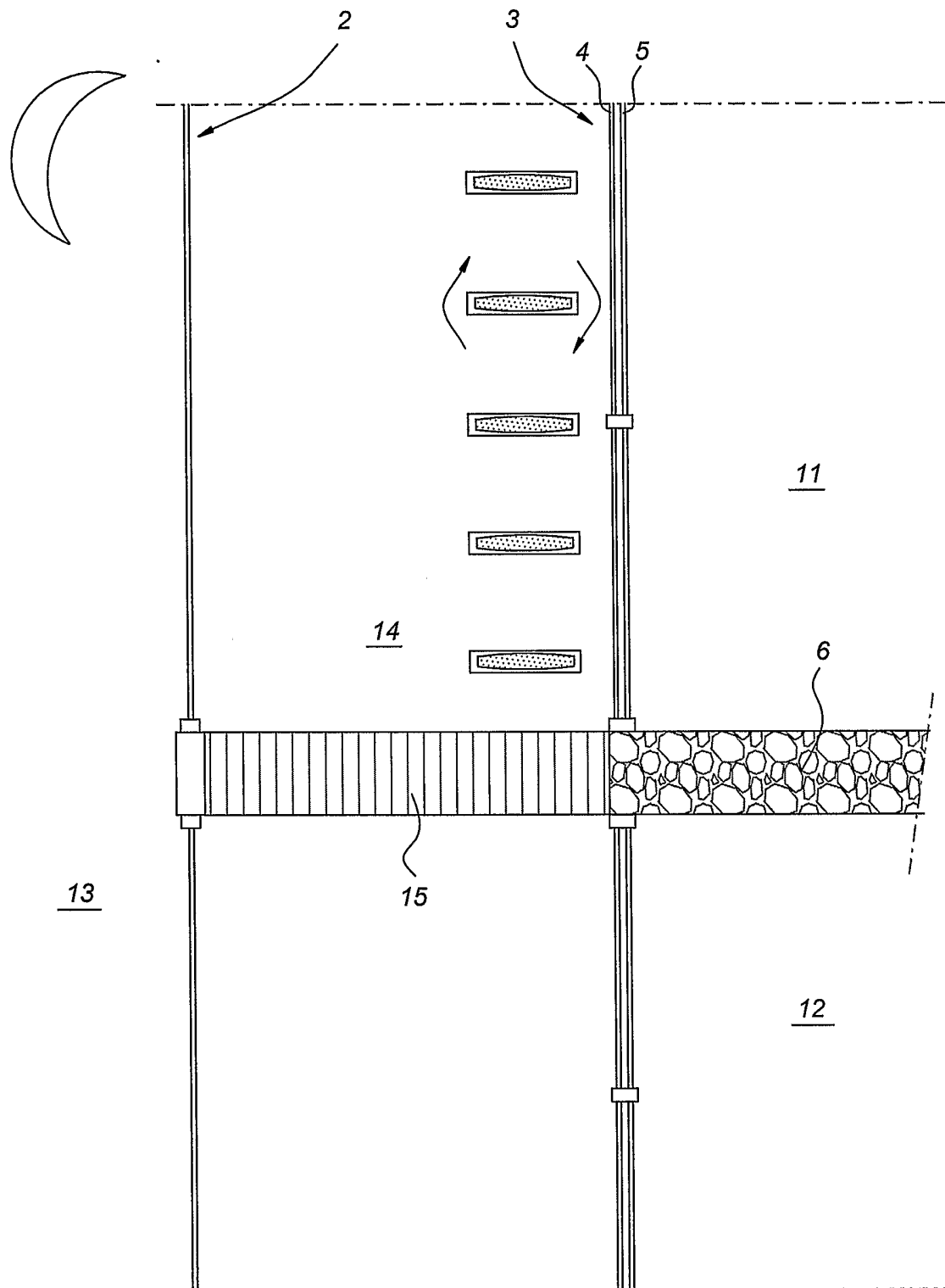
10. Method according to Claim 8 or 9, wherein during a first period the temperature between said first and second outer wall is lowered by introducing ambient air into the gap between said first and second outer wall.

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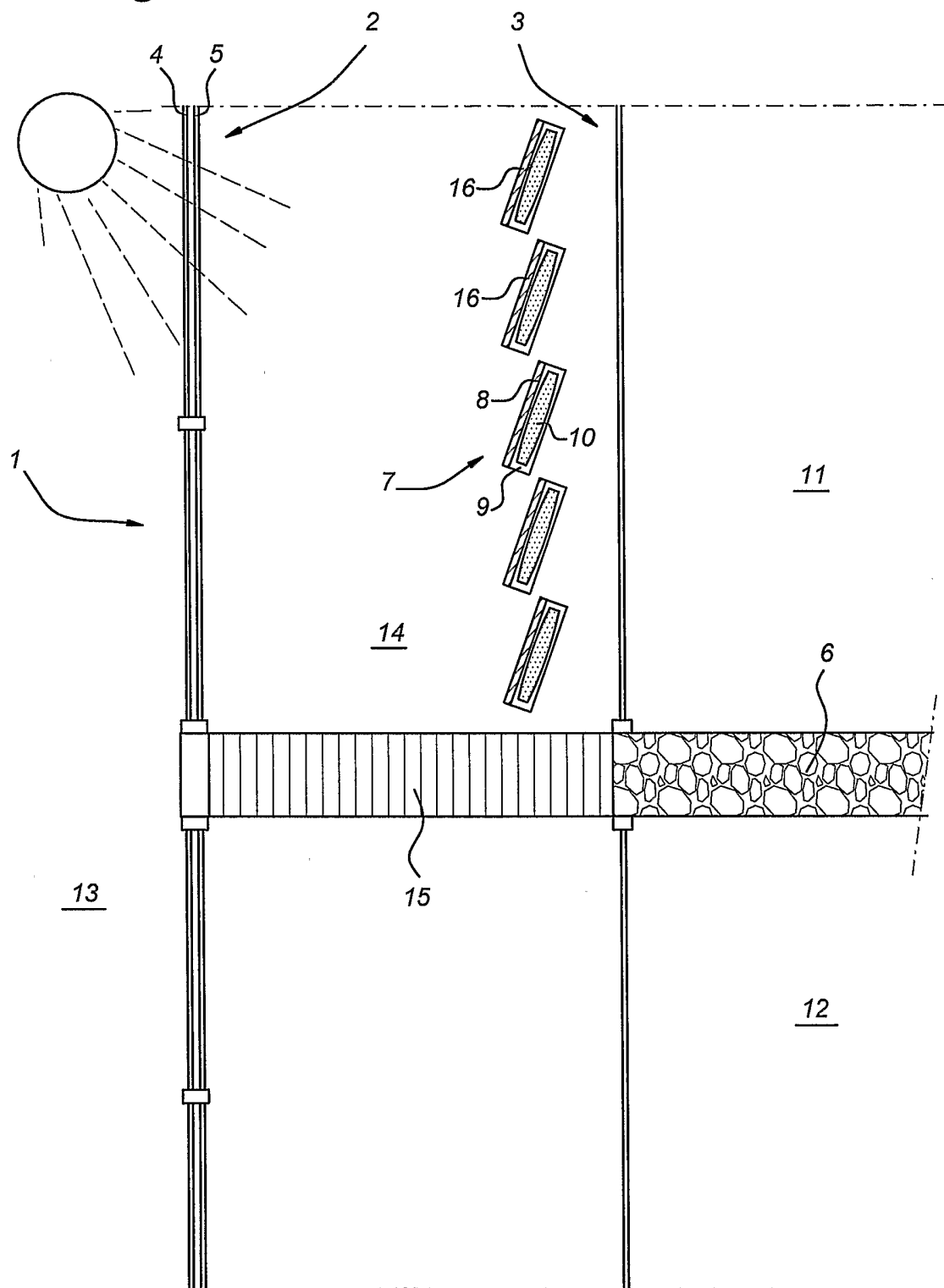
Fig 1



2/3

Fig 2

3/3

Fig 3

INTERNATIONAL SEARCH REPORT

International Application No

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A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 E06B9/264 E06B9/386 F24J2/40 F24J2/04 F24J2/34
E04B1/74

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)

IPC 7 E06B F24J E04B

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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 43 01 008 A1 (GOETZ GMBH METALL- UND ANLAGENBAU, 7012 FELLBACH, DE) 22 July 1993 (1993-07-22) column 4, line 39 - column 5, line 12 column 6, line 1 - line 24 figure 2	1-3,8,10
Y	-----	4-7,9
Y	US 4 159 707 A (MIQUEL ET AL) 3 July 1979 (1979-07-03) the whole document	4
Y	DE 42 09 251 A1 (FROMMHOLD, JOACHIM, DIPL.-ING., 6082 MOERFELDEN-WALLDORF, DE) 20 August 1992 (1992-08-20) the whole document	5-7,9

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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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

Authorized officer

Geivaerts, D

INTERNATIONAL SEARCH REPORT

Information on patent family members

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PCT/NL2005/000641

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 4301008	A1	22-07-1993	NONE	
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