
solar
FIN
SMART ENERGY

Architect Steve Bourne, the inventor of Solar.fin designed this hotel to show how the invention will look in practice.

The façade is clear glass and the solar.fin energy controller is behind this, combined with normal windows.

During the day the solar.fin panels absorb solar energy and saves it for use as required.

At night the panels can be opened to cool the building by radiating heat to the night sky.

The solar.fin panel connects to the building structure when required to heat or cool the thermal mass of the building.

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Steve studied at the Oxford School of Architecture

solar.FIN: a simple leap forward in building design

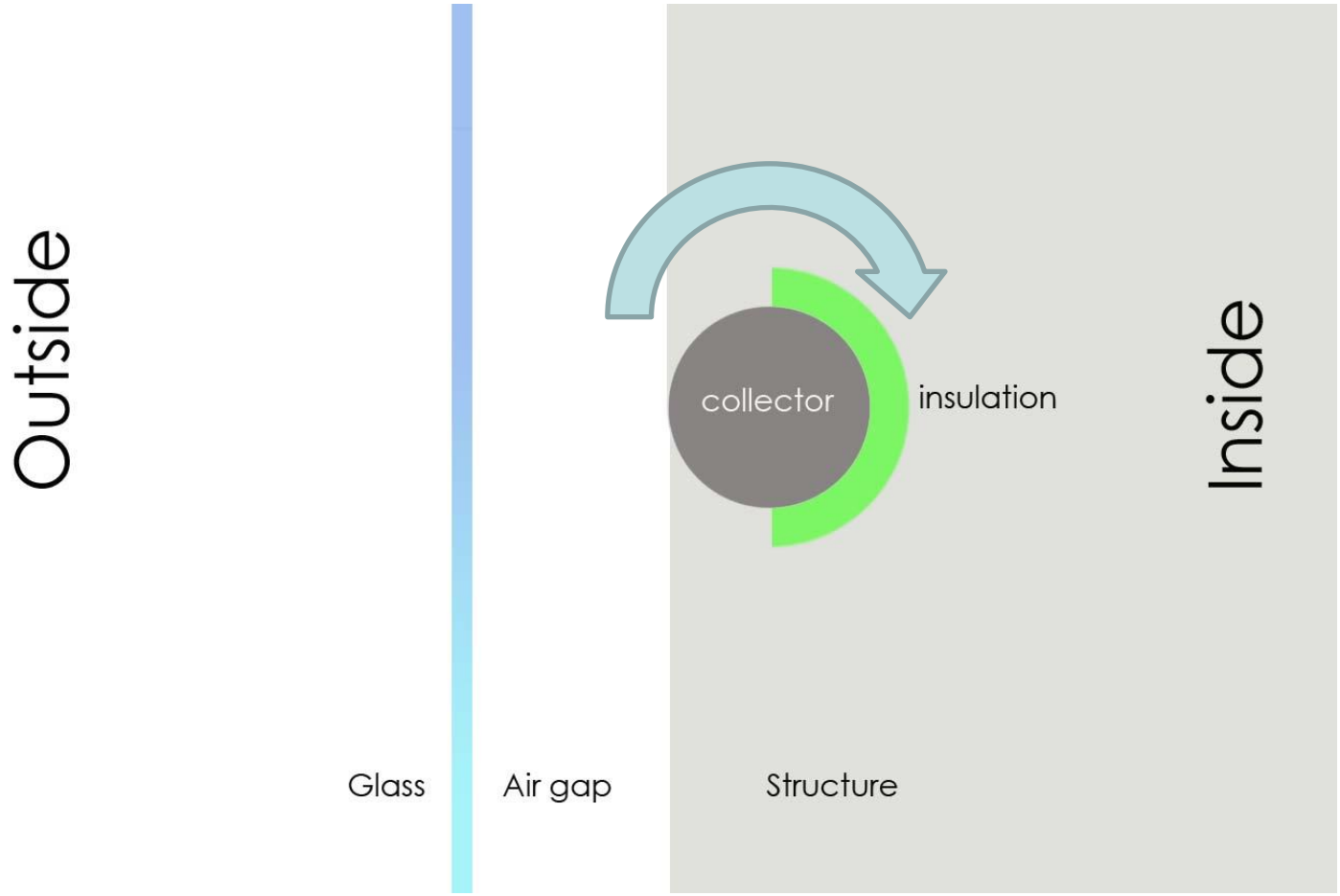
Nature is the most efficient collector of energy: A simple flower opens and closes with the sun to collect energy. So why can't buildings do the same?

By simple rotation of the solar.FIN insulation collectors are either exposed to the sun as required to gain heat. To cool the building at night again the insulation can be opened so that the collector can be cooled by radiating heat to the night sky.

To retain and protect the heat or cold collected the insulation is closed

The secret of the system is that the insulation always retains its integrity, overcoming all the problems of previous systems.

Furthermore with new patented technology the solar.FIN panels can be connected to the building structure when required either to heat or cool the building, transferring heat or cold to the building mass which is a natural storage medium.

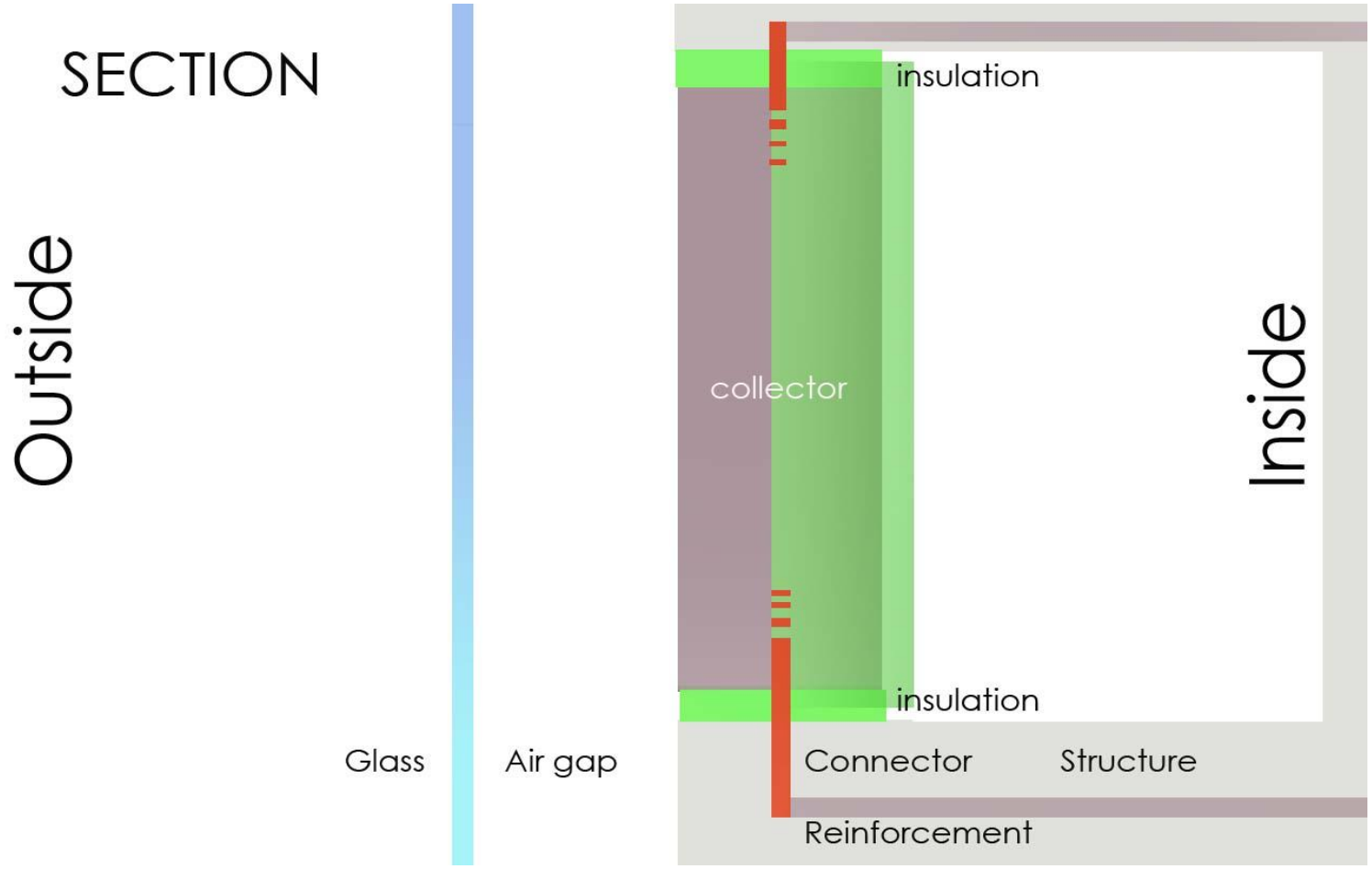


Elements of the Solar.fin system.

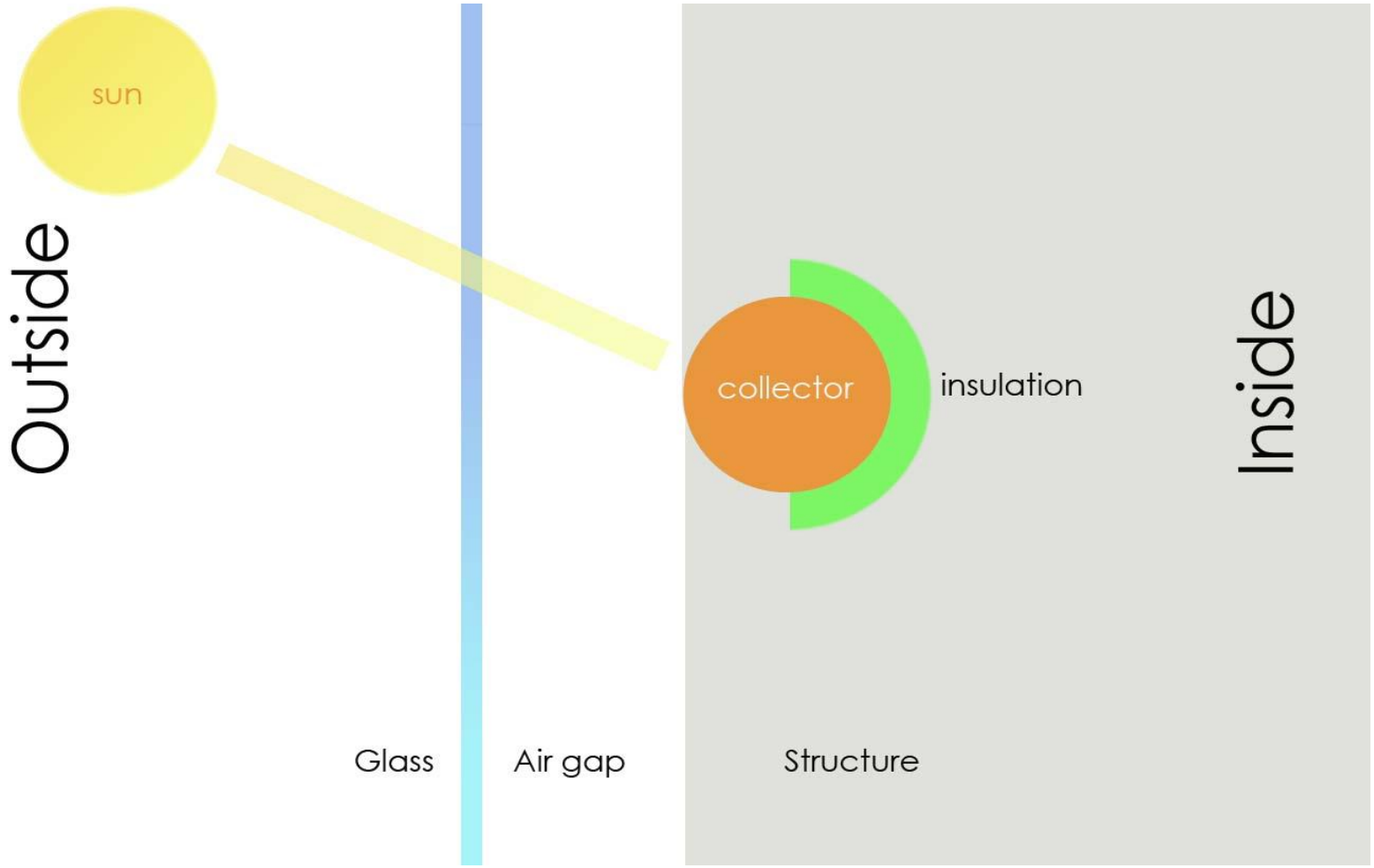
One element only is shown for simplicity.

The key to control of the system is that the insulation (shown in green) can rotate either exposing the collector to the sun or the night sky, or protecting the collector from heat gain or loss.

The insulation gives the user the option to collect or dissipate heat as required.

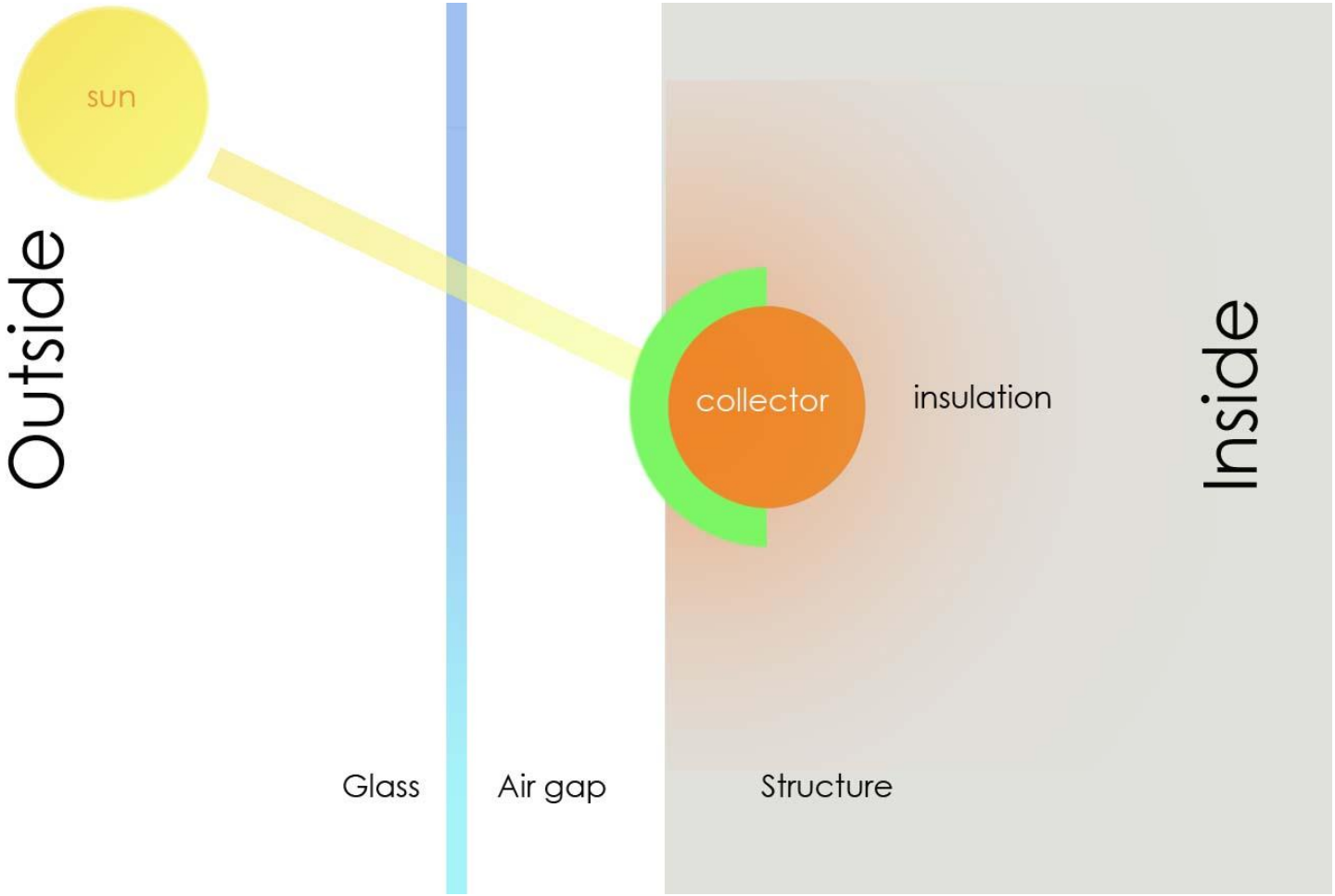


In section, the collector is a heat storage medium insulated from the structure, but can be connected as required to the reinforcing bars to transfer heat or cold to the structure. This is a patented method and overcomes the problem of heat or cold being transferred to the structure when it is not required.



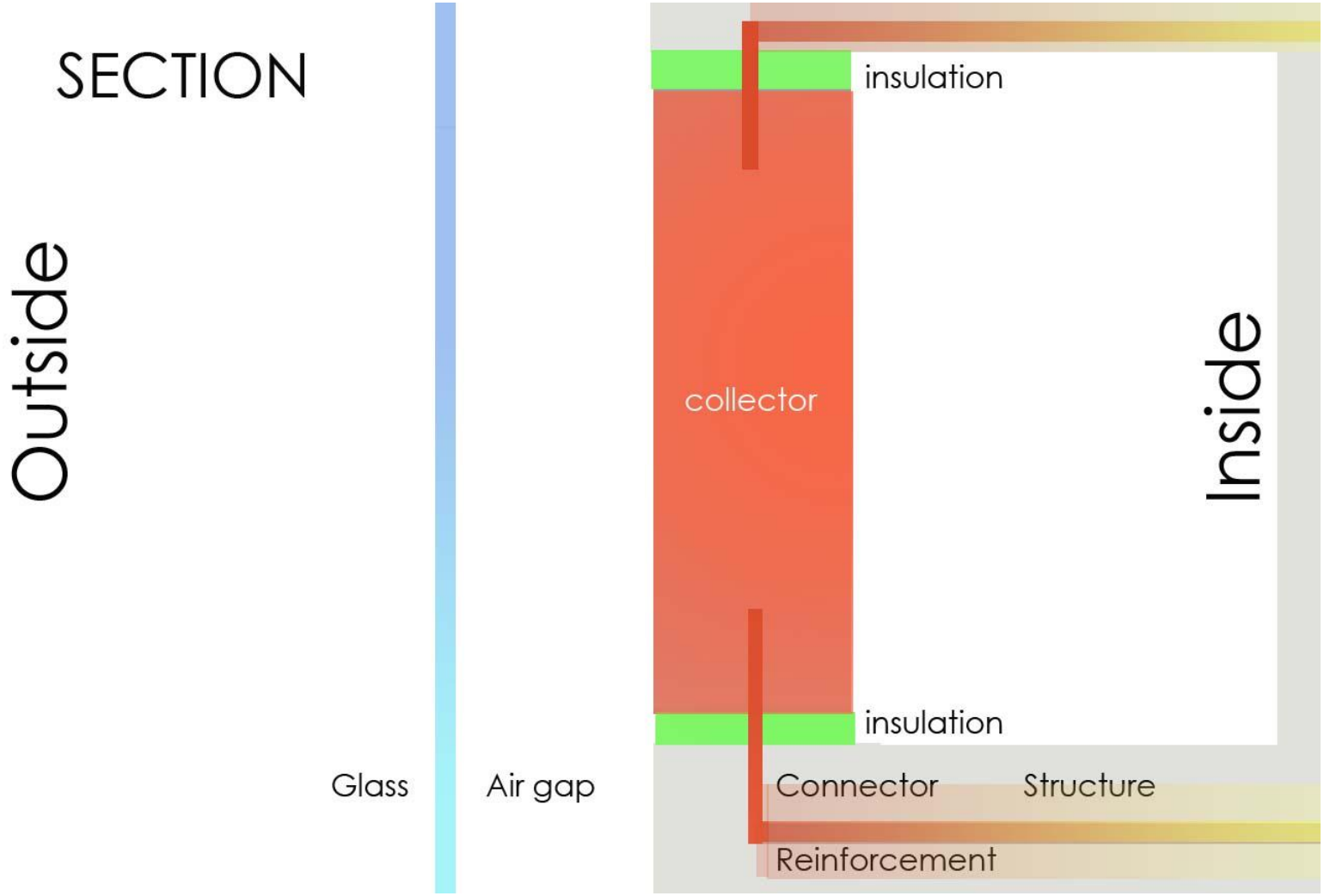
Collection

When the sun shines the solar.fin collector heats up. Importantly the inside of the building is protected from this heat by the insulation which is at the rear of the collector AND between the collector and structure. The air gap also becomes hot because of the green house effect.

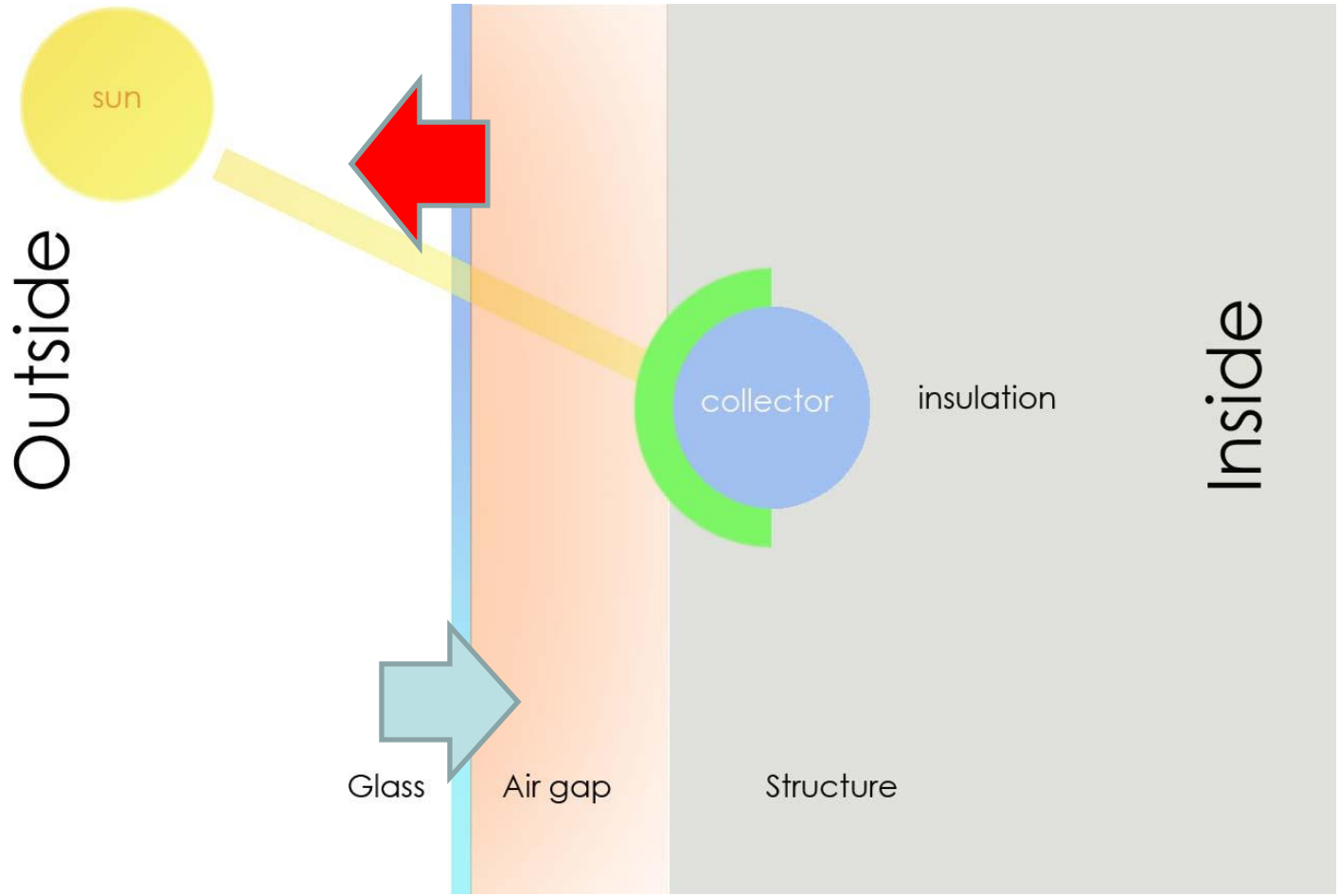


Heating

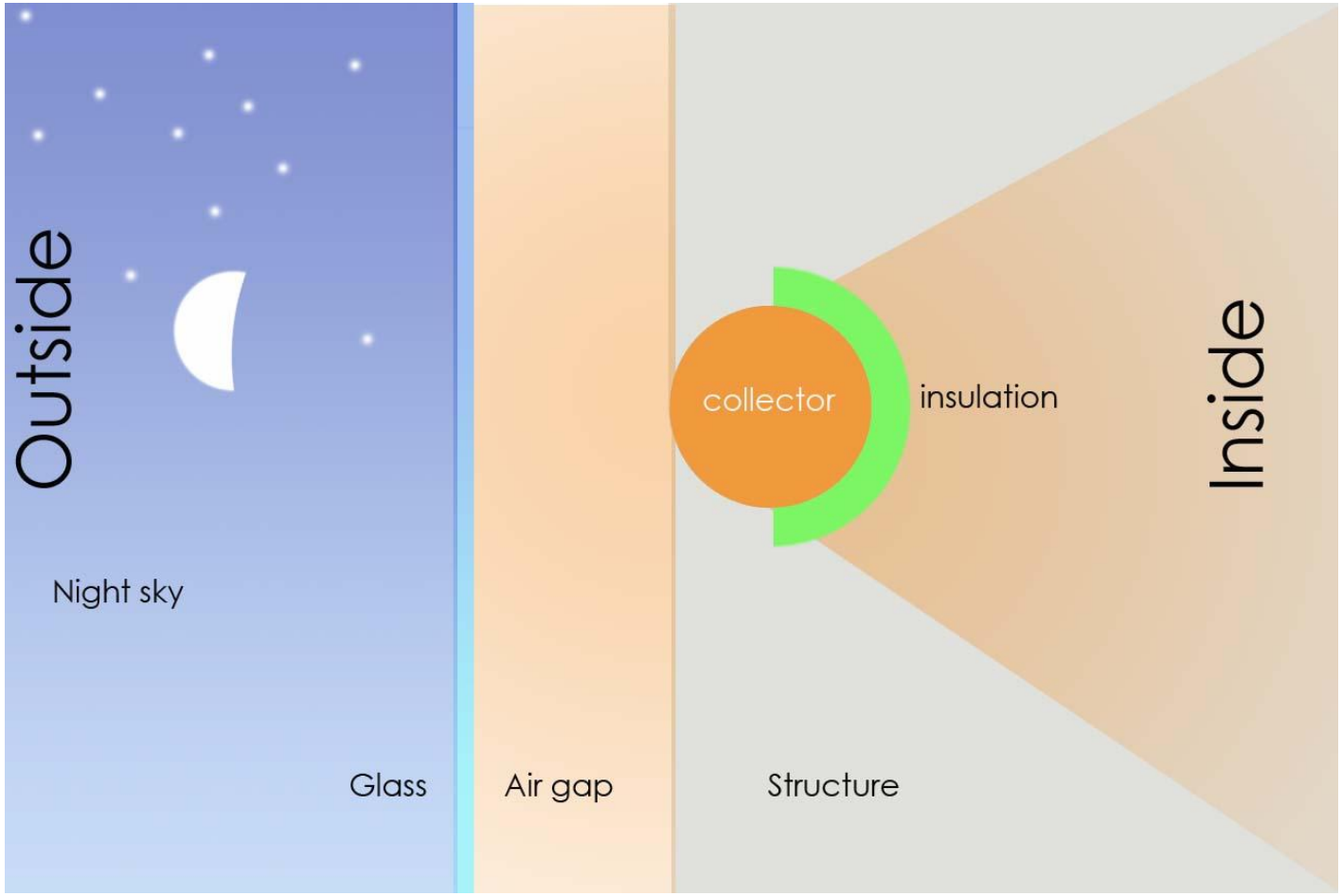
When heat is required in the building the insulation is rotated to protect the collector from outside and to radiate the heat internally. The second invention now is used: a connector physically joins the collector to the reinforcement of the building so that heat is passed into the thermal mass of the structure by conduction.



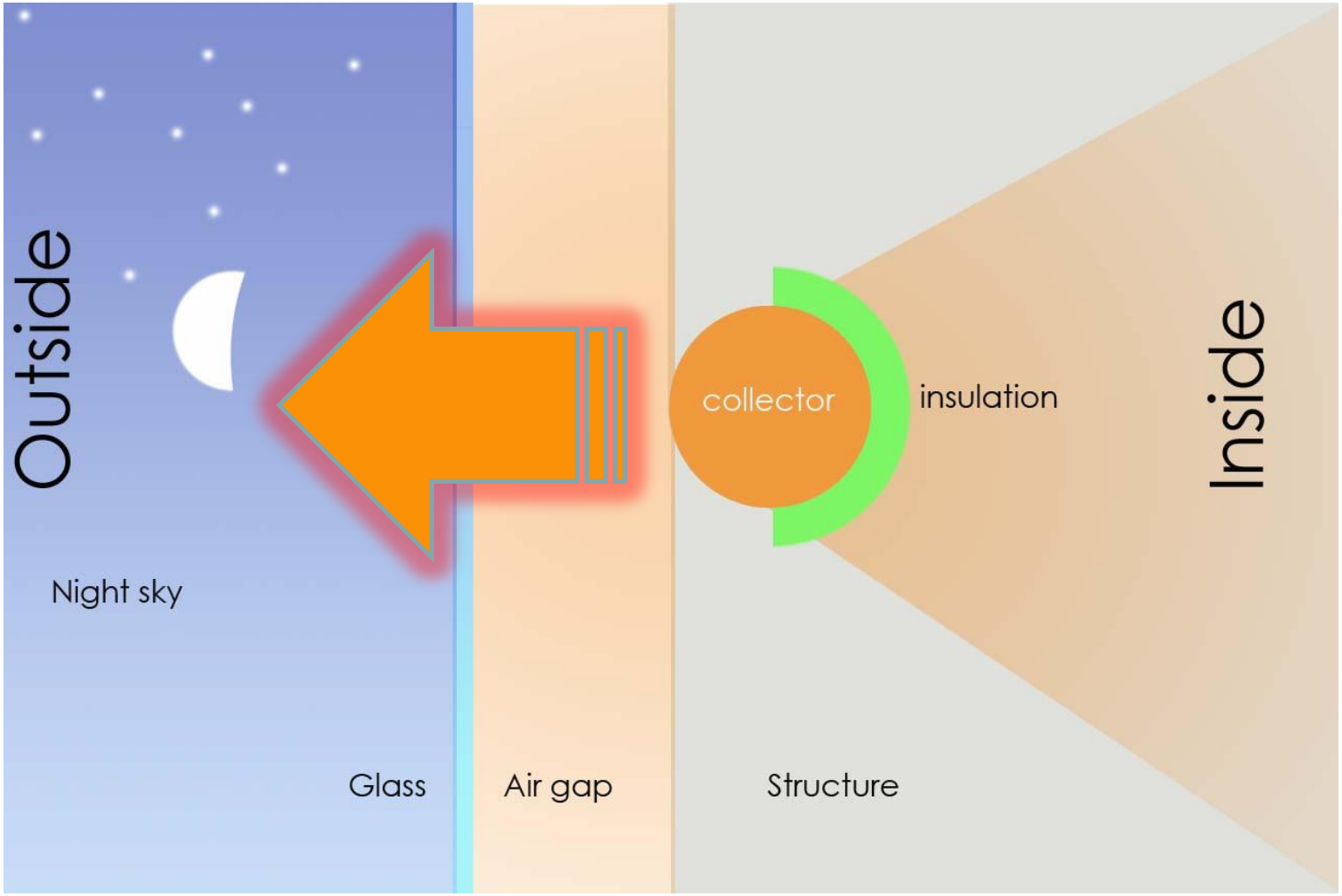
In section the patented solar.fin connector moves to make physical contact between the collector and the steel reinforcement of the slab so that the heat collected is conducted to the general building thermal storage mass



Protection from over heating
During long hot periods the insulation protects the building from overheating.
The air gap can be ventilated expelling (or if required using) air that can be over 80 degrees centigrade. The collector remains cool and can pick up excess heat from the interior or the thermal mass of the structure.

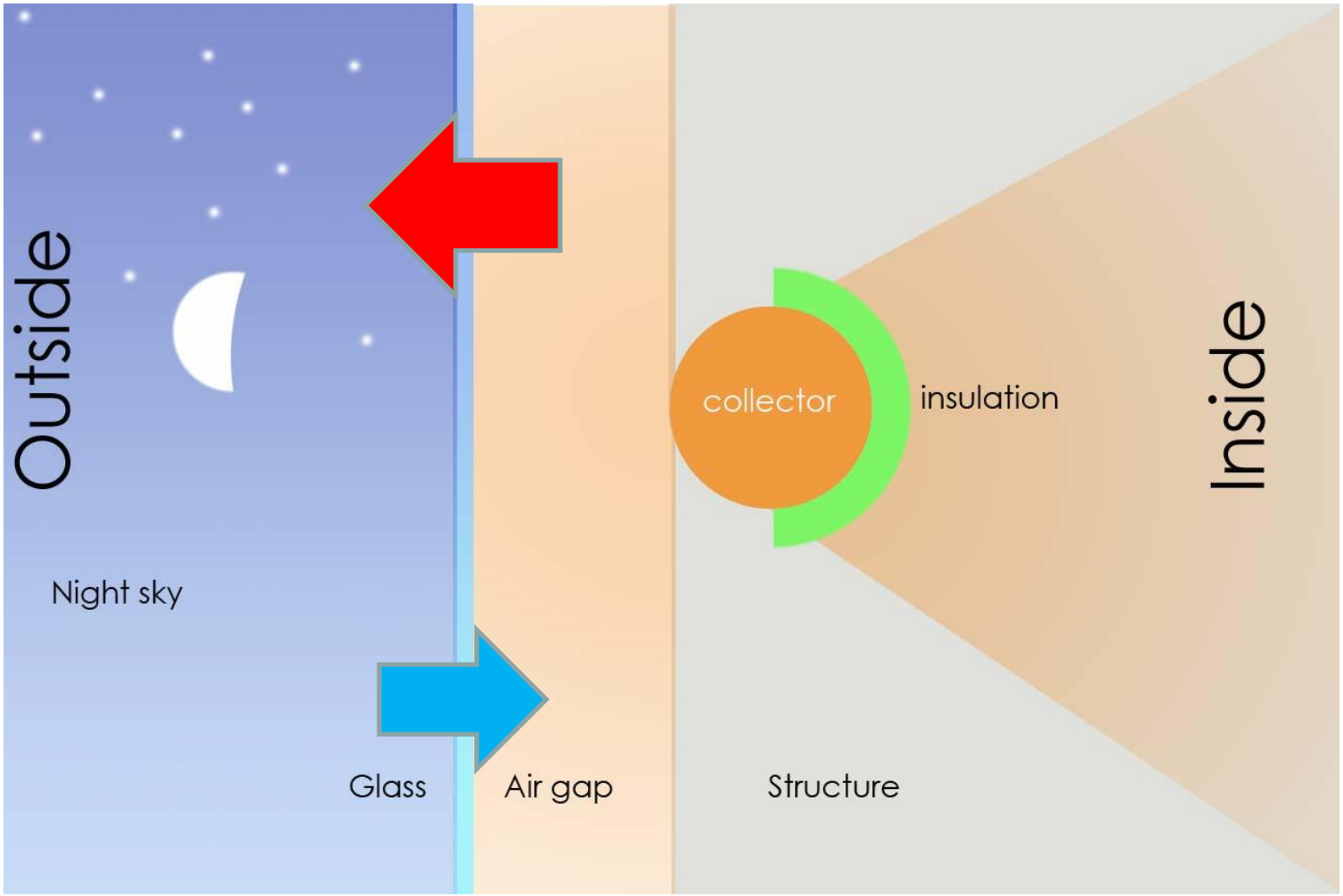


Cooling.
The collector is warm either heated by the interior(lights equipment and people) or purposely takes heat from the structure using the solar.fin connector between the reinforcement and the collector. There are now several ways the collector can dissipate the excess heat.



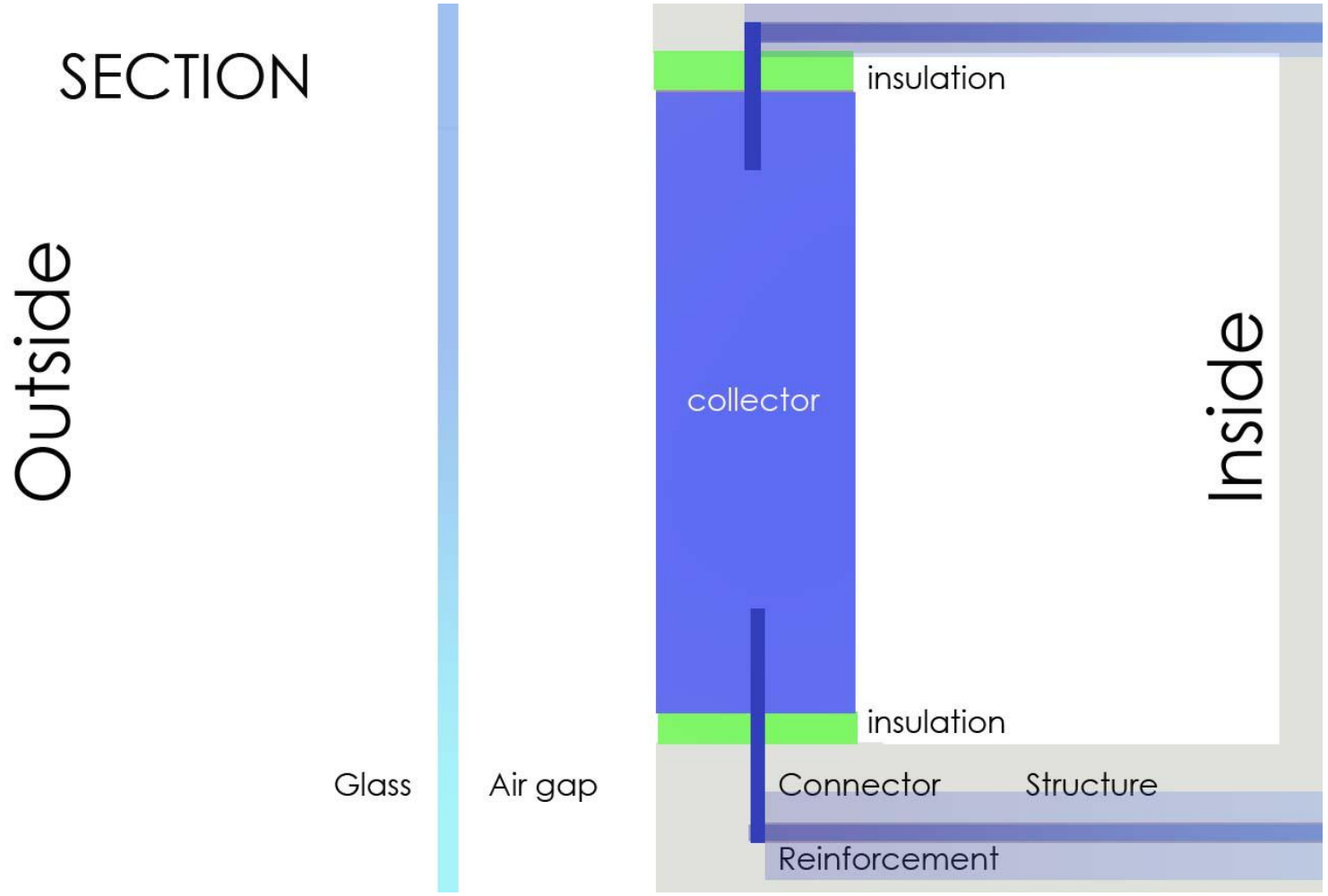
Cooling by radiation

A clear night sky is a perfect receiver of radiant heat. An example of this is in desert conditions where overnight the land can cool to freezing point by the morning despite the very high day time temperatures.

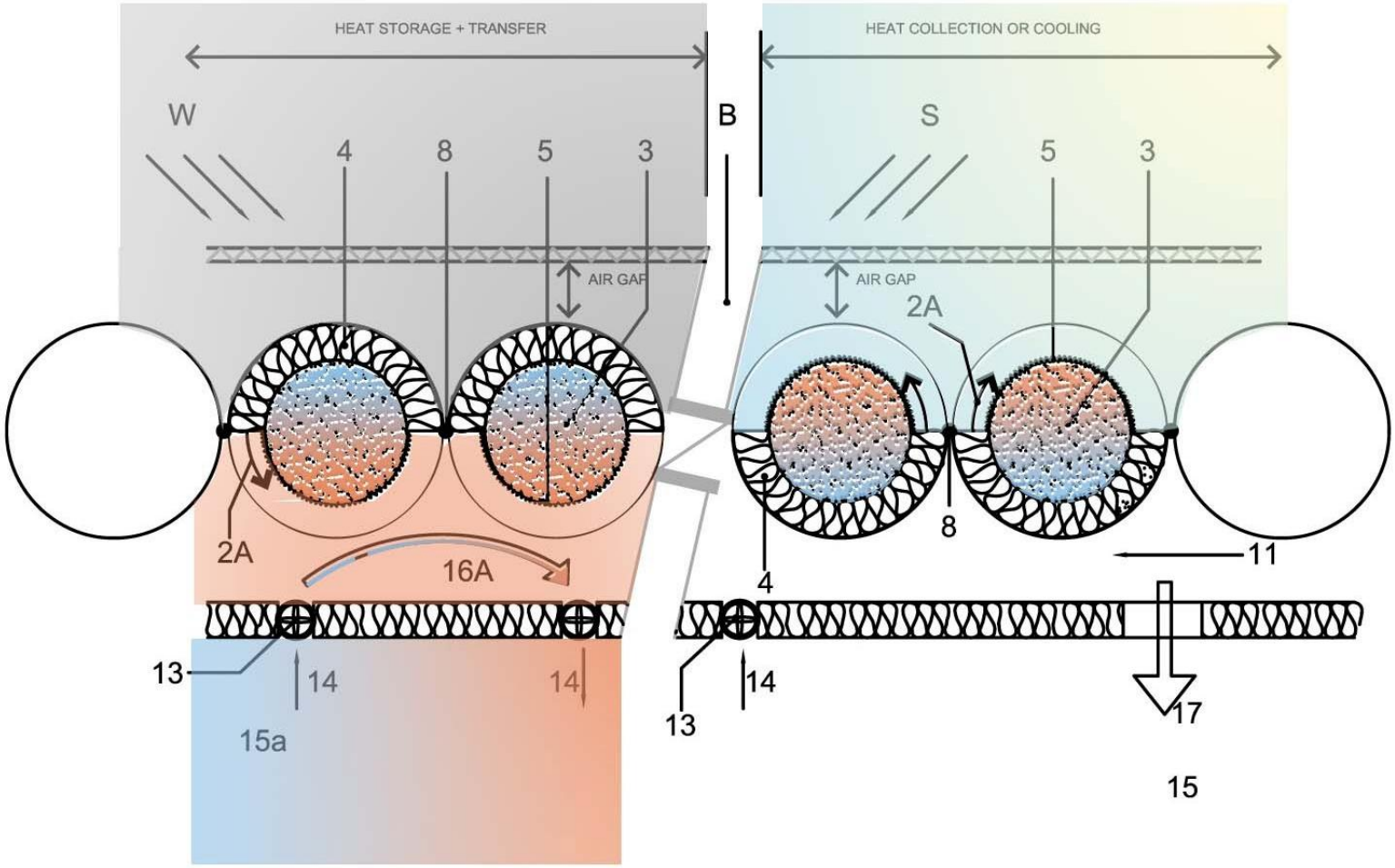


Cooling by ventilation

The air gap can be ventilated by opening louvers in the façade allowing cool air in which is then heated and rises due to the stack effect and can then be expelled outside.

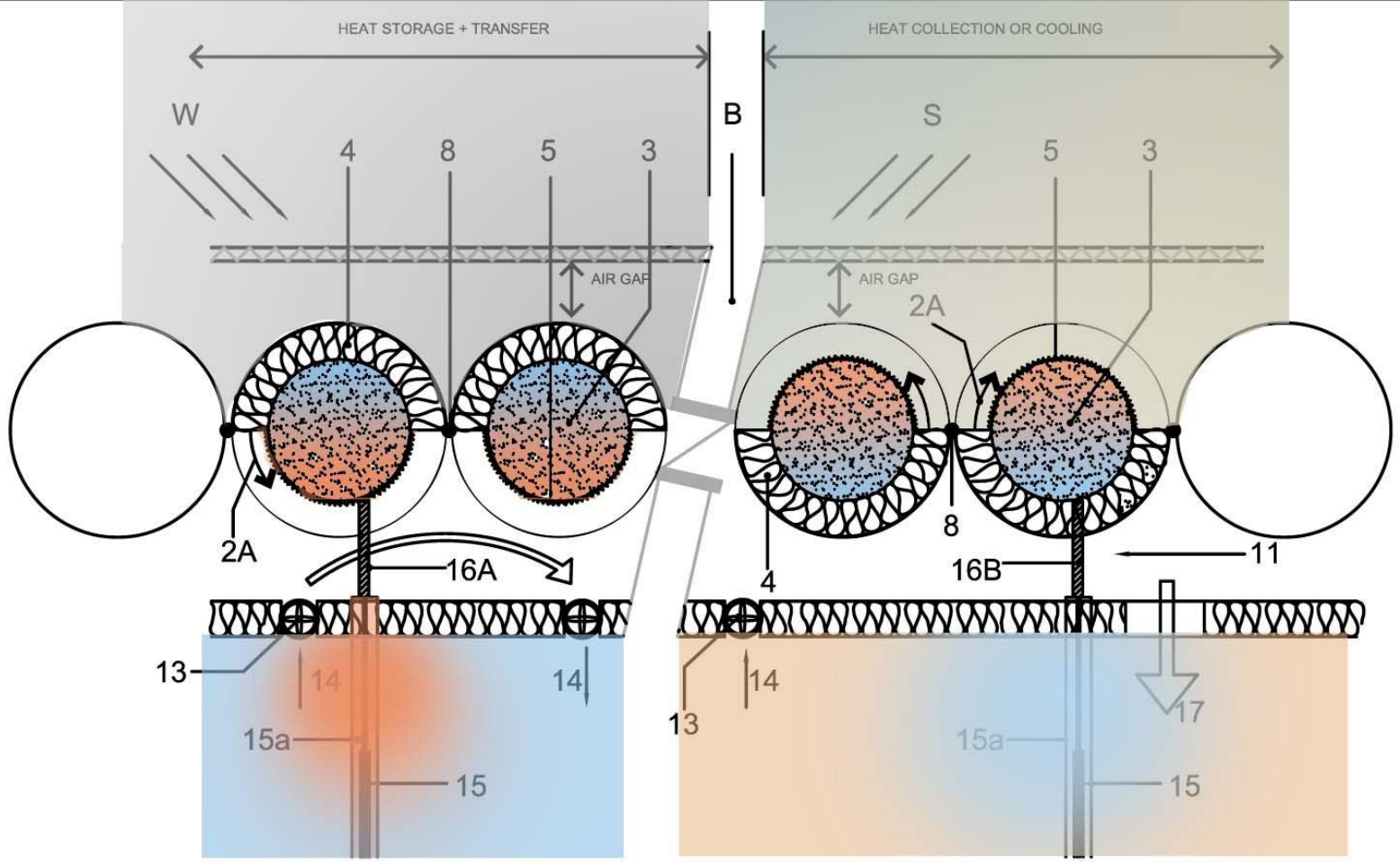


By the morning the collector has been substantially cooled and it can be connected to the reinforcing bars to conduct cool into the thermal mass of the building. Also the collector will radiate cool and reduce air temperatures creating natural air currents.



Patent drawing showing on the left portion heat storage and transfer. The insulation is closed (facing outside) so that the collector is radiating heat inside in a way controlled by an inner insulated wall that can be vented or opened to allow heat to the interior in a controlled way.

The right hand portion shows the insulation open so that the collector is being heated by the sun, but the interior is still well insulated.



Left side shows transfer of heat. The right shows night cooling.

Heat transfer using connectors between the collector and the reinforcing bars of the structure

Summary

From the diagrams it is clear that the patented solar.FIN system is able to collect dissipate and store energy in a simple way with just two moving parts

1. Rotating lightweight insulation
2. A mechanical connection between the collector and reinforcement

• Heat or cold is collected and controlled simply and cost effectively
• Critically the building is always insulated overcoming principle difficulties with other systems where the building either was to hot or absolutely freezing.
• The whole system can be linked to weather data so that the building not only reacts to day to day needs but energy can be stored for future use
• All of the building methods are conventional and inexpensive.
• This makes the payback several years compared with 20+ year payback for solar voltaic cells or windmills.
• Heating and cooling buildings is one of the major energy expenses
• The system can also incorporate all of the existing solar technology.
• The façade can be a super graphic that changes with rotation of the fins with an income that will further reduces payback time.
• Grants of about 20% of the cost of the system are often available

The end result is a comprehensive and cost effective solution for managing the temperature of a building, which if combined with other systems will make a neutral carbon footprint perfectly feasible

The United States of America

The Director of the United States Patent and Trademark Office

Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

United States Patent

Grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America, and if the invention is a process, of the right to exclude others from using, offering for sale or selling throughout the United States of America, or importing into the United States of America, products made by that process, for the term set forth in 35 U.S.C. 154(a)(2) or (c)(1), subject to the payment of maintenance fees as provided by 35 U.S.C. 41(b). See the Maintenance Fee Notice on the inside of the cover.

David J. Kappos

Director of the United States Patent and Trademark Office

US008151788B2

(12) **United States Patent**
Bourne

(10) **Patent No.: US 8,151,788 B2**
(45) **Date of Patent: Apr. 10, 2012**

(54) **WALL OR ROOF OF A BUILDING WITH AT LEAST ONE HEAT CONTROLLING ELEMENT**

(76) Inventor: **Stephen Glyn Bourne**, Hong Kong (CN)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 55 days.

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(51) **Int. Cl.**
F24J 2/34 (2006.01)

(52) **U.S. Cl.** **126/617**; 126/569

(58) **Field of Classification Search** 126/569, 126/617, 618, 702, 400; 52/220.1
See application file for complete search history.

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Primary Examiner — Brian Glessner
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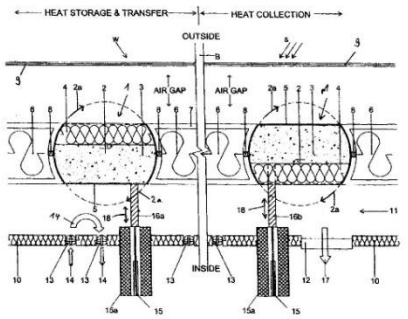
(57) **ABSTRACT**

The invention concerns a wall or roof of a building, wherein at least one heat controlling element for controlling a temperature in the building is arranged in the wall or the roof to form a segment of the wall or roof, the heat controlling element comprising at least a first section and a second section, the first section comprising a heat collecting and storing material and the second section comprising a heat insulating material, wherein the heat controlling element may adopt a first configuration, in which the first section is directed towards the outside of the building and the second section is directed towards the inside of the building, and a second configuration, in which the second section is directed towards the outside of the building and the first section is directed towards the inside of the building.

25 Claims, 2 Drawing Sheets



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申请人或专利权人：斯蒂芬·格林·伯恩

发明创造名称：具有至少一个热控制元件的建筑物的墙壁或屋顶

办理登记手续通知书

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Letter confirming that the patent is granted in China

审查员：姚燕　　审查部门：专利局初审及流程管理部

联系电话：62356655

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纸件申请，回函请寄：100088 北京市海淀区蓟门桥西土城路6号　国家知识产权局专利局受理处收　收

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Date
25.04.13

Reference	Application / Patent No.
52299-27	08860634.8 - 1605 / 2232162

Applicant/Proprietor
Bourne, Stephen Glyn

Decision to grant a European patent pursuant to Article 97(1) EPC

Following examination of European patent application No. 08860634.8 a European patent with the title and the supporting documents indicated in the communication pursuant to Rule 71(3) EPC dated 06.12.12 is hereby granted in respect of the designated Contracting States.

Patent No. : 2232162
Date of filing : 10.12.08
Priority claimed : 10.12.07/EPA 07023874

Designated Contracting States and Proprietor(s) : AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
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This decision will take effect on the date on which the European Patent Bulletin mentions the grant (Art. 97(5) EPC).

The mention of the grant will be published in European Patent Bulletin 13/21 of 22.05.13.

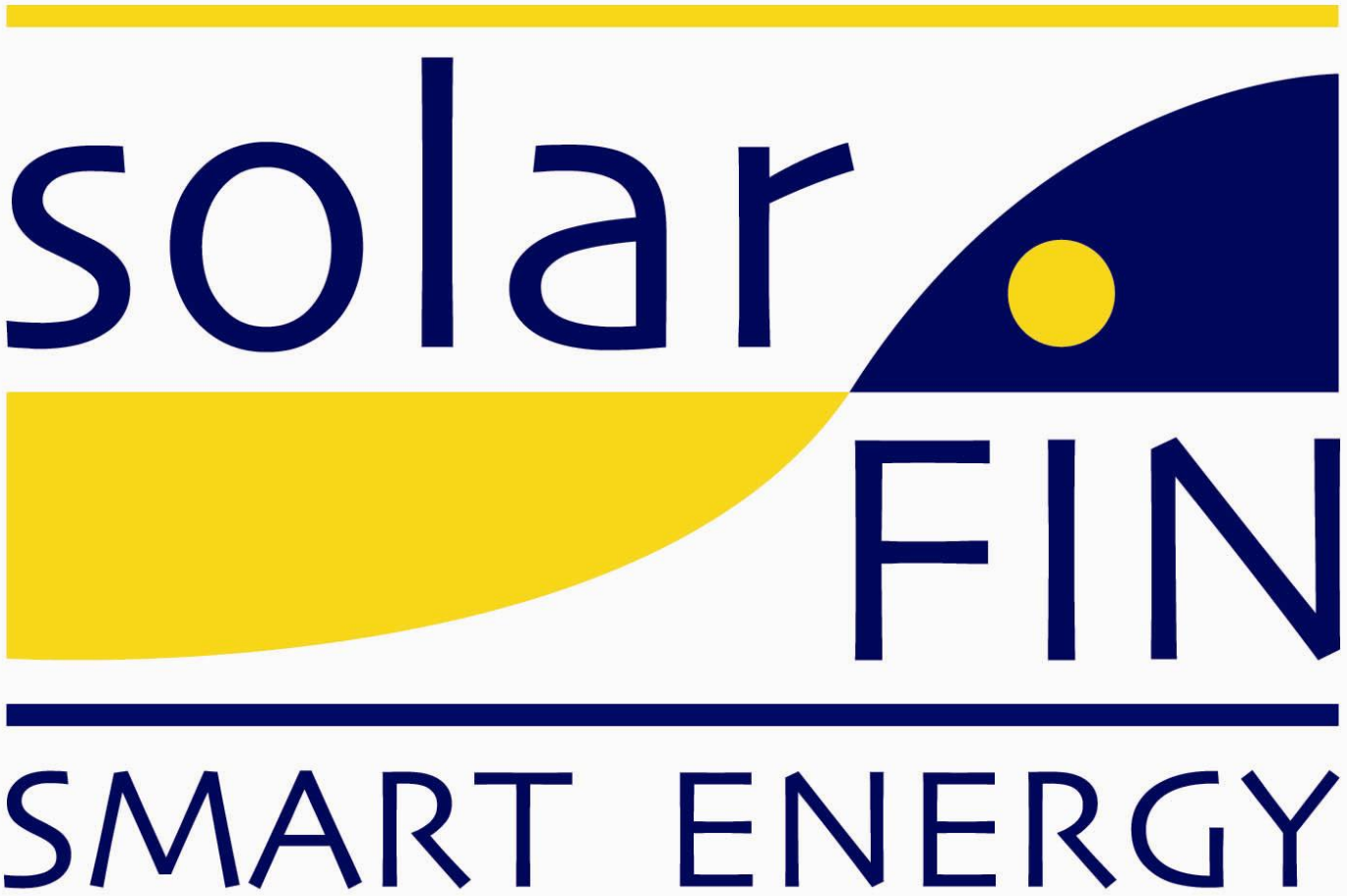
Examining Division

Mootz F　　Beltzung F　　Van Dooren M

Confirming European patent now granted in the France Germany UK and Spain

Registered letter
EPO Form 2006A 12.07 (190418)

to EPO postal service: 19.04.13



Solar-Fin is a registered company name internationally