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(54) **Thermal isolation module for constructions under pressure**

(57) Heat insulation module (1) for structures subjected to compressive stresses according to the invention consists of a frame (2), within which a load-bearing latticed structure (3) is arranged, the gaps (4) between the partitions of the module being filled with a heat-insulating

material (5), the load-bearing latticed structure (3) being affixed to a foundation plate (6) and covered by a topping panel (7), all the components of the module being made of a fibreglass composite material.

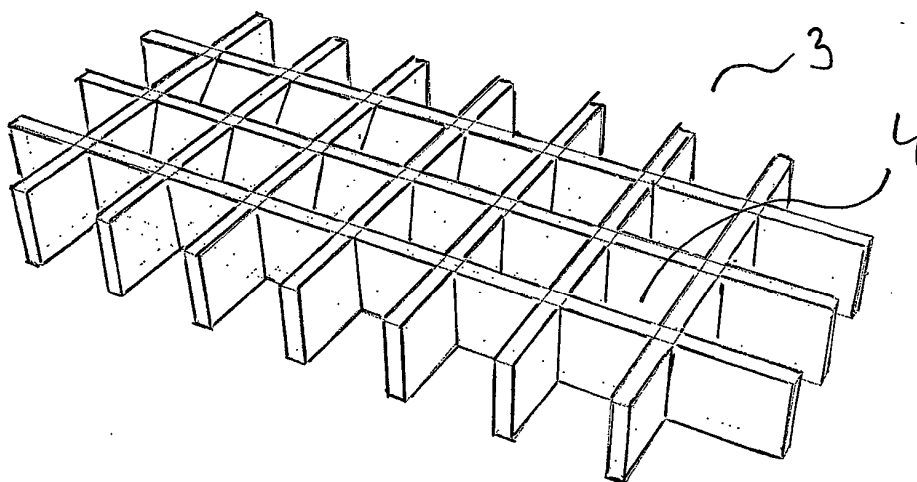


Fig.2

Description

Field of the invention

[0001] The invention relates to a heat insulation module for structures subjected to compressive stresses, the heat insulation effect of the module consisting in interrupting the thermal bridge after attaching a wall structure to a foundation element.

Background of the invention

[0002] At the present, different solutions offered by various manufacturers are used. In most cases, however, the problem remains unsolved or is worked around by means of external thermal barriers or the like.

[0003] The document CS 154786 B1 discloses a cellular insulating building element which comprises expanded ceramicsite or flue-ash grains bonded together with a hard, foamed polyurethane resin, wherein the resin primarily consists of polyol, such as butanediol, and further of toluene-diisocyanate, trifluoro-chlorethylene and dimethylaniline.

[0004] The document CS 193680 B1 discloses an insulating building element utilizing waste inorganic by-products from chemical glass polishing, from leaching of manganese raw materials with sulphur acid and the like. The insulating building element comprises calcium sulphate originating from industrial wastes, defibered asbestos and hydrating binders.

[0005] Besides that, the document CS 233065 discloses a cellular planar insulating element consisting primarily of expanded perlite with a fibrous component, a polymeric dispersion and a hydrophobic agent.

[0006] There are also foam glass panels which, however, are too brittle. Furthermore, the document EP 1918471 B1 presents a panel made of a recycled plastic material based on HDPE. The main drawbacks of the known solutions consist in their poor fire resistant properties and, in many cases, in the use of unsuitable materials. In the course of time, such materials were found to be harmful for the human body.

[0007] The document EP 1 231 329 describes a load-bearing hydrophobic heat-insulating element which consists from a supporting concrete structure having internal longitudinal cavities filled with polystyrene. The basic module, which comprises peripheral walls, a concrete partition wall and two cavities to be filled with polystyrene, may be multiplied along the length of the element, thus enabling relatively long elements to be prefabricated.

[0008] The document DE 199 42 965 describes another load-bearing hydrophobic heat-insulating element which consists from a supporting concrete structure having internal cavities filled with polystyrene. The cavities assume various shapes, which are typically composed of one pentagon and two smaller squares arranged opposite the former, such geometric pattern being repeated with alternating opposite arrangements of the pentagon

and the squares.

[0009] The document CH 689 022 describes another load-bearing hydrophobic heat-insulating element which consists from a supporting concrete structure having internal cavities filled with polystyrene. The cavities are formed by the openings which are arranged crosswise and interconnected by means of small channels, the interconnected cross-like elements being deployed in several series. One series is adjoined the other one, the opening of the latter being offset so that all the openings are generally evenly distributed in the overall area.

[0010] The document DE 200 08 570 U1 describes a load-bearing hydrophobic heat-insulating element which consists from a supporting concrete structure having internal longitudinal cavities filled with polystyrene, the supporting concrete structure being furthermore provided with an anchor tip which is embedded under the top face of the element and protrudes into the layer of bricks disposed above the same.

[0011] The document DE 295 02 704 U1 discloses a technical solution wherein concrete tubes are disposed between two concrete panels and separated by polystyrene layers. In addition, there is a bituminous bonding layer between the tubes and the panel.

[0012] It is the object of the invention to present a heat insulation module for structures subjected to compressive loads, which module would be made of a lightweight, yet high-strength material and provide optimum heat-insulating structural properties.

Summary of the invention

[0013] The above drawbacks are largely eliminated by the heat insulation module for structures subjected to compressive stresses according to the invention, wherein the module consists of a frame, within which a load-bearing latticed structure is arranged, the gaps between the partitions of the module being filled with a heat-insulating material, the load-bearing latticed structure being affixed to a foundation plate and covered by a topping panel, all the components of the module being made of a fibreglass composite material.

[0014] In a preferred embodiment, the load-bearing latticed structure is composed of an array of hollow prisms.

[0015] In another preferred embodiment, the load-bearing latticed structure is composed of an array of hollow cylinders.

[0016] In yet another preferred embodiment, the array of hollow prisms or cylinders is arranged in four regularly spaced rows, each row comprising two elements, and the heat-insulating material is disposed both around and inside the elements.

Brief description of the drawings

[0017] The invention will be further explained with reference to the accompanying drawings, wherein Fig. 1 shows the first embodiment of the heat-insulating module

containing the inner load-bearing latticed structure according to the invention, Fig. 2 shows the load-bearing latticed structure without the frame in a detail view, Fig. 3 shows the second embodiment of the heat-insulating module having the inner structural bodies shaped as hollow prisms, the module being shown in an assembled state, and Fig. 4 shows the third embodiment of the heat-insulating module having the inner structural bodies shaped as hollow cylinders, the module being also shown in an assembled state.

Preferred embodiment of the invention

[0018] Fig. 1 shows the heat-insulating module 1 for structures subjected to compressive stresses, the module being depicted in an assembled state. It is apparent that the heat-insulating wall module 1 consists of the frame 2 within which the load-bearing latticed structure 3 is arranged.

[0019] The details of the latter are shown, including the gaps, in Fig. 2.

[0020] The gaps 4 formed between the partitions of the structure are filled with the heat-insulating material 5 (schematically indicated). The load-bearing latticed structure 3 is affixed to a lower foundation plate and covered by the upper topping panel 7.

[0021] With reference to the embodiment presented in Fig. 3, the load-bearing latticed structure 3 is formed by the hollow prisms 3a. In the embodiment shown in Fig. 3, the same is formed by the hollow cylinders 3b. The bodies 3a and 3b are affixed to the lower foundation plate 6 and covered by the upper topping panel 7 (schematically indicated).

[0022] In a preferred embodiment, the load-bearing elements 3a and 3b are arranged in two rows, each row comprising four load-bearing elements 3a and 3b. Thus, the structure comprises eight bodies in total. Such a configuration provides optimum strength and load-carrying capacity. The heat-insulating material is disposed both around and inside the elements.

[0023] All the above structural components are made of a fibreglass composite material and bonded together by means of gluing. The advantages of such a fibreglass composite material include both high compressive strength and high bending strength.

[0024] The heat-insulating filler material is a compact thermal barrier composed of mineral substances, such as that marketed by the manufacturing companies Orsil or Rockwool. Filler materials like that are well known to those skilled in the art. During the fabrication, the above described compact panel-like mass is provided with the opening having the shape of the load-bearing bodies 3. Subsequently, the final perforated panel is embedded into the frame.

[0025] The entire frame has 50 cm in length, 30 cm in width and 25 mm in height. The mesh size is 50 x 50 mm. The cylindrical load-bearing bodies 3 have 50 mm in diameter. When prismatic elements 3a are formed, the size

of the lateral edges of such elements, e.g. square ones, may be also 50 mm.

[0026] The heat insulation effect of the module according to the invention consists in interrupting the thermal bridge after attaching a wall structure to a foundation element. This heat-insulating wall module forms an element for carrying compressive loads, as well.

[0027] Owing to its constructional arrangement and material composition, the heat-insulating module according to the invention is capable of carrying the entire compressive load the building structures are subjected to.

[0028] The heat-insulating module can be modified and adapted according to the dimensions of the particular building cladding. The behaviour of the entire element and the way the same influences its surroundings are primarily given by the number and size of the constituent elements used and by their material characteristics.

[0029] The overall structure in encapsulated in a heat-insulating covering and protected by means of special fire-resistant materials.

[0030] Thus, the reduction of the heat flow achieved by means of the above element is significant. Due to the desired fire-resistant properties, the compositions of the building claddings used must provide the highest possible level of protection of the above element from fire loads.

Claims

1. Heat insulation module for structures subjected to compressive stresses, **characterized in that** the module consists of a frame (2), within which a load-bearing latticed structure (3) is arranged, the gaps (4) between the partitions of the module being filled with a heat-insulating material (5), the load-bearing latticed structure (3) being affixed to a foundation plate (6) and covered by a topping panel (7), all the components of the module being made of a fibre-glass composite material.
2. Heat insulation module according to claim 1, **characterized in that** the load-bearing latticed structure (3) is composed of an array of hollow prisms (3a).
3. Heat insulation module according to claim 1, **characterized in that** the load-bearing latticed structure (3) is composed of an array of hollow cylinders (3b).
4. Heat insulation module according to claim 2 or 3, **characterized in that** the array of hollow prisms (3a) or cylinders (3b) is arranged in four regularly spaced rows, each row comprising two elements (3a, 3b), and the heat-insulating material (5) is disposed both around and inside the elements (3a, 3b).

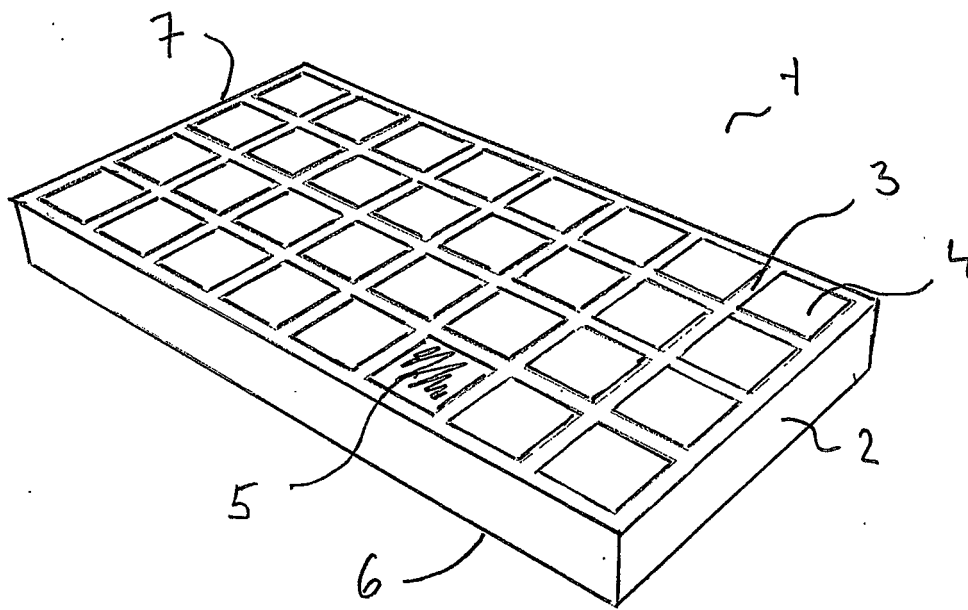


Fig.1

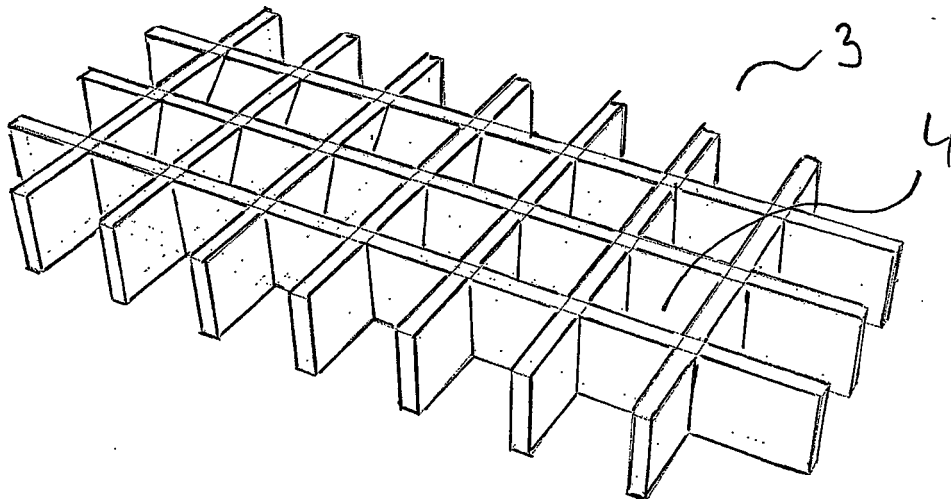


Fig.2

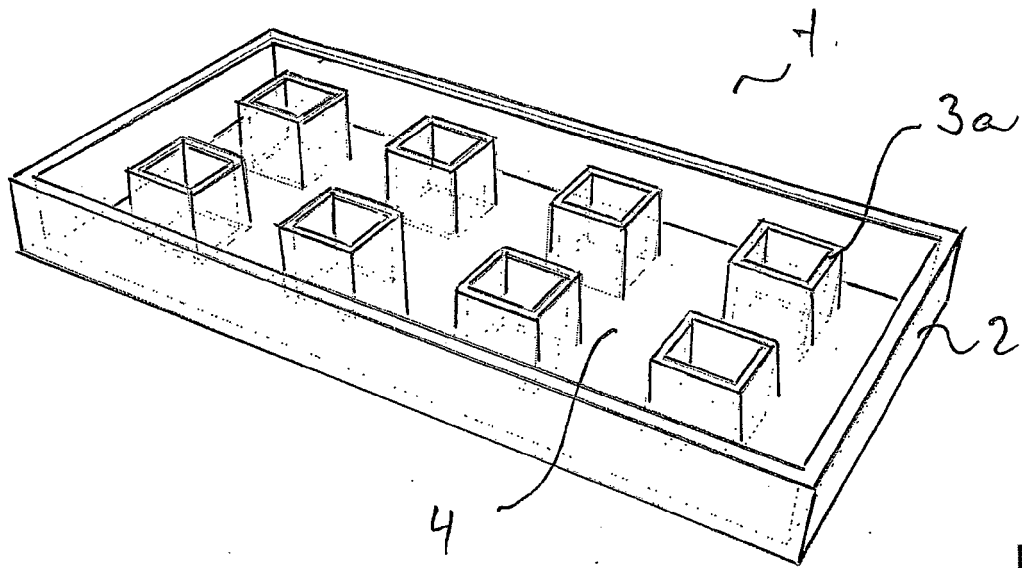


Fig.3

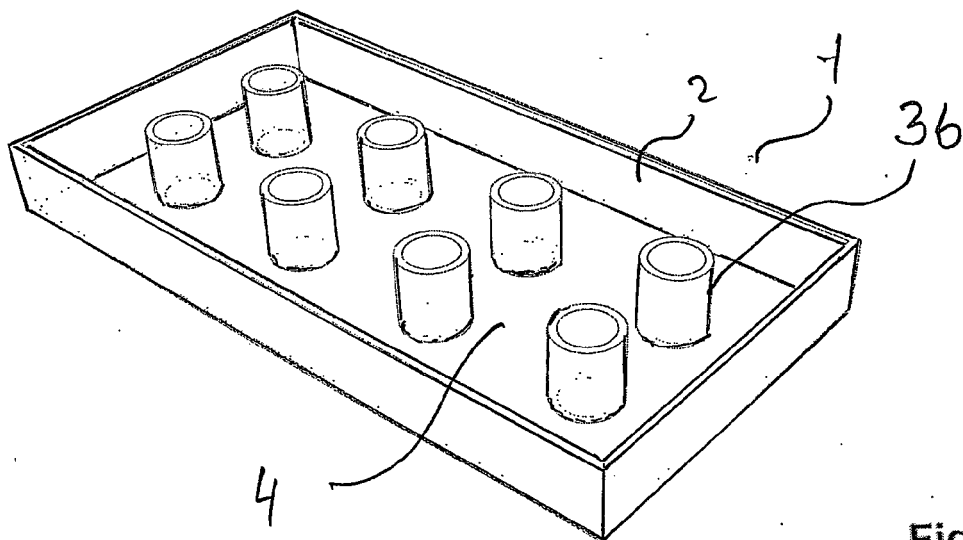


Fig.4



EUROPEAN SEARCH REPORT

Application Number
EP 13 46 6021

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	DE 295 02 704 U1 (FRANK GMBH & CO KG MAX [DE]) 14 June 1995 (1995-06-14) * the whole document * -----	1-4	INV. E04C1/41 E04B1/76
			TECHNICAL FIELDS SEARCHED (IPC)
			E04B E04C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 14 February 2014	Examiner Delzor, François
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 13 46 6021

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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14-02-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 29502704 U1	14-06-1995	DE 29502704 U1	14-06-1995
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EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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- CS 193680 B1 **[0004]**
- CS 233065 **[0005]**
- EP 1918471 B1 **[0006]**
- EP 1231329 A **[0007]**
- DE 19942965 **[0008]**
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