



EUROPEAN PATENT APPLICATION

(43) Date of publication:
14.09.2022 Bulletin 2022/37

(21) Application number: **22460014.8**

(22) Date of filing: **10.03.2022**

(51) International Patent Classification (IPC):
E04C 1/41 (2006.01) E04C 1/39 (2006.01)
E04B 2/18 (2006.01) E04B 2/24 (2006.01)
E04B 2/20 (2006.01) E04B 2/02 (2006.01)

(52) Cooperative Patent Classification (CPC):
E04C 1/41; E04B 2/18; E04C 1/392; E04C 1/397;
E04B 2002/0247

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **10.03.2021 PL 43725821**

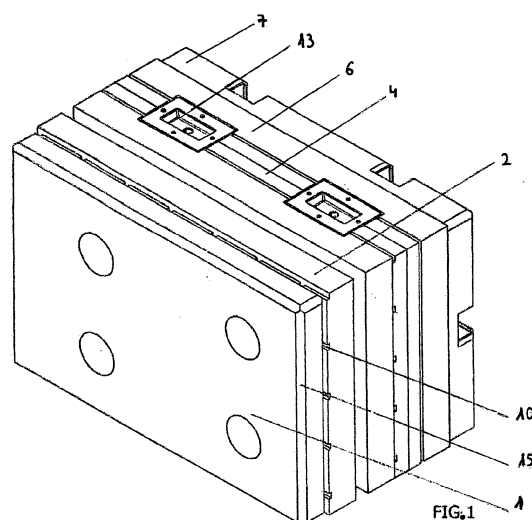
(71) Applicant: **Gwózdź, Grzegorz**
41-943 Piekary Śląskie (PL)

(72) Inventor: **Gwózdź, Grzegorz**
41-943 Piekary Śląskie (PL)

(74) Representative: **Bogacki, Grzegorz**
Kancelaria Patentowa "PATENTINVENT",
Ul. Andrzeja 10/1/4
40-061 Katowice (PL)

(54) **MULTILAYER BUILDING BLOCK**

(57) A multilayer building block in form of rectangular prism equipped with insulating and structural elements placed within its volume, wherein the first layer /1/ in form of flat rectangular prism makes a layer of cellular concrete, and the second layer /2/ in form of flat rectangular prism is a layer of thermal insulation. The third layer /3/ in form of flat rectangular prism is a layer of cellular concrete whereas the fourth layer /4/ in form of flat rectangular prism is a layer of thermal insulation with the metallic load-bearing structure /5/ placed inside its volume. The fifth layer /6/ in form of flat rectangular prism is a layer of cellular concrete and the sixth layer /7/ in form of flat rectangular prism is a layer of cellular concrete provided with the installation guides /8/ in form of framework. The third layer /3/, the fourth layer /4/ and the fifth layer /6/ are offset advantageously upwards and to one side in relation to the remaining block layers, and through all layers protrude at least two horizontally arranged structural elements /9/ fastening the block as a whole unit. The metallic load-bearing structure /5/ consists of at least two vertical elements /11/ held together by means of at least one lateral element /12/, whereby the vertical elements /11/ are provided with internal gaps /13/ to accommodate an advantageous screw joint of the blocks. The building block is provided with the chamfers /14/ enabling injection of the insulating compound, and the first layer /1/ and the last layer /7/ are equipped with the skew edges /15/ to place the external and internal sealing joints.



Description

[0001] The objective of the present invention is to provide a multilayer building block conceived as a primary element for construction of the building walls.

[0002] There are known the building blocks, for example in shape of rectangular hollow bricks with air gaps within their volume, or solid small blocks featuring an improved insulating power or containing the inserts made of insulating materials. The air gaps in such building blocks or insulating elements are arranged most often inside the block in the parallel rows or layers.

[0003] It is known by way of example a block for construction of the buildings disclosed in US Patent Application no. 2008/0184650, wherein it comprises the body formed of the inorganic material, having a rectangular shape, containing the non-linear heat tracks in the body material running crosswise the block and at least two cavities to accommodate the insulation material and reinforcing rod.

[0004] It is known an embodiment shown in the US Patent description no. 7739845, wherein an insulated rectangular structural block comprises the first segment made of cement material, containing an internal hole of the block core and is connected with the second cement segment by means of the insulating insert having a shape of serpentine. The insulating insert is provided with the projections matching the projections in the segments and is equipped with the grooves enabling the condensation and seepage of water to the outlet from the block.

[0005] Another solution known from the US Patent description no. 9435118 relates to the system of blocks used for construction of the walls comprising many of rectangular structural blocks, whereby each block contains an internal rectangular vertical rib. The block contains also a middle section placed between the lateral walls in relation to their abutment. Furthermore, the middle section has one or two diagonally arranged rectangular vertical passages crossing the middle section at an angle of about 30° to 45°, advantageously at an angle of 38°. The middle section contains also one of three vertically extending recesses corresponding to the vertical ribs on each side. The central part and the pair of lateral walls comprises up to four rectangular vertical passages for the utility pipes and/or electrical conductors.

[0006] From the European Patent description EP 0209993 it is known then a heat insulating masonry block, composed of at least two structural blocks between which is placed at least one board made of insulating material, whereby the blocks are interconnected by means of at least one strip. The structural blocks and the insulating board are provided with at least one transition cavity to let the connecting strip through. The heat insulating masonry block has the recesses for the strips prepared in the insulating board and in the blocks. The board itself is carried out of one integral unit, and in one of possible modifications is composed of more layers, each layer indicating the same or different insulating properties.

[0007] The presented types of building blocks do not solve completely the problems of thermal insulation, prevention of carrying away of moisture from the block elements, as well as easy and fast assembly thereof in form of the walls.

[0008] To avoid the shortcomings of the hitherto existing solutions a building block in accordance with the present invention has been worked out. The subject of this invention relates to the building block in form of rectangular prism comprising several layers, comprising the insulating layers and structural elements within its volume.

[0009] The essence of the invention consists in that the building block shaped like a rectangular prism is composed of several layers and includes the insulating and structural elements placed within its volume and is characterized by that the first layer in form of flat rectangular prism constitutes a layer of cellular concrete and the second layer in form of flat rectangular prism is a layer of thermal insulation. The third layer in form of flat rectangular prism constitutes a layer of cellular concrete whereas the fourth layer shaped like a flat rectangular prism is a layer of thermal insulation with a metallic load-bearing structure placed inside it. The metallic load-bearing structure is composed of at least two vertical elements connected by means of at least one transverse element, whereby the vertical elements are provided with internal gaps enabling the screw joint between the blocks. The fifth layer shaped like a flat rectangular prism is a layer of cellular concrete equipped with the installation guides in form of a framework.

[0010] The third, fourth and fifth layer are offset advantageously upwards and to one side in relation to the remaining block layers, and through all layers protrude at least two horizontally arranged structural elements fastening the block as a whole unit. The insulating layers of the building block have grooves which prevent formation and persisting of moisture. The building block is provided with the chamfers enabling injection of the insulating compound.

[0011] The first and sixth layer is provided with the skew edges for accommodation of the external and internal sealing joints. The insulating layers can be arranged in different configurations, can be of different thickness and can be made of different insulating materials. The installation guides in form of framework constitute simultaneously a skeleton which makes possible screwing of the inner wall panels.

[0012] The first layer of the building block constitutes at the same time an external finish thanks to the application advantageously of acrylic paint or tiles. The third, fourth and fifth layer are offset in relation to the remaining block layers by 2 % to 40 %.

[0013] The building block in accordance with the invention in its embodiment consists of at least two layers, whereby the first layer shaped like a flat rectangular prism is a layer of cellular concrete and the second layer, also in form of flat rectangular prism, makes a layer of thermal

insulation composed of three sublayers. Inside the first sublayer there is a metallic load-bearing structure, the second sublayer constitutes the heat insulation, and the third sublayer is provided with installation guides in form of a framework. The first and second sublayer is offset partially upwards and to one side in relation to the remaining block layers, and through all layers protrude at least two horizontally arranged structural elements fastening the block as a whole unit.

[0014] The subject of invention in an example of its embodiment is shown on the drawing, where FIG. 1 presents the building block in an axonometric projection when viewed from the first layer side, FIG. 2 - a building block in axonometric projection when viewed from the last layer side, FIG. 3 - a top view of the building block, FIG. 4 - an end view of the building block, FIG. 5 - a top view of the building block including the marked cross sectional views A-A and B-B, FIG. 6 - a cross sectional view of FIG. 5 taken in plane B-B, FIG. 7 - is a cross sectional view of FIG. 5 taken in plane A-A, FIG. 8 - a wall made of the building blocks in axonometric projection when viewed from the first layer side, FIG. 9 - a wall of the building blocks in axonometric projection when viewed from the last layer side, FIG. 10 - a modification of the building block in axonometric projection when viewed from the first layer side and FIG. 11 - a modification of the building block in axonometric projection when viewed from the last layer side.

[0015] The multilayer building block in accordance with the invention has a shape of rectangular prism including the insulating and structural elements placed within is volume. Each layer of the block has the same shape. The first layer 1 of the block constitutes a layer of cellular concrete, the second layer 2 is a layer of thermal insulation, the third layer 3 is a layer of cellular concrete and the fourth layer 4 is a layer of thermal insulation. Within the fourth layer 4 is placed a metallic load-bearing structure 5. The fifth layer 6 is advantageously a layer of cellular concrete, and the sixth layer 7 is also a layer of cellular concrete provided with the installation guides 8 in form of a framework. The third 3, fourth 4 and fifth layer 6 are offset upwards and to one side in relation to the remaining block layers, and through all layers protrude at least two horizontally arranged structural elements 9 fastening the block as a whole unit.

[0016] The insulating layers 2 and 4 comprise the grooves 10 preventing the formation and persisting of moisture.

[0017] The building block is provided with the chamfers 14 enabling injection of the insulating compound.

[0018] The first 1 and the last layer 7 of the block is provided with the skew edges 15 for accommodation of external and internal sealing joints.

[0019] The insulating layers 2 and 4 can be applied in different configurations, can be of different thickness and can be made of different insulating materials. The third 3, the fourth 4 and the fifth layer 6 of the block are offset upwards and to one side in relation to the remaining lay-

ers by 2 % to 40 %.

[0020] The first layer 1 is at the same time an external finish of the block in consideration of its smooth surface or thanks to advantageous application of paints, for example acrylic paint, or tiles. The installation guides 8 in form of framework allow to place therein the electrical conductors or heating installations and simultaneously make a skeleton used for fastening of the wallboards.

[0021] The metallic load-bearing structure 5 consists then of at least two vertical elements 11 connected by means of at least one transverse element 12, whereby the vertical elements 11 are provided with the internal gaps 13 for advantageous screw joint of blocks. The blocks screwed together by means of the bolts 18 are shown in the drawings FIG. 8 and FIG. 9.

[0022] The building block in accordance with the invention in its embodiment is composed of at least two layers, whereby the first layer 16 shaped like a flat rectangular prism is advantageously a layer of cellular concrete and the second layer 17 shaped like a flat rectangular prism is a layer of thermal insulation comprising three sublayers. Within the first sublayer 17a is placed the metallic load-bearing structure 5, the second sublayer 17b makes an insulation and the third sublayer 17c is provided with the installation guides 8 in form of a framework. The first sublayer 17a and the second sublayer 17b is partially offset advantageously upwards and to one side in relation to the remaining block layers, and through all layers protrude at least two horizontally arranged structural elements 9 fastening the block as a whole unit.

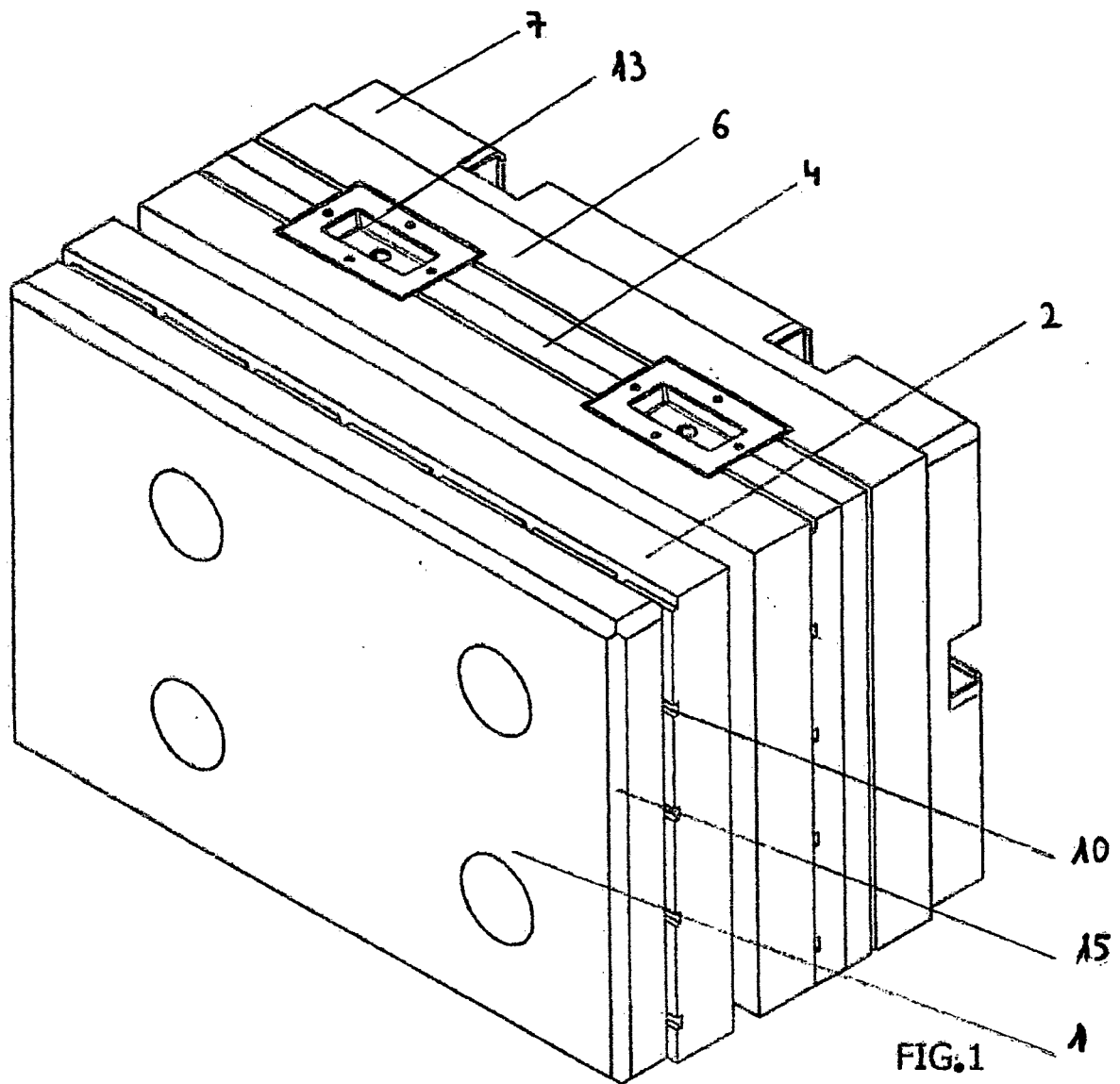
[0023] The building block according to the invention has numerous advantages in relation to the similar blocks known from the prior art. It is characterized by very good insulation properties and at the same time a simple design of the insulating layers and load-bearing structure being easy for execution and fastening during erection work, what results in relatively low manufacturing costs of the building block according to the invention. Furthermore, the block in accordance with the invention has a very smooth end face which does not require any external work. The blocks according to the invention are very simple in assembly and relatively lightweight and additionally do not require heavy construction equipment during erection. Moreover, thanks to their design, these blocks ensure that between the adjacent units, creating for example a wall, a good thermal insulation is maintained in assembled condition.

[0024] The building block in accordance with the invention can be used to erect the one-storeyed and many-storeyed buildings, both dwelling-houses and industrial buildings, and in its modification to erect the light building structures, for example umbrella roofs or garages.

55 Claims

1. The multilayer building block shaped like a rectangular prism equipped with the insulating and struc-

- tural elements placed within its volume, **wherein** the first layer /1/ in form of flat rectangular prism constitutes a layer of cellular concrete, the second layer /2/ in form of flat rectangular pattern is a layer of thermal insulation, the third layer /3/ in form of flat rectangular prism is a layer of cellular concrete, the fourth layer /4/ in form of flat rectangular prism is a layer of thermal insulation comprising the internally arranged metallic load-bearing structure /5/, which consists of at least two vertical elements /11/ held together by means of at least one transverse element /12/, whereby the vertical elements /11/ are provided with the inner gaps /13/ to accommodate the screw joint of the blocks, then the fifth layer /6/ in form of flat rectangular prism is a layer of cellular concrete, and the sixth layer /7/ in form of flat rectangular prism is a layer of cellular concrete provided with the installation guides /8/ in form of a framework, whereby the third layer /3/, the fourth layer /4/ and the fifth layer /6/ are offset upwards and to one side in relation to the remaining block layers, and through all layers protrude at least two horizontally arranged structural elements /9/ fastening the block as a whole unit.
2. The building block in accordance with claim 1, **wherein** the insulating layers /2/ and /4/ comprise the grooves /10/.
3. The building block in accordance with claim 1, **wherein** it is provided with the chamfers /14/ for the insulating compound.
4. The building block in accordance with claim 1, **wherein** the first layer /1/ and the last layer /7/ are provided with the skew edges /15/ to accommodate the sealing joints.
5. The building block in accordance with claim 1, **wherein** the insulating layers /2/ and /4/ can be applied in different configurations, can be of different thickness and can be made of different insulating materials.
6. The building block in accordance with claim 1, **wherein** the layers /3/, /4/ and /6/ are offset advantageously upwards and to one side in relation to the remaining block layers by 2 % to 40 %.
7. The building block in accordance with claim 1, **wherein** the installation guides /8/ in form of a framework constitute simultaneously a skeleton for screwing in of the wallboards.
8. The masonry block in accordance with claim 1, **wherein** the first layer /1/ makes at the same time an external finish of the block thanks to the application advantageously of paint, for example acrylic paint, or tiles.
9. The building block in accordance with claims 1 - 8, **wherein** it is composed of at least two layers, whereby the first layer /16/ shaped like a flat rectangular prism is a layer of cellular concrete and the second layer /17/ shaped like a flat rectangular prism is a layer of thermal insulation consisting of three sublayers; within the first sublayer /17a/ is placed the metallic load-bearing structure /5/, the second sublayer /17b/ constitutes an insulation, the third sublayer /17c/ is provided with the installation guides /8/, whereby the first sublayer /17a/ and the second sublayer /17b/ are partially offset upwards and to one side in relation to the remaining block layers, and through all layers protrude at least two horizontally arranged elements /9/ fastening the block as a whole unit.



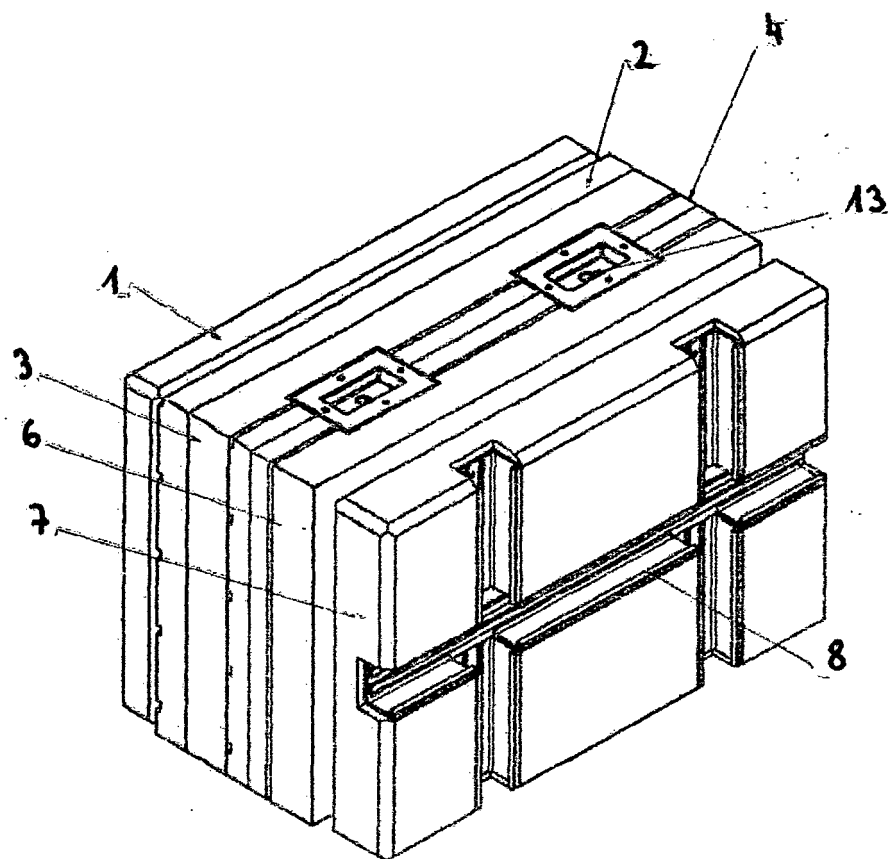
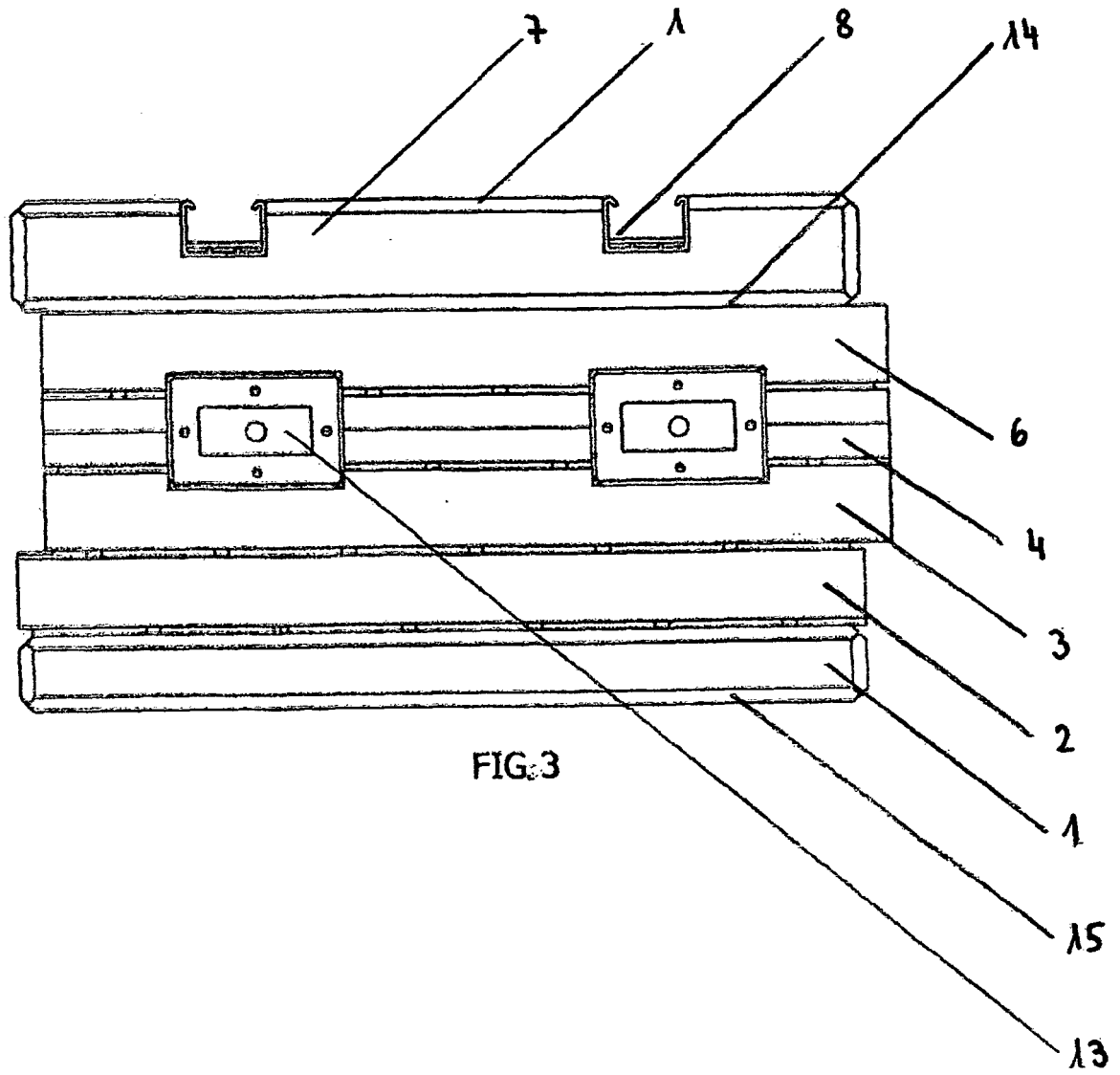
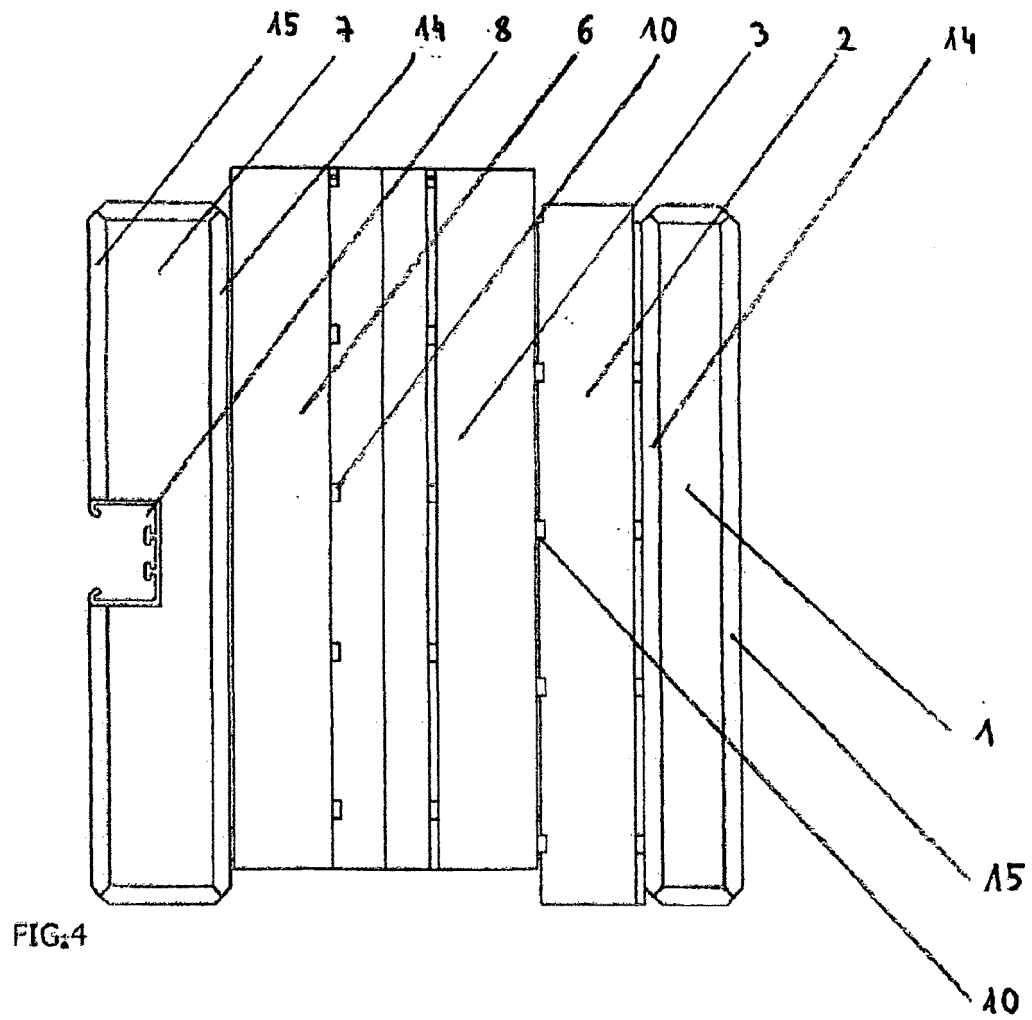


FIG. 2





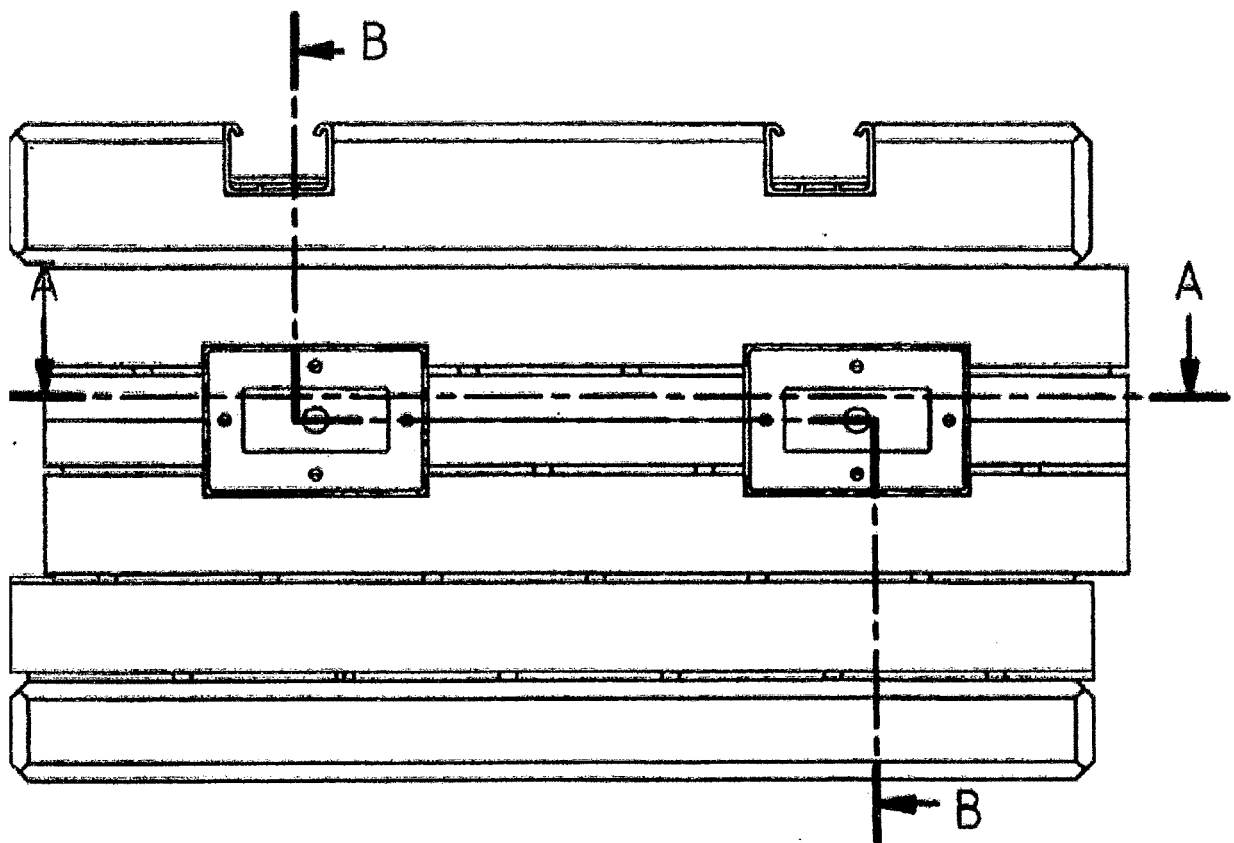


FIG. 5

B-B (1 : 4)

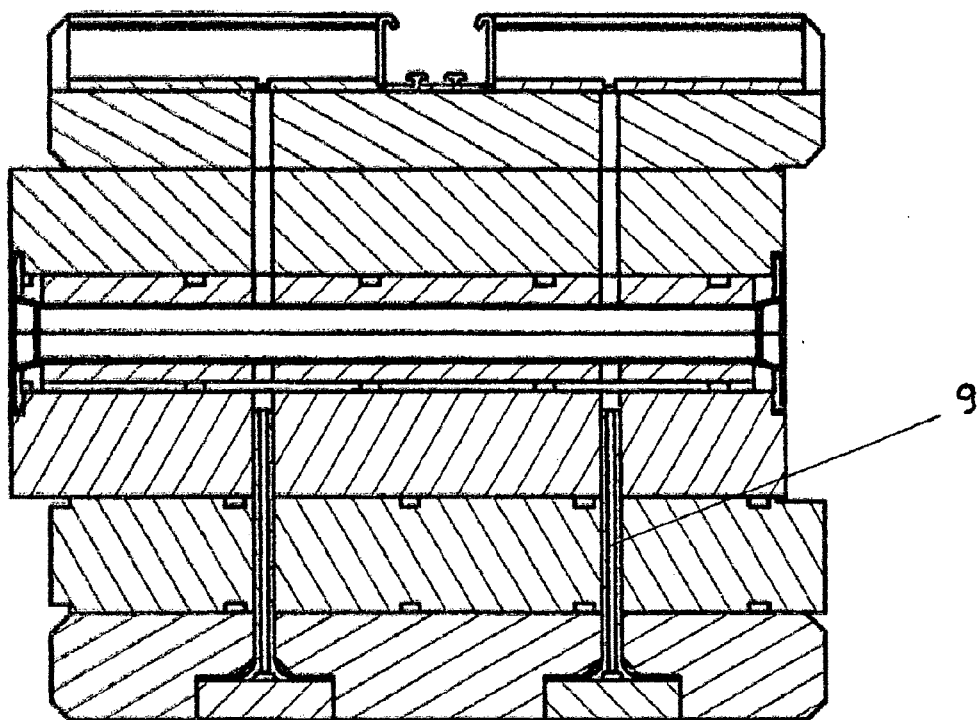


FIG. 6

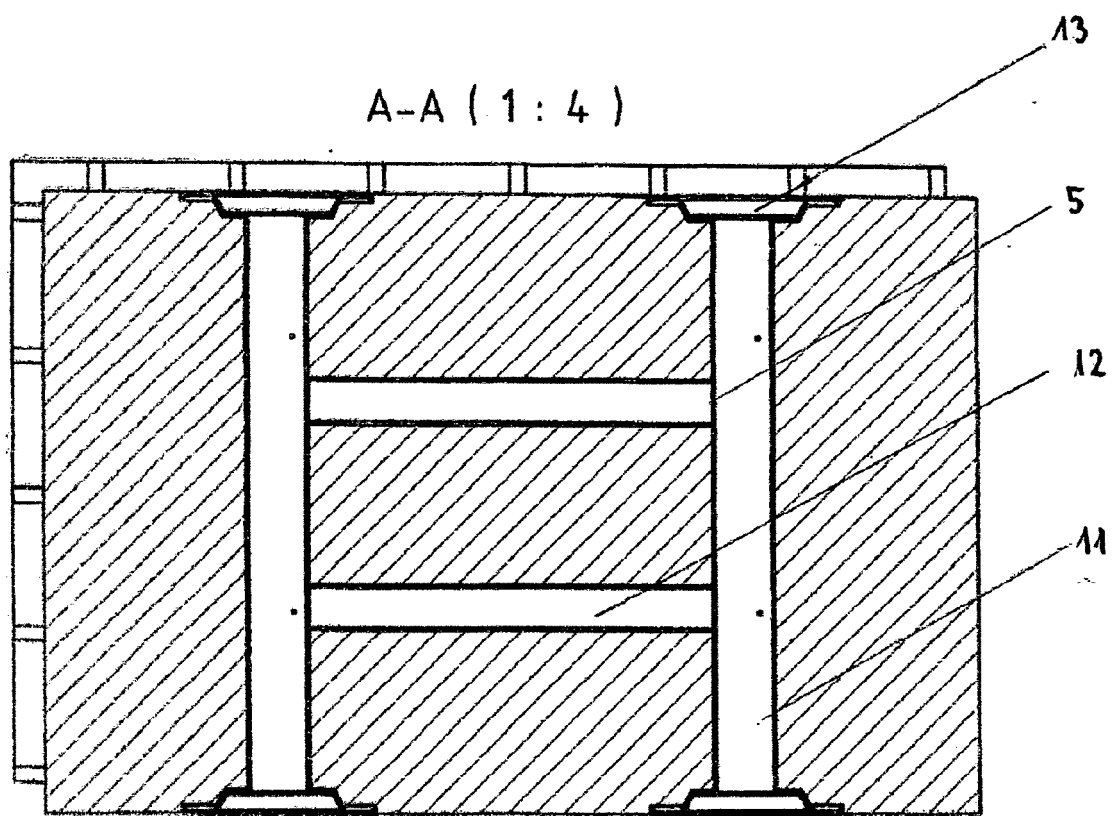


FIG.7

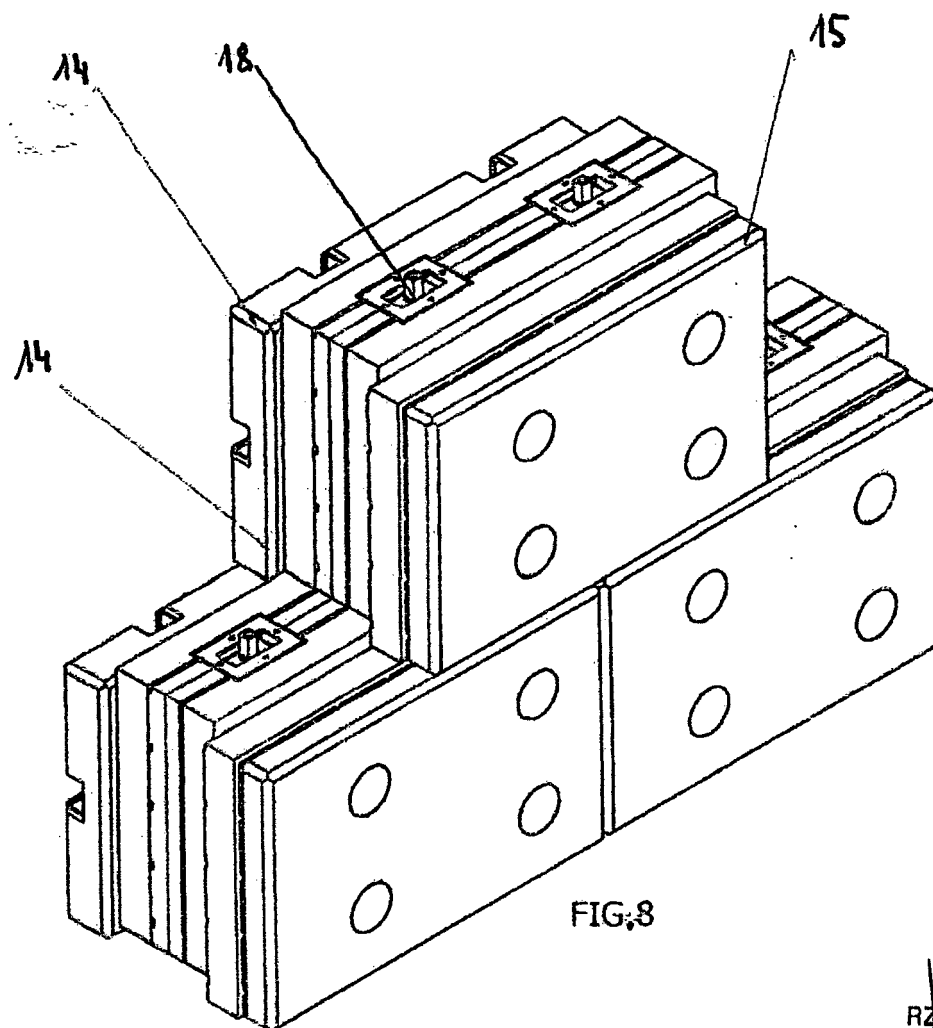


FIG. 8

RZECZNIK PATENTOWY

Grzegorz Bogacki

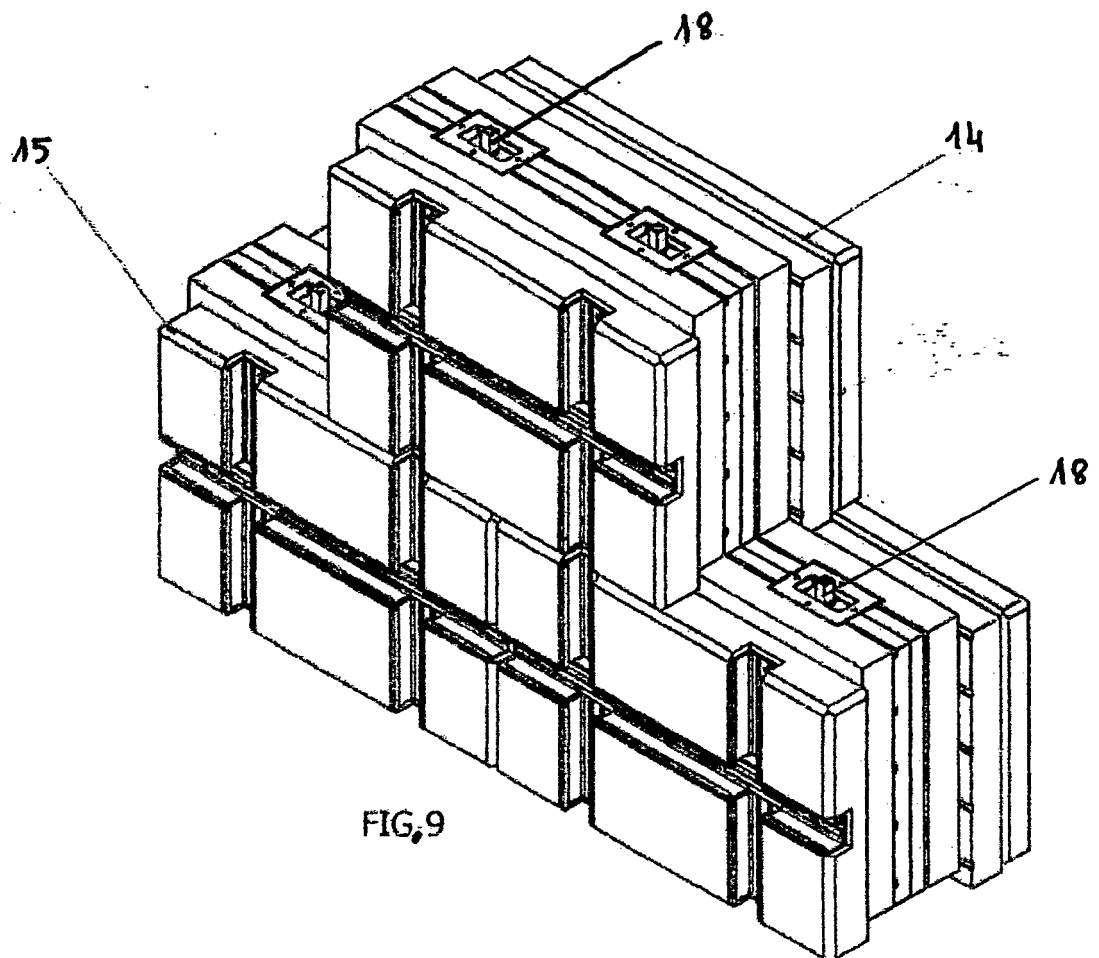


FIG.9

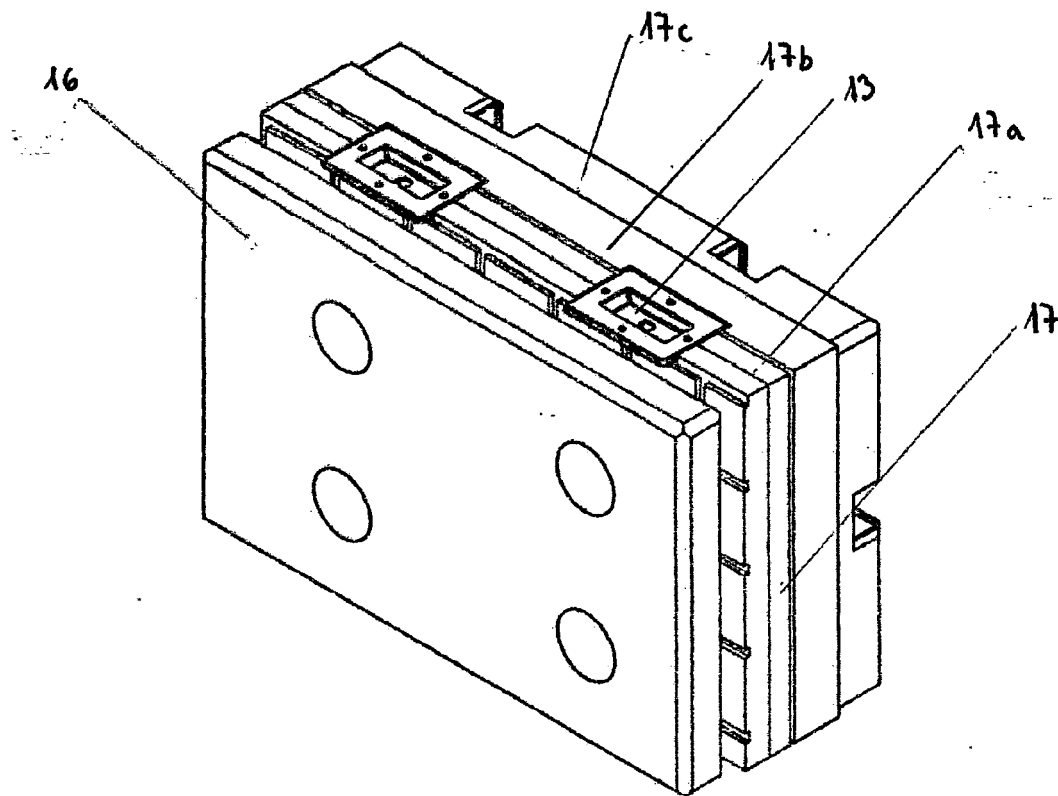


FIG.10

RZECZNIK PATENTOWY

Grzegorz Bogacki

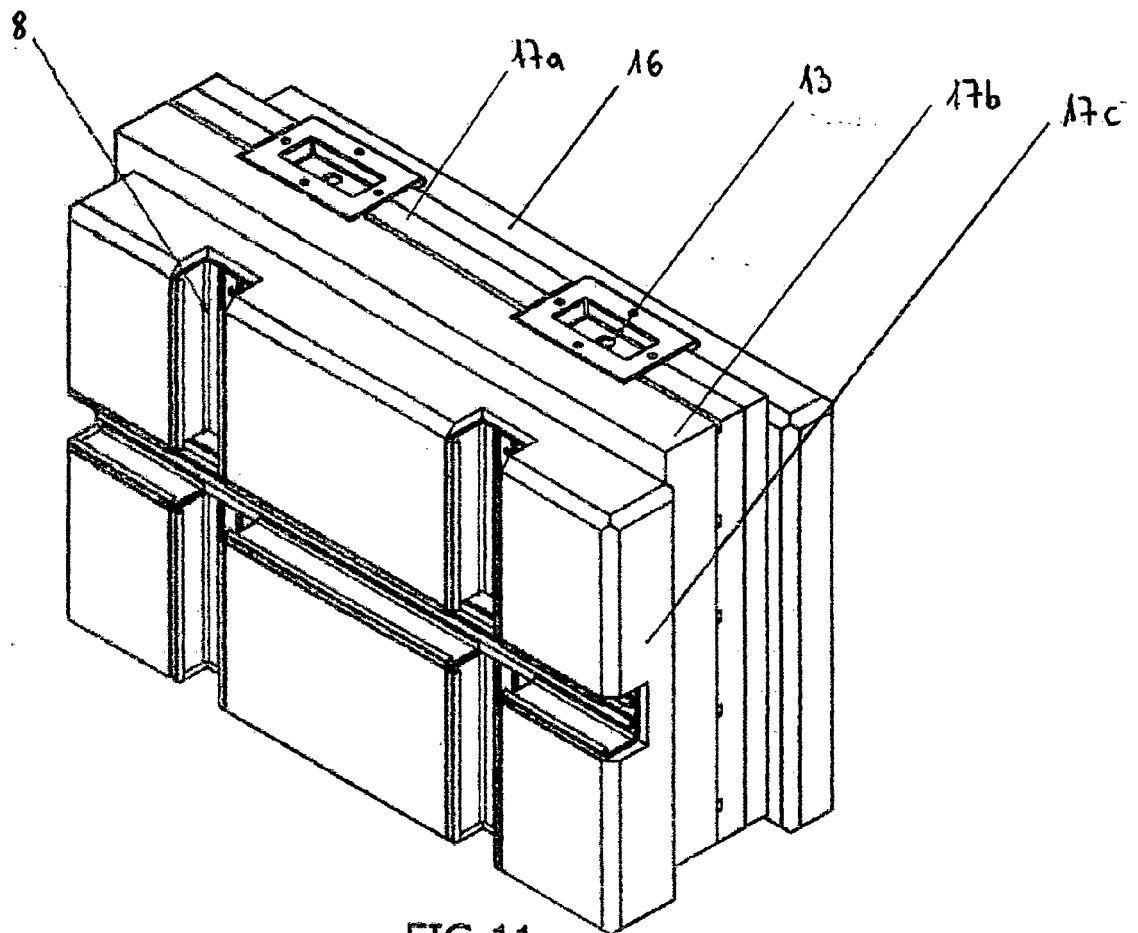


FIG. 11

RZECZNIK PATENTOWY

Grzegorz Bogacki



EUROPEAN SEARCH REPORT

Application Number

EP 22 46 0014

5

10

15

20

25

30

35

40

45

50

55

1

EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	KR 2003 0024425 A (BAN HEE HWAN [KR]) 26 March 2003 (2003-03-26) * figures 1, 7 * -----	1-9	INV. E04C1/41 E04C1/39 E04B2/18 E04B2/24 E04B2/20
Y	FR 2 418 311 A1 (SANSON JEAN LOUIS [FR]) 21 September 1979 (1979-09-21) * page 3 * -----	1-9	ADD. E04B2/02
Y	KR 2013 0137913 A (KYERIM CONSTRUCTION CONSULTING COMPANY [KR]) 18 December 2013 (2013-12-18) * figure 5a * -----	1-9	
Y	FR 2 494 751 A1 (KERCKOVE YVES [FR]) 28 May 1982 (1982-05-28) * page 3 * -----	4, 7, 8	
Y	KR 100 761 787 B1 (HANKOOK STYROPOL CO LTD [KR]) 28 September 2007 (2007-09-28) * figure 1 * -----	2, 3	
A	CN 109 281 431 A (SHANDONG JINPIAO FOOD MACHINERY CO LTD) 29 January 2019 (2019-01-29) * figures 1, 2 * -----	1-9	TECHNICAL FIELDS SEARCHED (IPC) E04C E04B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 22 July 2022	Examiner Saretta, Guido
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	

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

EP 22 46 0014

5 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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

22-07-2022

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
	KR 20030024425 A	26-03-2003	NONE	

15	FR 2418311 A1	21-09-1979	NONE	

	KR 20130137913 A	18-12-2013	NONE	

	FR 2494751 A1	28-05-1982	NONE	

20	KR 100761787 B1	28-09-2007	NONE	

	CN 109281431 A	29-01-2019	NONE	

25				
30				
35				
40				
45				
50				
55				

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

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 20080184650 A [0003]
- US 7739845 B [0004]
- US 9435118 B [0005]
- EP 0209993 A [0006]