(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 862 983 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
22.04.2015 Bulletin 2015/17

(21) Application number: **13804367.4**

(22) Date of filing: **11.06.2013**

(51) Int Cl.:
E04B 1/66 *(2006.01)* ***E04C 2/36*** *(2006.01)*

(86) International application number:
PCT/EA2013/000005

(87) International publication number:
WO 2013/185782 (19.12.2013 Gazette 2013/51)

(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

(30) Priority: **14.06.2012 EA 201200801**

(71) Applicant: **Limited Liability Company "Ekstruzionnye Linii"**
Moscow 107113 (RU)

(72) Inventor: **KUDRITSKY, Konstantin Valeryevich**
Moscow 117623 (RU)

(74) Representative: **Neykov, Neyko Hristov**
58, Vorino Str. app. 2
1680 Sofia (BG)

(54) DISMANTLEABLE DEVICE ADAPTED FOR HERMETICALLY SEALING AN END OF A HOLLOW PANEL WITH A CELLULAR STRUCTURE

(57) The present invention relates to a sealing means, and in particular to a dismantle able device, comprising a closing profile, extending along a longitudinal axis and can be used for hermetically sealing the edges of cellular, perforated panels, such as polycarbonate panels, or identical to those. The invention consists in the fact that the proposed device further comprises a fitting element, comprising a fixing bulge intended for fastening of the fitting element to the closing profile, and fixtures, and the closure profile comprises an internal slot extending along the longitudinal axis over the entire length of the closing profile. The invention improves the hermetically sealing of the ends of a hollow panel.

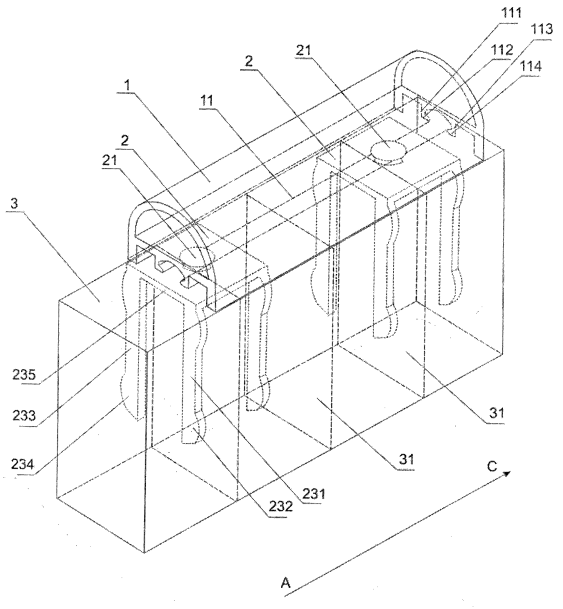

FIG. 1

EP 2 862 983 A1

Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a dismantle able device for hermetically sealing, and in particular to a device comprising a closing profile, positioned along the longitudinal axis, which can be used to seal the ends of hollow panels with cellular structure such as polycarbonate panels, or identical to them - acrylic, polypropylene, PVC and other plastic structures with hollow, tunnel forms, used for example in the construction of canopies, awnings, different ceilings, walls and roofs of greenhouses, advertising structures.

[0002] From the prior art is known a detachable device, designed for hermetically sealing of the end of a hollow panel with cellular structure, comprising a closing profile, extending along the longitudinal axis of the profile (the article "Polycarbonate constructions: Russian version", "Stroyprofile" magazine № 3, 2006).

[0003] In the described device, there aren't provided any special fittings to the closing sealing profile. The disadvantage of this solution is the low reliability of sealing the end of the hollow panel with cellular structure. By using the device in different weather conditions, in particular by the formation of ice, the closing profile, which has no additional fitting elements can be totally or partially separated from the end of the said hollow panel with cellular structure. Thus, the sealing of said cellular panel is disrupted, which is connected with the possibility of ingress of water, ice and impurities in said cellular panel, and also to reducing the lifetime of the entire construction, where the hollow panel with cellular structure is used.

[0004] From the prior art is also known a dismantle able device, suitably shaped for sealing the end of a hollow panel with cellular structure, comprising a closing profile, extending along a longitudinal axis (utility model patent № 107211-RU, published in 2011). The described closing profile has U-shape and is provided with additional flexible panels.

[0005] This device has been adopted as a prototype of the present invention.

[0006] The disadvantage of this solution is the low reliability of sealing and closure of the transverse edge of the hollow panel with cellular structure. By using the device in different weather conditions, in particular by the formation of ice, the closing profile can be fully or partially separated from the end of the cellular panel. Thus, the sealing of said cellular panel is disrupted, which leads to infiltration of water, ice and impurities in said cellular panel, and to reducing the lifetime of the entire construction, where a hollow panel with cellular structure is used.

SUMMARY OF THE INVENTION

[0007] Based on the described prior art in this field, the object of the present invention is to provide a dismantle able device, adapted for hermetically sealing of the transverse edge of a hollow panel with cellular structure by removing at least one of the aforementioned disadvantages, namely - the invention should solve the technical problem of improving the effectiveness of hermetical sealing the transverse edge of a hollow panel with cellular structure.

[0008] To solve this problem, the dismantle able device, intended for hermetically sealing the transverse edge of a hollow panel with cell structure, further comprises at least one fitting element, comprising a fixing bulge. The fixing bulge is located towards the closing profile and is designed to attach the fitting element to the profile. The device, according to the invention also comprises a fixture. The fixture is arranged on the back of the closure profile, and is designed to attach the fitting element to the hollow profile. The closing profile contains also an inner slot. The inner slot is formed along the longitudinal axis of the closing profile. The inner slot is located opposite the fixing bulge of the fitting element and is formed so, as to receive the fixing bulge of the fitting element. The inner slot comprises at least one first wall. The first wall is designed for elastic deformation in a plane, perpendicular to the longitudinal axis, at the entry of the fixing bulge of the fitting element, into the slot of the closing profile. The first wall includes a first rigid rib. The first rigid rib enters into the slot and is intended for engaging and holding the fixing bulge of the fitting element in the internal slot of the closing profile.

[0009] According to this feature, by means of the fitting elements, the ability to provide a tight and reliable closure of the end of the profile of said hollow panel with cellular structure, is achieved. Thus, is achieved such strength of the sealing, which is not distorted during the exploitation of the structure in a variety of weather conditions. This increases the life of the panel as well as all constructions that are located above the panel. This advantage is especially important at the Russian climatic conditions - with high rainfall, long winter and cold weather that continue through most of the spring and fall, as in other countries with similar climates.

[0010] There is an embodiment of the invention, wherein the fixture of the fitting element comprises a flexible clamp having at least a first leg, oriented in the plane of the transversely longitudinal axis A - C of the profile, and representing at least a first bend.

[0011] Due to the described characteristic configuration, it is likely that the fitting elements can be produced with fixtures, which enable the fitting element to fasten securely in the cavity of said hollow panel with cellular structure.

[0012] There is also an embodiment of the invention, wherein the flexible clamp comprises at least one second leg, different from the first one, located towards the first leg and oriented contrariwise in relation to the profile, to the plane, which is transverse to the longitudinal axis, and represents at least a second bend.

[0013] First and second legs are connected with each other by means of a resilient bridge with a suitably chosen

length. In this situation, the second bend is located perpendicular to the first bend.

[0014] According to this characteristic, it becomes possible to manufacture fitting elements with fixtures, which enable the fitting element to be attached, for example, to a partition wall between two adjacent cavities of the hollow panel with cellular structure. For each standard size of the thickness of the hollow panels, for example, polycarbonate sheets - 4 mm, 6 mm, 8 mm, 10 mm, etc., could be produced separate fitting elements with their own fixtures for the partition walls between two adjacent cavities of the said panel. But it is also possible to produce universal fitting elements, which are suitable for different thicknesses of the panels.

[0015] Furthermore, there is an alternative embodiment of the aforementioned invention, where the flexible clamp consists in a plurality of first and second legs, wherein the resilient bridge, connecting the plurality of first and second legs includes a resilient plate with a selective form, as it's front side is oriented towards the cross section profile and it's rear side is oriented towards the back side of the profile. The fixing bulge is fixedly attached to the front side of the resilient plate, and the plurality of first and second legs are fixedly connected to the opposite side of the resilient plate.

[0016] According to this feature, it is possible to obtain fitting elements for attaching the profile to a hollow panel with cellular structure, wherein the attachment of the fitting elements to the said profile is much more stable and assured, which, in turn, leads to more secure installation of the profile in said panel.

[0017] There is also an embodiment of the invention, wherein the cavity of the cross-sectional profile has at least second wall, different than the first wall. The second wall comprises a second rigid rib, which enters into the slot and is intended for engaging and retaining the fixing bulge of the fitting element, into the slot of the closing profile.

[0018] According to this feature, it is possible to improve the fixing of the closing profile to the fixing bulge of the fitting element, and for this purpose it is preferred the profile is produced with more walls in the slot.

[0019] According to a preferred embodiment of the invention, the second wall is designed for elastic deformation in the plane, perpendicular to the longitudinal axis at the entry of the fixing bulge of the fitting element into the slot of the closing profile.

[0020] According to this feature, it is possible to simplify the assembly of the closure profile of a hollow panel with cellular structure, since the elastic deformation allows the assembly in a plane, perpendicular to the axis A-C.

[0021] According to one embodiment of the invention, the fixing bulge of the fitting element is provided with a cross section in the form of a mushroom, oriented in a plane, transverse to the longitudinal axis A-C.

[0022] According to this feature, it is possible to produce fitting elements for fixing of closure profile of a hollow panel with cellular structure, having an axial symmetry. The mushroom-shaped fixing bulge of the fitting elements is chosen because of the ability to fit into the slot of the hollow profile and to be fixed there. This characteristic of the fitting elements may be suitable, for example, for an embodiment, in which each fixture of the fitting elements of said panel has a plurality of legs, which are inserted and fixed in the cell of the hollow panel.

[0023] There is also an embodiment of the invention, where the fixing bulge of the fitting element is arrow-shaped, oriented in a plane, transverse to the longitudinal axis.

[0024] According to this feature, it is possible to produce the fitting elements for fixing the closure profile to a hollow panel with cellular structure, with planar symmetry. The arrow-shaped cross section in the plane, perpendicular to the longitudinal axis, the shape of the fixing bulge of the fitting elements is selected so, that it can fit into the slot of the closure profile and to be fixed there. This characteristic of the fitting elements is suitable, for example, for an embodiment where all the fixtures of the fitting elements of said panel, have first and second legs, which are inserted and fixed in the cell of the hollow panel.

[0025] According to a preferred embodiment of the invention, the internal slot of the closure profile is a first section in the plane, oriented transversely to the longitudinal axis, and is made in the shape of the Greek capital letter omega. According to this particular configuration, it is possible to have a correlation between the shape of the internal slot of the closure profile and the shape of the fixing bulge of the fitting element, regardless of whether it is in the form of a mushroom or an arrow.

DESCRIPTION OF THE DRAWINGS.

[0026] Other features and advantages of the invention will become apparent from the description given below for illustration, and without limiting it, with reference to the accompanying drawings, where:

- Fig. 1 represents a perspective view in partial section of the dismantle able device according to the present invention, suitably shaped for hermetically sealing of hollow panel with cellular structure together with said panel.
- Fig. 2 shows a cross-sectional view of the dismantle able device from Figure 1 according to the present invention, together with said panel.
- Fig. 3 - represents an axonometric view of a fitting element in the embodiment of the present invention, comprising a flexible clamp with a plurality of legs, appropriately shaped for fixing the fitting element into the cavity of the panel,
- Fig. 4 - presents an axonometric view of a fitting element according to the invention with a flexible clamp comprising first and second fixing legs.
- Fig. 5 - represents an axonometric view of a cross section with partial sections, according to the present invention.

- Fig. 6 - presents a block diagram, illustrating the sequence of the steps for the assembly of the dismantle able device according to the invention.

DESCRIPTION OF PREFFERED EMBODIMENTS

[0027] According to Figures 1 and 2, the dismantle able device, suitably shaped for hermetically sealing the end of a hollow panel 3 with cellular structure, comprises a closure profile 1, located on the longitudinal axis A - C of the hollow panel 3.

[0028] The dismantle able device further comprises at least one fitting element 2, comprising: a fixing bulge 21, oriented towards the closure profile 1, and intended for attaching the fitting element 2 to the closure profile 1, and fixture 22, located backwards of the closing profile 1, and intended for attaching the fitting element 2 to the hollow panel 3 with cellular structure. In the cross-section profile 1 is formed an internal slot 11, located along the longitudinal axis A-C and laying across the entire length of the closure profile 1,and located opposite the fixing bulge 21 of the fitting element 2 and intended for the reception of the fixing bulge 21 in the fitting element 2.

[0029] The hollow panel 3 is divided by means of partitions of hollow cells 31. The inner slot 11 includes at least one wall 111, which is designed for an elastic deformation in a plane, perpendicular to the longitudinal axis A-C, while accepting the fixing bulge 21 of the fitting element 2 in the inner slot 11 of the closing profile 1. The wall 111 includes a first rigid rib 112, entering the slot 11 and intended for engaging and holding the fixing bulge 21 of the fitting element 2 in the slot 11 of the closing profile 1.

[0030] The inner slot 11 comprises a second wall 113, different from the first wall 111, which is formed with a second rigid rib 114, salienting inwardly into the slot and intended for engaging and holding the fixing bulge 21 of the fitting element 2 in the slot 11 of the closing profile 1. The fixture 22 of the fitting element 2 consists in a flexible clamp 23, which has at least one first leg 231, disposed backwards of the cross-section profile, in a plane perpendicular to the longitudinal axis A-C of the closing profile 1, which is filled with the least one first bend 232.

[0031] The flexible clamp 23 further comprises a second leg 233, which differs from the first leg, and is located backwards the cross-section profile, in a plane perpendicular to the longitudinal axis A-C, and occurring as at least second bend 234. The first 231 and second legs 233 are connected to each other by a resilient bridge 235 with a selective length, wherein the second bend 234 is positioned and oriented perpendicular to the first bend 232.

[0032] Preferably panel 3 can be manufactured as a polycarbonate panel, consisting in at least two layers, connected with longitudinal stiffeners, which are forming cavities, separated from each other by transverse bulkheads. Also there can be used aluminum panels with cellular structure or any other material having internal cavities, separated by bulkheads.

[0033] Depending on the thickness and the structure of panel 3, the fitting elements 2 can be used in various embodiments, such as for example:

- for the fixation of the fitting elements 2 in the cavity of panel 3, can be used fixtures, comprising a plurality of legs, which are suitably formed for fixing in the cavity of the panel (see Figure 3),
- for fixing of the partition walls 31 in the cavity of the panel 3, may be used all fitting elements, which are provided in the form of an elastic clamp, which is inserted and fixed on the partition walls 31 of two adjacent cavities of the panel 3 (see Figure 4).

[0034] For the shape of the closing panel 1, different designs may be used. Preferably it should have an inner cavity, in order to reduce the amount of the used material, to achieve the required strength, which will result in an improved stability of the profile in small sizes and in ability to be formed with different cross-sections. A common feature of the closing profiles, which are object of the present invention, is the presence of internally formed longitudinal slot 11, intended to engage and hold the fixing bulge 21 of the fitting element 2 into the slot of the closing profile.

[0035] The dismantle able device for hermetically sealing the end of a hollow panel with cellular structure is assembled in the following steps: (See Figure 6).

[0036] Step A1. In the end hole of the closing panel 3 are placed and fastened fitting elements 2. Depending on the need for mechanical coupling of the closure profile and the panel 3, the fitting elements can be mounted at different distances from one another. In case of installation on street constructions that are part of the panel 3, the fitting elements can additionally be fixed to the partition walls between adjacent cavities by means of pliers or a similar tool. Upon installation on temporary structures, which are part of the panel, for example, when inserted in covered areas, the fitting elements can be introduced into the cavity of the panel 3 with the possibility of removal.

[0037] Step A2. At the end opening of panel 2 is placed closing profile 1.

[0038] Step A3. By pressing or tapping into the slot of the closing profile 1, the fixing bulges of the fitting elements are placed and fastened, which provides mechanical fastening of the profile 1 to the panel 3.

[0039] Dismantling of the closure profile 1 can be executed by the mechanical movement of the full profile 1 along the axis A-C in the slotted hole to the complete removal of the fixing bulges 21. After that, the fitting elements 2 can be removed. This allows the further use of the closing profile and the fitting elements.

[0040] The construction allows using various embodiments of shaping of the internal slot of the closing profile, which enable easier insertion and fastening of the fixing bulges 21 of the fitting element 2 of the profile 1.

[0041] The present invention can be manufactured in plants for the production of plastics, such as polycarbonate or aluminum products.

[0042] According to the proposal of the applicant, a prototype of a detachable device has been made, designed for hermetically sealing of the end of a hollow panel with cellular structure. The profile is made of polycarbonate. For a hollow panel with cellular structure is used a polycarbonate panel. The device was tested in winter conditions, at a low temperature and with repeated change of the temperature around 0 ° C, which leads to freezing of the water, ice formation and the subsequent thawing of the ice.

[0043] The tested prototype shows the following characteristics:

- reliable mounting of profile to the panel,
- tight and secured sealing of the end of said panel;

[0044] So, the present invention has achieved the intended objective - improvement of the effectiveness of the hermetically sealing of the ends of hollow panels with cellular structure.

Claims

1. A dismantle able device for hermetically sealing the end of a hollow panel with cellular structure, the device comprising a closing profile, extending along the longitudinal axis of the panel, **characterized in that**, it comprises at least one fitting element, comprising:

   • a fixing bulge, oriented towards the closing profile and intended for attaching the fitting element to the closing profile,
   • fixtures, located backwards of the profile and designed to attach the fitting element to the hollow panel with cellular structure, wherein the closing profile comprises an internally shaped slot, extending along the entire length of the closing profile, located opposite the fixing bulge of the fitting element, and intended for receiving the fixing bulge of the fitting element. The inner slot comprises at least one first wall, designed for an elastic deformation in a plane, perpendicular to the longitudinal axis, for the receiving of the fixing bulge of the fitting element in the slot of the closure profile, said first wall is provided with rigid rib, entering the slot and intended to engage and hold the fixing bulge of the fitting element into the slot of the closing profile.

2. A dismantle able device, according to claim 1, **characterized in that**, the fixtures of the fitting element include a flexible clamp, comprising at least one leg, disposed backwards of the profile, in the transverse plane of the longitudinal axis, and which represents at least a first bend.

3. A dismantle able device according to claim 2, **characterized in that** the flexible clamp comprises at least a second leg, different from the first leg, located backwards of the profile, in a plane perpendicular to the longitudinal axis and which represents at least a second bend, wherein the first and the second legs are connected by a resilient bridge with a selective length, and the second bend is located in a plane, oriented perpendicular to the first bend.

4. A dismantle able device according to claim 3, **characterized in that** the flexible clamp comprises a plurality of first and second legs, and the resilient bridge, connecting the first and the second leg includes a resilient plate with a selective shape, whose front side is located to the closing profile, and the back side is arranged backwards of the profile, as the fixing bulge is rigidly connected to the front side of the elastic plate and the plurality of first and second legs are rigidly connected to the back side of the elastic plate.

5. A dismantle able device according to claim 1, **characterized in that**, the slot comprises at least one second wall, different from the first wall, and the second wall comprises a second rigid rib, entering the slot and intended to fix and hold the fixing bulge of the fitting element in the channel of the closing profile.

6. A dismantle able device according to claim 5, **characterized in that** the second wall is designed for elastic deformation in a plane, perpendicular to the longitudinal axis, by the receiving of the fixing bulge of the fitting element into the slot of the closing profile.

7. A dismantle able device according to claim 5 or 6, **characterized in that** the fixing bulge of the fitting element is formed with a cross section, resembling the shape of a mushroom and is arranged in a plane, transverse to the longitudinal axis.

8. A dismantle able device according to claim 5 or 6, **characterized in that** the fixing bulge of the fitting element is formed with a cross section resembling the shape of an arrow, and is situated in a plane transverse to the longitudinal axis.

9. A dismantle able device according to claim 7 or 8, **characterized in that** the inner slot of the closing profile is provided with a cross section in the shape of the Greek capital letter Omega and is formed in a plane, oriented transversely to the longitudinal axis of the panel.

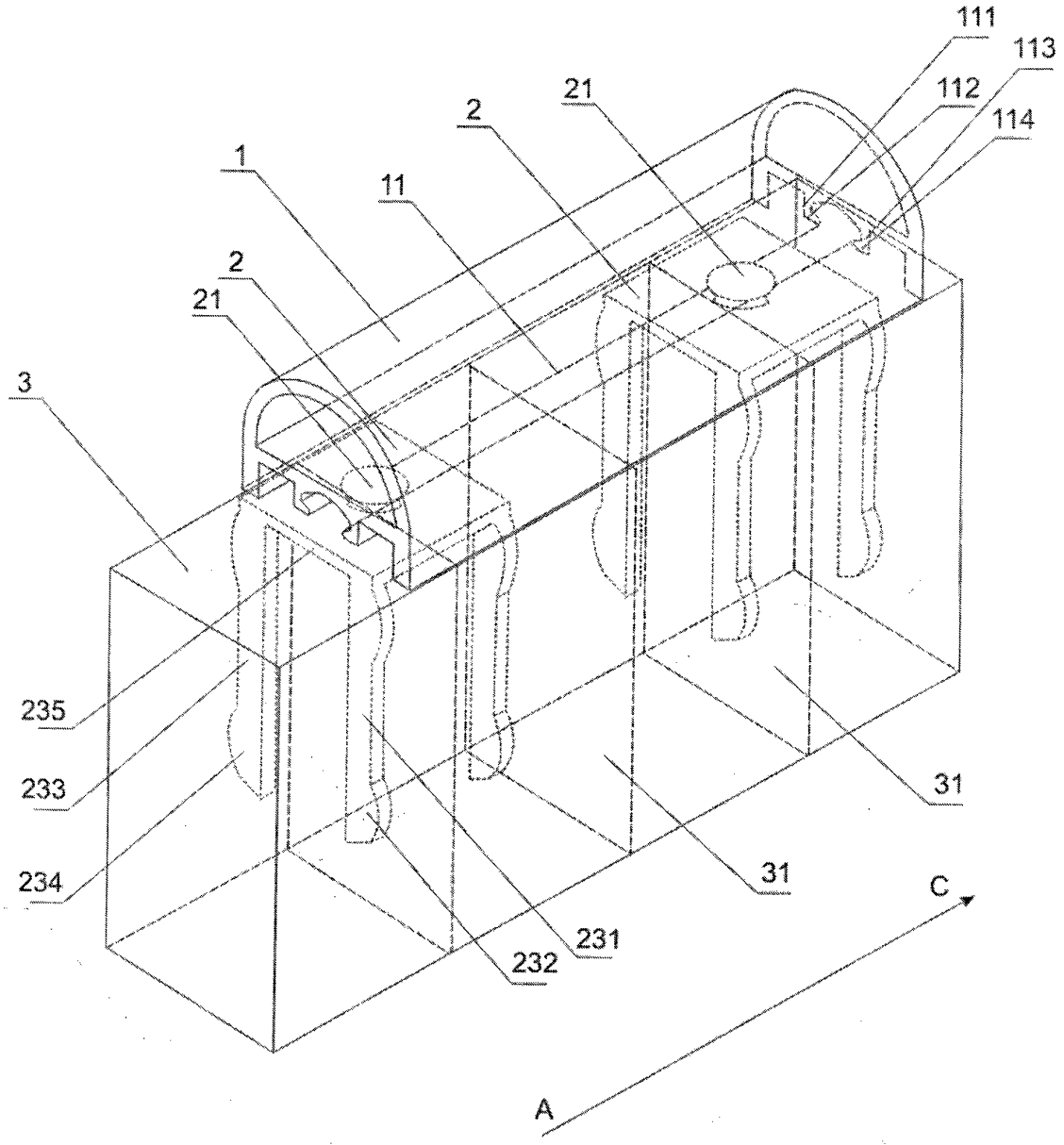

FIG. 1

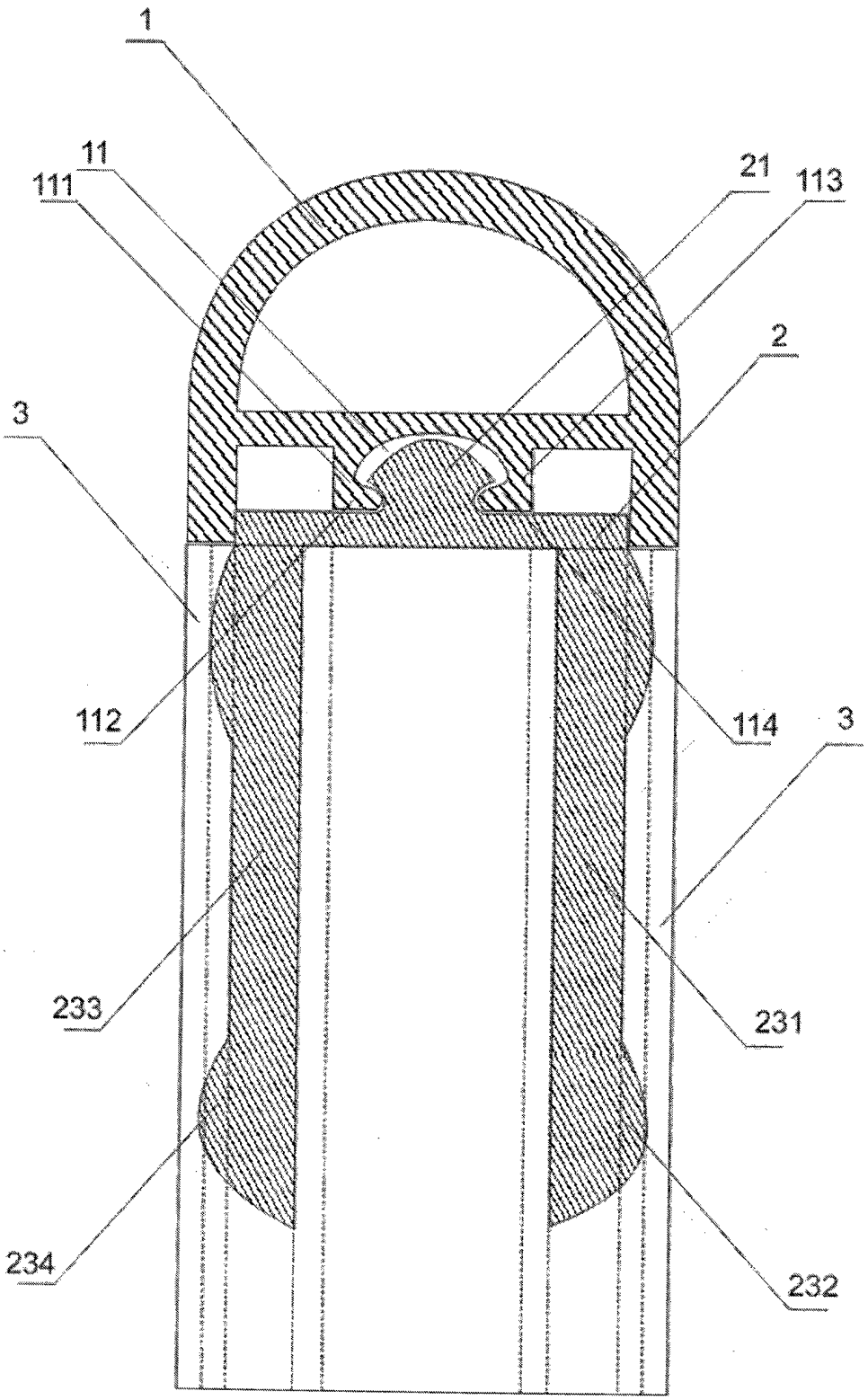

FIG. 2

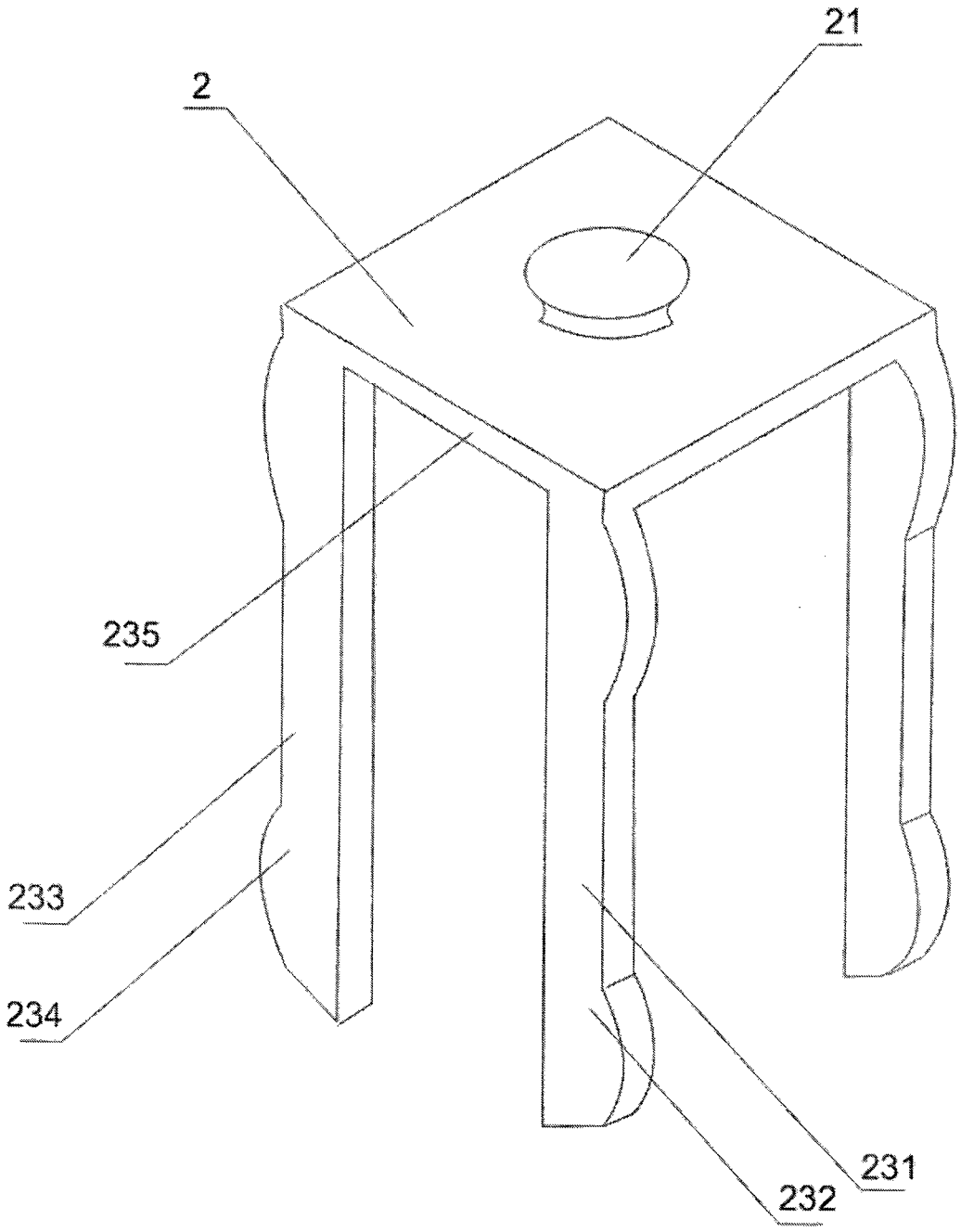

FIG. 3

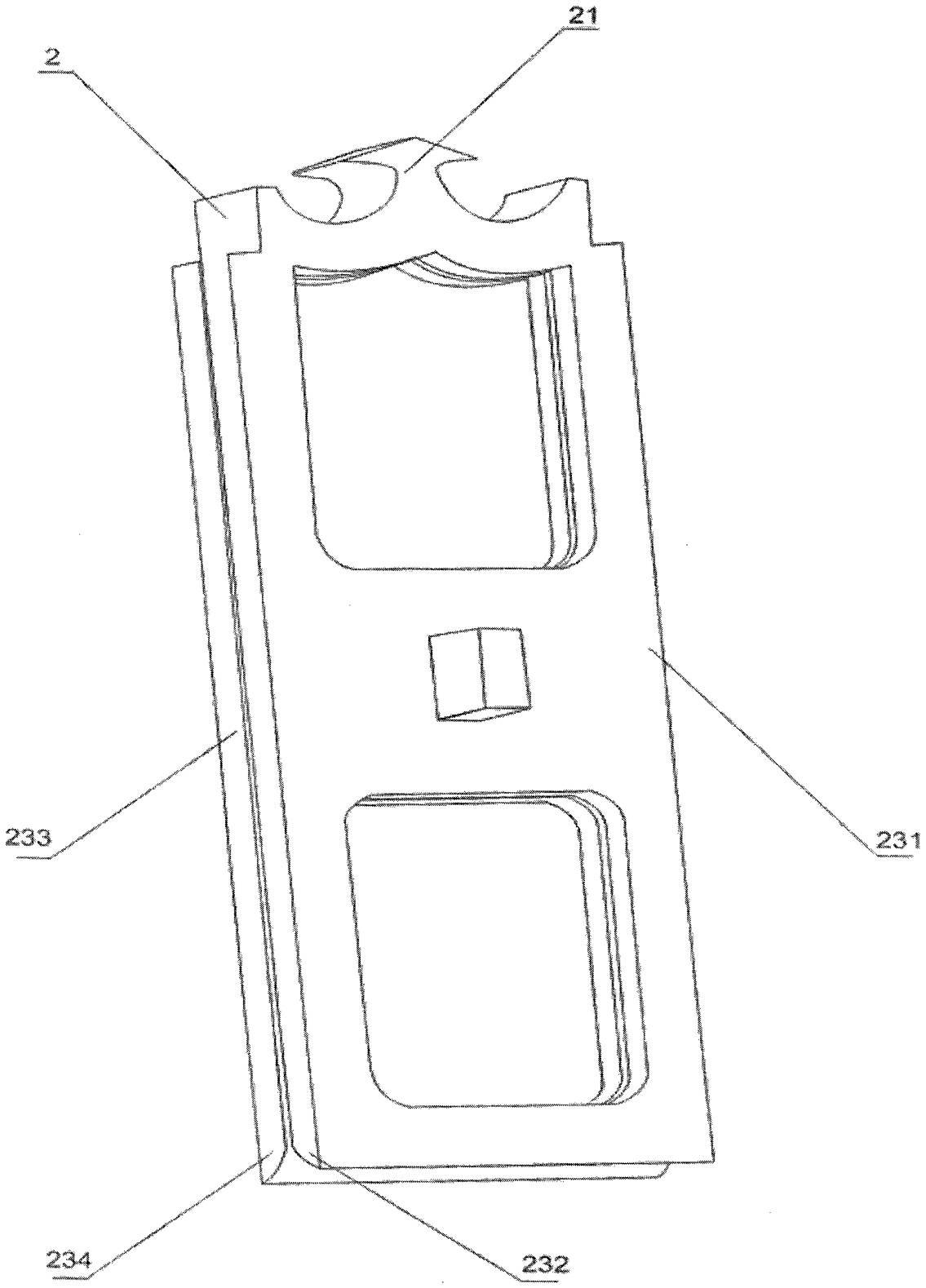

FIG. 4

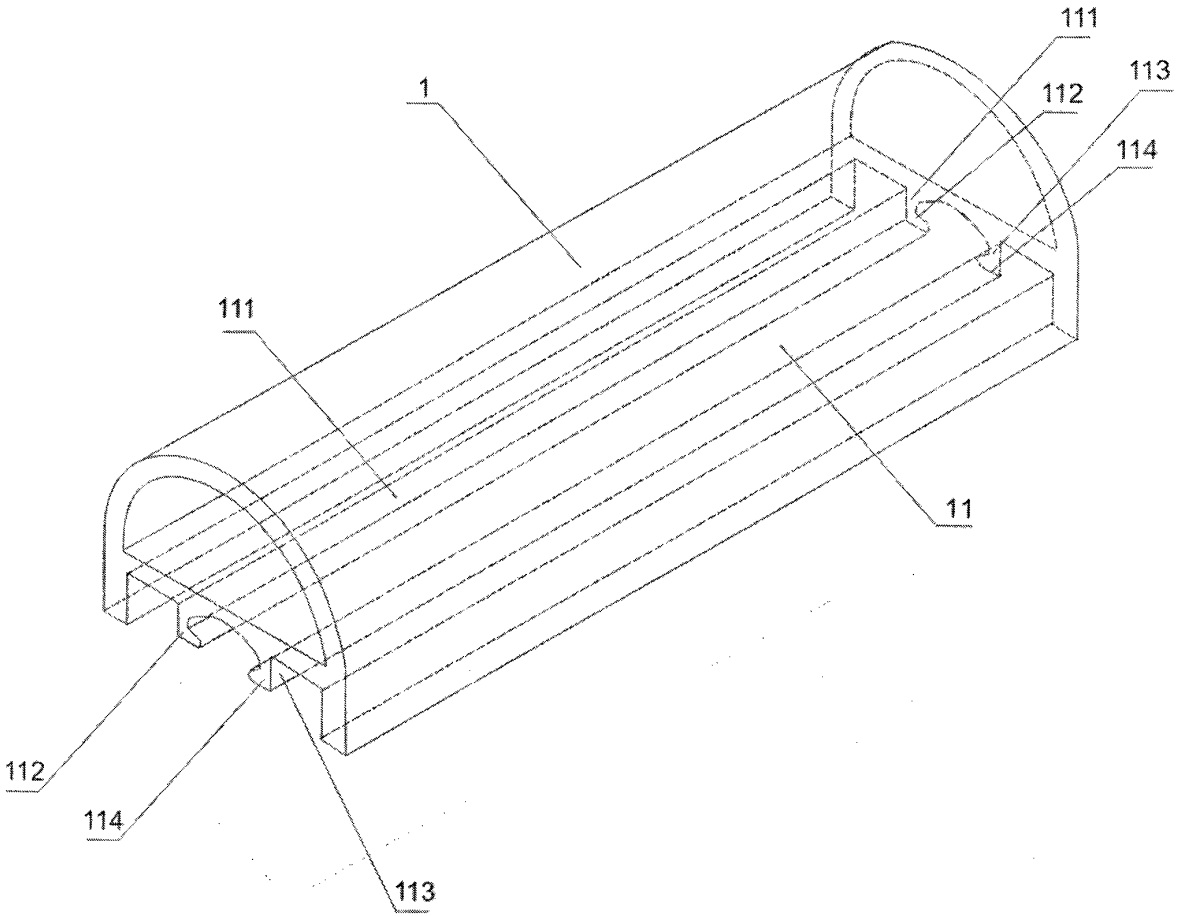

FIG. 5

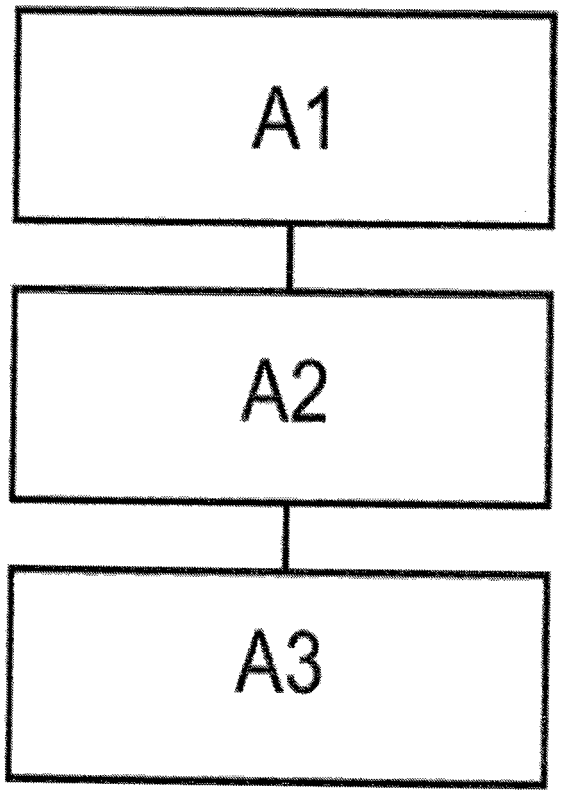

FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EA 2013/000005

A. CLASSIFICATION OF SUBJECT MATTER

E04B 1/66 (2006.01) E04C 2/36 (2006.01)

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)

E04C 2/00-2/38, E04B 1/00, 1/62, 1/66, 1/74-1/90

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 practicable, search terms used)

PatSearch (RUPTO internal), USPTO, PAJ, Esp@cenet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	RU 107211 U1 (ZAKRYTOE AKTSIONERNOE OBSHCHESTVO "TRASTKAPSTROI") 10.08.2011	1-9
A	RU 39150 U1 (TIKHONOV VIKTOR ALEKSANDROVICH) 20.07.2004	1-9
A	US 3546841 A (HOME COMFORT PRODUCTS CO) 15.12.1970	1-9

☐ Further documents are listed in the continuation of Box C. ☐ 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 application or patent 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
20 August 2013 (20.08.2013)	26 September 2013 (26.09.2013)
Name and mailing address of the ISA/	Authorized officer
Facsimile No.	Telephone No.

Form PCT/ISA/210 (second sheet) (July 1998)