



(11)

EP 3 378 343 A1

(12)

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

(43) Date of publication:
26.09.2018 Bulletin 2018/39

(51) Int Cl.:
A42B 3/32 (2006.01)

(21) Application number: **15817433.4**

(86) International application number:
PCT/ES2015/000162

(22) Date of filing: **17.11.2015**

(87) International publication number:
WO 2017/085331 (26.05.2017 Gazette 2017/21)

(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:
MA MD

(71) Applicant: **ION, Gabi Mirela**
28043 Madrid (ES)

(72) Inventors:
• **ALONSO ZAMORANO, Juan**
28043 Madrid (ES)
• **ION, Gabi Mirela**
28043 Madrid (ES)

(74) Representative: **González López-Menchero, Álvaro Luis**
Protectia Patentes y Marcas, S.L.
C/ Arte 21, 2ªA
28033 Madrid (ES)

(54) **NON-REASSEMBLABLE DIVISIBLE HELMET**

(57) A helmet (1) formed by two half-shells (2) (3), each formed by an outer shell (5) and (7) incorporating impact-absorbing material and a complementary impact-absorbing material (4) and (6), wherein each half-shell has a series of recesses and projections, wherein the projections have slots integrated in such a manner that by interlocking the recesses with the projections a continuous duct (11) is defined and, also, has one or various safety and retention slots that prevent the re-introduction of the spring-strip (9) in the duct (11), once removed to separate the half-shells, and retain the spring-strip inside the duct, wherein the outer shell (5) and (7) and the absorbing material (4) and (6) of each half-shell (2), (3) also has a geometry such as to allow interlocking in the vertical direction and in the horizontal direction. A divisible helmet is achieved, wherein the parts cannot be reassembled once separated on removing the spring-strip that joins them together, in addition to avoiding dangers and improving the structural reinforcement due to the similarity between the dimensions of the spring-strip and those of the channel span.

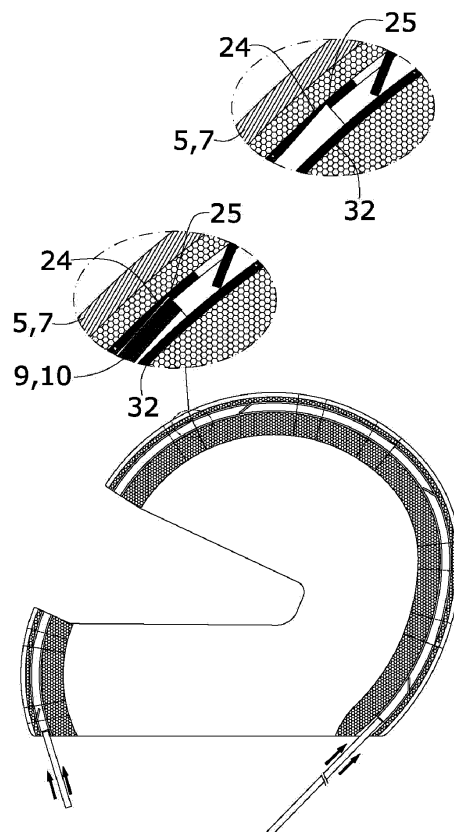


FIG.10

EP 3 378 343 A1

Description

OBJECT OF THE INVENTION

[0001] The object of the present invention, as established in the title of the invention, is a non-reassemblable divisible helmet, i.e. it makes reference to a protective garment worn on the head and generally made of metal or other resistant material, typically for protecting the head from high-speed impacts or collisions, which may be separable and does not allow subsequent reassembly. The helmets may be open or open face, covering at least the crown, forehead and temples, or full face helmets that also cover the chin or jawbone. There are other helmets, known as convertible, which allow the chinrest to pivot upwards, in the manner of an open face helmet. The helmet of the present invention is of any of the aforementioned types.

[0002] The present invention is characterised in the special constructive form of the helmet, i.e. it may be removed from the user's head in case of accident without moving the head, pulling or twisting the neck which, also, due to its constructive form, once separated, prevents the disassembled parts from being reassembled and, also, is structurally reinforced. In addition, it may be robotically manufactured.

[0003] Therefore, the present invention falls within the field of head protection means, particularly helmets and, more specifically, helmets separable or divisible into parts in order to facilitate removal from the head.

BACKGROUND OF THE INVENTION AND TECHNICAL PROBLEMS TO BE SOLVED

[0004] Different helmets are known in the state of the art which allow removal from the head without need to move the wearer's head, since they can be separated into at least two parts, thereby facilitating removal of the helmet and access to the user's head.

[0005] In general, these helmets, such as that disclosed in patent WO2014041215, have two interlockable half-shells having complementary recesses and projections, such that both the recesses and projections of the outer shell and of the impact-absorbing material of each of the half-shells are complementary, such as to allow the interlocking and adjustment of each half-shell, also having a series of rigid protuberances of the shell itself and perforations defined in each half-shell such that, once interlocked, define a continuous duct wherethrough a spring-strip is made to pass with the object of joining the two parts.

[0006] The helmet disclosed in said patent of the state of the art has two basic layers, one rigid outer shell and an internal impact-absorbing material. In order to create the channel wherethrough the spring-strip passes, rigid protuberances or wedges were used which had a cavity at their end to close and form the continuous channel wherethrough the spring-strip passed. Since these hard

protuberances deeply penetrate the absorbing material, its thickness is reduced by more than half, also reducing its capacity for absorbing shocks and, also, in the event of an isolated impact on said protuberances, can even perforate the thin layer of absorbing material that separates them from the skull, perforating it.

[0007] The helmet thus defined nonfulfils the user safety objective, since it has dangerous risks such as the alternative reduction in the layer of absorbing material, multiplying the danger that the rigid protuberances of the same material of the helmet shell and by way of extension thereof perforate the impact-absorbing material and inserted to create the channel wherethrough the spring-strip that joins the two halves perforate the skull and become introduced in the brain.

[0008] In addition, its manufacturing process is traditional, subject to human error, slow and expensive.

[0009] Also, said helmet has aspects susceptible of being improved, such as the fact that the union of the two half-shells is limited to a joint strip of undefined dimensions, which remains "loose" with respect to its channel; furthermore, the channel wherethrough the spring-strip is inserted lacks self-retention means, due to which the spring-strip could fall out of its housings simply due to the vibration during use thereof or minor impacts. In addition, the looseness of the spring-strip with respect to the channel will produce the movement between the two half-shells, allowing the entrance of water, wind and external noise; but even worse is the fact that the helmets, once opened by EMS technicians after an impact or accident, allow reassembly and reuse thereof, with the ensuing danger, as their structure is normally weakened after an impact.

[0010] The present invention avoids all these problems, describing a non-reassemblable divisible helmet that:

- eliminates the hazardous protuberances of the shell.
- incorporates slots and spring-strips having dimensions adjusted therebetween.
- has different safety slots which include a helmet anti-reassembly system, such that, upon removing the spring-strips, they cannot be reintroduced.
- the safety slot system has means which also exert pressure on the spring-strips, retaining them without preventing their removal by EMS technicians.
- the slots are embedded and surrounded exclusively by impact impact-absorbing material, endowing them with a double shock absorption zone and constant thickness, one on the upper part, between the slot and the shell, and another, on the lower part, between the slot and the skull and/or head. This, together with the fact that the slots are disposed parallel to the shell, without projections or rigid material

projected towards the interior of the shell, completely eliminates the risk of cranial perforation in the event of impact.

- this helmet can be robotically manufactured, as in the case of vehicles and other goods, reducing the risk of human error, multiplying their production and lowering costs.

DESCRIPTION OF THE INVENTION

[0011] The object of the present invention is a non-reassemblable divisible helmet which is also structurally reinforced, i.e. a helmet that can be separated or divided into its constituent parts, preferably two, and which due to its construction, geometry and safety slots prevents the reassembly or rejoining of the two parts after being separated by EMS technicians, wherein the safety slots that form the duct are embedded and surrounded by impact-absorbing material, wherein some safety slots secure the spring-strip or strip in place, preventing it from becoming involuntarily separated from the helmet due to vibrations and/or insignificant blows which, also, firmly and solidly joins its parts, offering an integrated structural reinforcement to the entire helmet, which can be robotically manufactured.

[0012] Each of the halves that compose the helmet, hereinafter referred to as half-shells, have a joint profile having complementary recesses and projections such that the half-shells are disposed in opposition by the joint profile, forming an integral helmet shell.

[0013] In general, the projections of each half-shell have a slot(s) forming a future duct, inserted in such a manner that, with the recesses interlocked with the projections, a continuous duct is defined and also has means that prevent the reintroduction of the spring-strip or strip in the duct, once removed to separate the half-shells.

[0014] Each of the half-shells is designed in such a manner that, in the joint profile with the other half-shell, it has a design such that the shell with part of the absorbing material defines projections interlockable with seats or with recesses of the impact-absorbing material or, briefly, absorbing materials of said half-shell, said half-shell having recesses and projections complementary to those defined in the joint profile of the other half-shell.

[0015] Part of the absorbing material is incorporated and firmly adhered to each of the projections defined in the shell of each half-shell and there are slots in each of these projections of absorbing material in each half-shell, such that we will name the set or combination of the type or various types of slots continuous duct or, simply, duct, such that, on interlocking the shell with part of the absorbing material with the rest of the absorbing material of each half-shell and, subsequently, the half-shells therebetween, they define a continuous duct wherethrough a spring-strip or strip passes, which is longitudinally flexible but rigid and firm against shear forces, having a cross-section similar to the space available therein,

which interlocks with the interior space of the duct, forming a single and integral body which acts as a beam, for example, made of steel, Kevlar, etc., extending from the front part towards the rear part or nape and, in the case of a full face helmet that also protects the jawbone, fulfils the same chinrest reinforcement objective of the helmet.

[0016] Therefore, reference can be made to an interlock in the vertical direction of each of the recesses and projections defined in the parts of each half-shell, in addition to an interlock in the horizontal direction of each of the recesses and projections defined in the joint profile of each half-shell.

[0017] Due to the structural characteristics of each half-shell and to the fixation and retention of the spring-strip inside the channel, the helmet is endowed with greater overall structural rigidity and also improves the union between the absorbing material and the shell.

[0018] Furthermore, and with the object of preventing the reuse of the helmet once its two half-shells have been separated upon removing the spring-strip, it has means for preventing the reintroduction of the spring-strip and that in a possible embodiment, said means would consist of disposing two flaps folded towards the interior of the free space of the slot with the free edge of the flaps, either in the longitudinal direction of the slot or in the transverse direction of the slot, using assembly parts disposed underneath the folded flaps and which are pushed and moved along the end of the spring-strip in its first passage through the slot and, consequently, through the rest of the duct envisaged for such purpose and which prevent the reintroduction of the spring-strip once removed.

[0019] Said folded flaps, in addition to fulfilling the function described once the helmet is joined, secure the spring-strip in the interior of the slot on exerting pressure thereon. On doing so they prevent it from moving or moving forward inside the slot, causing them to accidentally fall out of the helmet due to vibrations or insignificant impacts, and also prevent it from vibrating in its interior due to sudden movements, wind, etc., as well as sideways movements between the half-shells.

[0020] In another alternative embodiment, in order to prevent the reintroduction of the spring-strip in the interior of the channel, the duct may have one or various type 3 slots, which will be defined later in the text, having reduced thickness on one of its upper ends which define steps in its union with the following slots and in an opposite direction to the forward movement of the spring-strip. In another possible embodiment, which would prevent the reintroduction of the spring-strip in the interior of the duct and, also, would fulfil the purpose of retaining it in its interior, the duct may have one or various type 7 slots, which will be defined later in the text which, having the characteristics of the previous type 3 slots, incorporates a flap folded towards the interior of the free space of the slot, with the free edge of the flap in the transverse direction of the slot.

[0021] Also, another possible way of making the helmet safe by preventing the reintroduction of the spring-

strip is by means of a flap folded towards the interior of the type 4 slot, which will be defined later in the text, and with the free edge disposed transversely to the longitudinal direction of this slot and, thus, of the duct.

[0022] Therefore, as mentioned earlier, when making reference to the term continuous duct or, simply, duct, reference is made to the set or combination of one type or various types of slots forming a defined continuous duct wherethrough the spring-strips are firmly housed, and which may have different types of slots:

- Type 1 slot (safety and retention) having flaps disposed on the free edge thereof in the longitudinal direction of the spring-strip, which prevents the re-introduction of the spring-strip in the interior of the slot upon opening the shell and which also retains the spring-strip in its interior.
- Type 2 slot (safety and retention) having flaps disposed with the free edge thereof in the transverse direction of the spring-strip disposed in opposition therebetween, which prevents the reintroduction of the spring-strip in the interior of the slot upon opening the helmet and which also retains the spring-strip in its interior.
- Type 3 slot (safety and blockage) having a recess on the upper part of one of its ends which defines steps in its union with the following slot. This type 3 slot is also designed to prevent the reintroduction of the spring-strip in the interior of the duct once the helmet has been separated on removing the spring-strip and lacks retention means.
- Type 4 slot (safety and blockage) having at least one flap with the free edge of the flap disposed towards the interior of the slot and transversal to the direction thereof, which prevents the reintroduction of the spring-strip in the interior of the slot and which also retains the spring-strip in its interior.
- Type 5 slot (standard safety) which has a completely smooth interior and exterior, not having any retention means whatsoever.
- Type 6 slot (non-removal/non-return) which seeks to prevent the recovery and/or removal of the assembly parts used with the first two types of slots.
- Type 7 slot (safety, retention and blockage) having the same recess mentioned for the type 3 slot and, also, having a flap folded towards the interior of the free space of the slot, with the free edge of the flap in the transverse direction of the slot.

[0023] All the flaps having type 1, type 2, type 4, type 6 and even type 7 slots have been made preferably using a die or any other similar method.

[0024] Thanks to the construction characteristics of this helmet, it may be manufactured robotically, i.e. in an automated manner, with the ensuing savings in material, labour, costs and human error.

[0025] Unless expressed otherwise, all the technical and scientific elements used in the present specification have the meaning usually understood by a person skilled in the art whereto this invention belongs. In the implementation of the present invention, similar or equivalent procedures and materials to those used in the specification may be used.

[0026] Throughout the description and the claims, the word "comprises" and its variants do not intend to exclude other technical characteristics, additives, components, materials or steps. For persons skilled in the art, other objects, advantages and characteristics of the invention shall be partly inferred from the description and partly from the implementation of the invention.

EXPLANATION OF THE FIGURES

[0027] As a complement to the description being made, and for the purpose of helping to make the characteristics of the invention more readily understandable, in accordance with a preferred embodiment thereof, said description is accompanied by a set of drawings constituting an integral part thereof which, by way of illustration and not limitation, represent the following:

Figure 1 shows a representation of an external view of a helmet, in this case a full face helmet, such as that object of the present invention.

Figure 2 shows the same previous representation wherein a spring-strip has been used.

Figure 3 shows the helmet partially separated, wherein part of one of the constructive forms of the interior can be observed, as well as the spring-strips or strips used in the case of a full face helmet, wherein only one, the longest, is required when opened.

Figure 4 shows a detailed view of a first embodiment, which shows the absorbing material and its relationship with the shell.

Figure 5 shows a second embodiment of the absorbing material and its relationship with the shell.

Figure 6 shows a detailed view of the left half-shell, wherein the shell appears separated with part of the absorbing material adhered thereto and the rest of the absorbing material.

Figure 7 shows the same previous representation wherein the spring-strip that passes through the continuous duct.

Figure 8 shows a first embodiment for preventing the reassembly of the two half-shells reusing the spring-strip upon opening the helmet on removing the spring-strip.

Figure 9 shows a second embodiment for avoiding the reassembly of the two half-shells reusing the spring-strip once the helmet has been opened.

Figure 10 shows a detailed view of a third embodiment that prevents the reassembly of the two half-shells by reintroduction of the spring-strip throughout the duct.

Figure 10A shows a representation of a type 3 slot, wherein a longitudinal cross-section thereof can be observed.

Figure 10B shows a more detailed view of the possible combination of a type 3 slot with other possible types of slots for forming a duct.

Figure 11 shows a type 4 slot, which seeks to fix or retain the spring-strip within the duct under pressure.

Figure 12 shows a type 5 slot, completely smooth and without any retaining means.

Figures 13A, 13B and 13C show the type 6 slot, non-removal/non-return of assembly parts and the entry process of the bevelled assembly parts in their cavity or storage deposit, their housing and the subsequent removal of the spring-strip that prevents the removal/recovery thereof.

Figure 14A, 14B and 14C shows the type 6 slot and the entry process of the quadrangular/prismatic assembly parts in their cavity or storage tank, their housing and the subsequent removal of the spring-strip that prevents the removal/recovery thereof.

Figure 15 shows a type 6 slot, non-removal/non-return, with details of the flap that prevents the recovery of the assembly parts and the cavity or deposit wherein they are definitively housed.

Figure 16 shows a type 7 slot, which is the result of the simultaneous combination of type 3 and type 4 slots, therefore offering safety, preventing the reintroduction of the spring-strip and ensuring the retention of the spring-strip in the interior.

Figure 17 shows a cross-section of the helmet where the spring-strip introduced can be observed with the pulling grips showing.

Figure 18 shows a rear view of a helmet and a deposit or cavity of the type 6 slot for the definitive housing

of the unrecoverable assembly parts used for the first passage of the joint strip that joins the two half-shells, disposed on the rear part of the helmet, near the nape.

Figure 19 shows an anterior view of a helmet and the deposit or cavity of the type 6 slot, for the definitive housing of the unrecoverable assembly parts, used for the first passage of the joint strip that joins the two half-shells, disposed on the front part of the helmet or chinrest.

PREFERRED EMBODIMENT OF THE INVENTION.

[0028] In light of the figures, following is a description of a preferred embodiment of the proposed invention: Figure 1 shows a helmet shell (1) formed by two half-shells, a right half-shell (2) and a left half-shell (3), which interlock in order to be assembled forming the helmet shell (1), wherein each of the half-shells are destined for offering protection to the skull area and, in the case of a full face shell such as that represented, and/or convertible, although not represented, also to the jawbone or chinrest (8) zone.

[0029] The right half-shell (2) comprises an outer shell (5) and absorbing padding (4), while the left half-shell (3) comprises an outer shell (7) and absorbing padding (6), the two parts having a geometry such as to allow fitting and interlocking, as well as an overall structural reinforcement of the helmet.

[0030] In figure 2, mention should be made of a first joint strip (9) disposed on the part extending from the forehead to the nape and, although not represented, it can be assembled conversely, having a projection or pulling grip at one end (9.1); in the case of full face and/or convertible helmets, it also has a second joint strip (10) for joining the half-shells at the chin part, and which has a projection or pulling grip (10.1).

[0031] Said projection or pulling grip (9.1) would previously exist incorporated to the spring-strip when the spring-strip is introduced through the duct in the direction from the forehead to the nape, otherwise, i.e. if it were introduced from the nape to the forehead, said projection would subsequently have to be coupled to the end that would project from the forehead, on pushing the spring-strip mechanically from the nape zone sufficiently to couple it thereto, subsequently reintroducing it. The same occurs with the projection or pulling grip (10.1) of the second spring-strip (10), which would be present if introduced through the duct from the nose to towards the chin. On the contrary, i.e. introducing it from the chin zone towards the nose, the projection is coupled to the end that would project near the nose, as described in the previous case.

[0032] Each of the half-shells (2,3) has, in the joint profile, a series of recesses and projections defined in such a manner as to allow perfect interlocking, which may also be tongue-and-groove interlocking, of the two half-shells.

[0033] Figure 3 shows that the right half-shell (2) has projections (2.1) and recesses (2.2), while the left half-shell (3) has projections (3.1) and recesses (3.2) having a geometry such that the projections (2.1) of the right half-shell (2) interlock with the recesses (3.2) of the left half-shell (3) and the projections (3.1) of the left half-shell interlock with the recesses (2.2) of the right half-shell.

[0034] The same occurs in the jaw protection zone, that the right half-shell (2) has at least one chinrest projection (2.3) and, at least, one chinrest recess (2.4) and the left half-shell (3) has at least one chin projection (3.3) and at least one chinrest recess (3.4).

[0035] Figure 3 also reveals the presence of a continuous duct or, abbreviated, duct, of the helmet (11) extending from the forehead part to the rear part or nape zone or vice versa, and a continuous duct or, abbreviated, duct, from the chinrest (12) extending through the jaw protection area. The two ducts (11) and (12) have dimensions such as to allow the housing and retention of the spring-strip once housed in its interior.

[0036] In this figure, the first spring-strip (9) and the second spring-strip (10) can be observed, both with their respective projections or pulling grips (9.1) and (10.1), said first and second spring-strip (9) and (10) having dimensions such that they fit into the duct wherein they are housed such as to form a compact body in the manner of a rigid beam.

[0037] Figure 4 shows a first constructive form of each half-shell which is such that underneath the projections (7.2) of the shell of the left half-shell (7) projections (7.1) of impact-absorbing material or, simply, absorbing material of the left half-shell, are adhered thereto, having first slots (11.1) of a duct. The impact-absorbing material (6) of the left half-shell, in its joint strip, has projections (6.1), recesses (6.2) and seats or grooves (6.3) on each projection (6.1), wherein second ducts (11.2) are disposed on the upper part of each of the projections (6.1) such that, upon interlocking the upper part of the absorbing material adhered to the shell with the lower part, i.e. to the rest of the absorbing padding, the projections (7.1) are disposed on the seats (6.3) and the first ducts (11.1) are aligned with the second ducts (11.2) forming a first duct part of the future and complete continuous duct (11). Exactly the same occurs with the right half-shell (2), wherein underneath the projections (5.2) of the shell (5) there are projections (5.1) of absorbing material adhered thereto, having a third slot (11.3) of the duct (11), while the absorbing material (4) has, in its joint profile, projections (4.1), recesses (4.2) and seats or grooves (4.3) on each projection (4.1), with fourth slots (11.4) of the duct (11) being disposed on the upper part of each of the projections (4.1) such that, upon interlocking the upper part of the absorbing material adhered to the shell with the lower part, i.e. with the rest of the absorbing material, the projections (5.1) are disposed on the seats (4.3) and the third slots (11.3) are aligned with the fourth slots (11.4), forming a second duct part of the future and complete continuous duct (11).

[0038] Figure 5 shows an alternative embodiment, wherein the left half-shell, as in the previous case, underneath the projections (7.1) of absorbing material having slots (11.1) of the duct (11), while the absorbing material (6) has projections (6.1) and recesses (6.2), wherein the upper part of the projections (6.1) have slots (11.2) of the duct (11) such that, coupled to the upper part of the absorbing material adhered to the shell (7), the projections (7.1) are interlocked with the recesses (6.2), and the slots (11.1) are aligned with the slots (11.2), forming a first duct part of the future and complete continuous duct (11).

[0039] In a complementary manner, the same occurs with the right half-shell (2) wherein, underneath the projections (5.2) of the shell (5), it has projections (5.1) of absorbing material and a slot (11.3), while the absorbing material (4) in its joint profile has projections (4.1), recesses (4.2), wherein slots (11.4) are disposed on the upper part of each of the projections (4.1) such that, on coupling the upper part of the absorbing material adhered to the shell to the lower part, i.e. with the rest of the absorbing material, the projections (5.1) are disposed parallel to the recesses (4.2) and the slots (11.3) aligned with the slots (11.4) forming a second duct part of the future and complete continuous duct (11).

[0040] Once each of the right and left half-shells are interlocked, the front part of the joint profile that joins the two half-shells is assembled, wherein all the slots (11.1), (11.2), (11.3) and (11.4) are aligned forming a continuous duct (11).

[0041] The same principles and embodiments are applicable to the chinrest wherein, likewise, after coupling the shell having part of the absorbing material to the rest of the absorbing material of each half-shell and, upon assembling the two half-shells, a continuous duct (12) of the chinrest is formed.

[0042] That is, in both embodiments, each of the half-shells has a shell having a profile with recesses and projections, where to part of the absorbing material is firmly incorporated or adhered, having a geometry complementary with the rest of the absorbing material of said half-shell and with an external profile such as to allow interlocking with the profile of the other half-shell, defining a continuous duct (11) and/or (12).

[0043] Consequently, reference can be made to an interlocking in the vertical direction of each of the recesses and projections defined in the parts of each half-shell, in addition to an interlock in the horizontal direction of each of the recesses and projections defined in the joint profile of each half-shell.

[0044] Figures 6 and 7 show a complete view of the left half-shell, wherein the complementary nature of the external shell can be observed with the rest of the absorbing material. Figure (7) shows the passage of the first spring-strip (9) and the second spring-strip (10).

[0045] Figures 8 to 16 show the different types of slots used to form some types of continuous duct (11) and/or (12) and which, conveniently combined, will offer safety,

due to preventing the reintroduction of the spring-strip in the duct and/or retaining the spring-strip inside the duct.

[0046] Figure 8 shows a first embodiment for preventing that, once the two half-shells (2) and (3) are separated on removing the spring-strips (9) and (10), the two half-shells can be reassembled on impeding the reintroduction of the spring-strips.

[0047] This embodiment comprises a type 1 safety and retention slot (30) having two die cuts that produce two flaps (13) and (14), both folded towards the inner space of the slot, such that the free end of the flaps (13) and (14) extends in the longitudinal direction of the duct, having opposing inclinations, using therein two wedged or bevelled assembly parts (15) and (16) having a wedge vortex (15.1) and (16.1), respectively, in correspondence with the free end of the flaps, such that, on introducing the assembly parts (15) and (16), said vortices lift the flaps, aligning them with the inner contour of the duct, subsequently allowing the passage of the spring-strip.

[0048] Said wedged parts (15) and (16) are housed underneath the flaps of the interior of each type 1 slot, included in one continuous duct (11) and/or (12) in front of the first passage of the spring-strip (9) or (10) during the helmet manufacturing process, in a single possible assembly, such that during the spring-strip (9) or (10) introduction process, it pushes and drags one of the parts (15) or (16) until pushing the other, finally falling out of the exterior of the helmet and being recovered by the manufacturer or being housed by the opposite end to that of introduction of the spring-strip (9) or (10) in the cavity or unrecoverable storage deposit envisaged in the type 6 slot, when it exists in the embodiment.

[0049] In those cases where the spring-strip (9) is introduced from the nape towards the forehead and the spring-strip (10) from the chin to the nose, the wedged assembly parts (15) and (16) project from the forehead and from the nose, respectively, while if the spring-strip is introduced from the forehead to the nape or from the nose towards the chin, they would be housed in a type 6 safety and non-removal/non-return slot, ending blindly in an ad hoc storage deposit (17) and (18) for said parts, as can be observed in figure 13A-13B, 13C, in relation to figures 17 and 18. Alternatively, they can project outwards if other types of slots are used at the end near the nape or chin.

[0050] Figure 9 shows a second embodiment for preventing that, once the two half-shells of the helmet are separated due to the removal of the strips (9) and (10), the two half-shells cannot be reassembled on impeding the penetration of the spring-strips.

[0051] This second embodiment comprises a type 2 safety and retention slot, having two die cuts that produce two flaps (19) and (20), both folded towards the inner space of the duct, such that the free end of the flaps (19) and (20) is disposed transversely in the longitudinal direction of the duct, having opposing inclinations and disposed in opposition therebetween, using two prismatic assembly parts (21) and (22) housable thereunder and

movable through the interior of the duct and, subsequently, through the rest of the duct, as shown in the sequence of forward movement of the spring-strip on being introduced in the interior of the slot.

5 **[0052]** In both embodiments, those shown in figures 8 and 9, the flaps (13) and (14), on the one hand, and (19) and (20) on the other, have a fold with opposing inclinations with the object of preventing the introduction of the strip through either of its two ends.

10 **[0053]** The assembly parts, both wedged (15) and (16) prismatic (21) and (22), serve to allow the passage of the spring-strips in their first and only assembly in-factory, such that once expelled outside of the continuous duct, according to one of the forms of assembly, or housed in the type 6 slot(s) (17), storage of lost parts, due to impeding their recovery or removal, as shown in figures 13A, 13B, 13C, and figures 14A, 14B, 14C, according to another of the embodiments, the flaps (13) and (14), in one case, and (19) and (20) in the second embodiment would impede the reintroduction of the spring-strip through either end of the duct, once removed by the EMS technicians in accidents. In the event of the existence of a type 6 slot in the duct, it would, on its own, prevent the reintroduction of the spring-strip from the nape and/or chin due to its blind end.

25 **[0054]** Figure 10 shows a third embodiment for preventing the reintroduction of the spring-strip once removed in the separation of the helmet half-shells and that comprises a type 3 safety and blockage slot (32), such that and as can be observed comprises a recessed end (24) which, in its union with the following slot of the duct, forms a step (25), represented in the upper detail, and that as can be observed in the lower detail, in the reintroduction of the spring-strip (9) or (10) prevents the forward movement of the spring-strip.

30 **[0055]** Figures 10A and 10B shows a detail of the type 3 safety and blockage slot (32), which on one of its ends has an inner recess (24) such that, coupled to other types of slots (30), (31), (33), (34) and/or (36) and, even, with another (32), defines a step (25) that impedes the reintroduction of the spring-strip.

35 **[0056]** Figure 11 shows a type 4 safety and retention slot (33) that seeks to prevent the reintroduction of the spring-strip once removed, in addition to retaining and fixing the spring-strip inside the slot and, thus, the duct, having for such purpose a single flap (26), produced by a three-sided die, with the free edge inside the slot and transversal to the direction thereof. Depending on the orientation of the inclination of the flap (26), the spring-strip may be introduced in this slot through one end or another.

40 **[0057]** Figure 12 shows a type standard safety 5 slot (34) having no retention means whatsoever, designed to complement any duct in any embodiment.

45 **[0058]** Figures 13A, 13B, 13C and 14A, 14B and 14C show the housing and storage process of the wedged assembly parts (15) and (16), on the one hand, and the prismatic assembly parts (21) and (22) on the other,

pushed by the spring-strip (9) or (10) until being housed inside the storage (17) without possibility of being recovered. To such end, a type 6 slot (35) is used, which prevents the removal/recovery of the wedged assembly parts (15) and (16) or the prismatic assembly parts (21) and (22). To this end, type 6 slots have flaps (23), resulting in a three-sided die, folded towards the interior thereof, in such a manner as to allow the introduction of the assembly parts but not their removal, and the final end of said type 6 slot is closed (37), since on removing the spring-strip (9) or (10), the flap (23) returns to the interior of the slot.

[0059] Figure 15 shows a detailed view of a type 6 slot (35), safety and non-removal/non-return, which, as indicated, has a flap (23) folded towards the interior of the slot and with the free edge transversal to the longitudinal direction of the slot, having a blind final end (37), that defines a storage (17) in which to house the assembly parts without possibility of removal.

[0060] Figure 16 shows a detailed view of a type 7 safety, fixation and blockage slot (36) which, as can be observed, is a fusion of type 3 and type 4 slots into a single slot, due to which it has a flap (26) folded towards the inner space of the slot, and a recess (24).

[0061] Figure 17 shows how the ducts (11) and (12) are formed by a succession of various types of slots: type 4 slots (33) which prevent the reintroduction of the spring-strips (9) or (10) once removed, and type 5 slots (34). Given that in this embodiment the spring-strip(s) must be introduced from the nape and/or chin, the accesses must subsequently be blinded by means of welding or any other firm and resistant system.

[0062] In the embodiment shown in figures 17 and 18, the ends of the spring-strips (9) and (10) would have a projection or pulling grip (9.1) and (10.1) would respectively project from the respective ducts.

[0063] The possibilities of assembly and combination of the different types of slots for forming the ducts would be, in an orientatively but not limited to:

- The type 1 safety and retention slot (30) and the type 2 safety and retention slot (31) can be combined with:

- i. both therebetween, in which case it would be advisable to use recoverable parts, due to the size of the deposit of slot 6.
- ii. safety and retention slot 4 (33): Although this slot can be assembled in any direction, it should be taken into account that the orientation of the flap will condition wherethrough the spring-strip is introduced.
- iii. type 5 standard safety slot (34).
- iv. one or various type 4 safety and retention slots (33) and/or with one or various type 5 standard safety slots (34).
- v. one type 6 non-removal/non-return slot (35).
- vi. a combination of type 4 (33), type 5 (34) and one type 6 (35) slot.

- vii. a combination of type 3 (32), type 4 (33), type 5 (34) and type 7 (36) slots, provided that the spring-strip is introduced through the nape and/or chin, and slots 3 and 7 have their recessed upper edge oriented in a direction such as to allow the forward movement of the spring-strip towards the forehead and/or nose, subsequently closing the inlet orifice(s) of the spring-strip(s) by welding or by any other firm method.
- viii. one or various type 7 safety, blockage and retention slots (36), provided that the spring-strip is introduced through the nape or chin and their upper recessed edge is oriented towards the nape and/or chin, subsequently closing the inlet orifice(s) of the spring-strip(s) by welding or by any other firm method.

[0064] Type 3 safety and blockage slot (32), on lacking means for retaining the spring-strip in the interior of the duct, can and should be combined with:

- i. at least one type 1 and/or type 2 safety and retention slot (30) and/or (31), in which case the introduction of the spring-strip is nape forehead and chin nose, as otherwise the upper recess of this slot 6 would impede the forward movement of the spring-strip.
- ii. at least, one type 4 safety and retention slot (33).
- iii. at least one type 5 standard safety slot (34), in addition to any of those described, including type 7 slot (36) and with the exception of type 6 slot (35).
- iv. a combination of type 4 slot(s) (33) and type 5 slot(s) (34).
- v. the helmet can also be executed using a combination of this type 3 slot (32) and type 4 slot(s) (32).
- vi. one or various type 7 safety, blockage and retention slots (36), both types of slots having their upper recessed edges oriented towards the nape and/or chin.

[0065] Type 4 safety and retention slot (33) can be combined to execute the helmet with:

- i. itself, in a succession of type 4 slots (33), sufficing this combination to enable, on its own, an embodiment of the helmet with the same helmet safety and non-reassembly guarantees.
- ii. with one or various type 5 standard safety slot(s) (34).
- iii. with one type 1 safety and retention slot (30) plus/or one type 2 safety and retention slot (31).
- iv. with one combination of previous point iii and one or various type 3 safety slots (32) oriented as explained earlier in the specification.
- v. a combination of previous points iii and iv and one or various type 5 standard slot(s) (34).
- vi. one or various type 7 safety, blockage and retention slots (36), combined or not with any of the fore-

going, except type 6 slot.

[0066] Type 5 standard safety slot (34) can be combined with all the foregoing slots to form the duct, including type 7 slot (36).

[0067] Type 6 non-removal/non-return slot (35) can be combined with:

- i. one or various type 1 slot(s) (30) plus/or type 2 safety and retention slot(s) (31), being advisable to consider the space in its storage deposit if more than one.
- ii. a combination of previous point i with one or various type 5 slot(s) (34).

Type 7 safety, blockage and retention slot (36) can be combined with:

- i. itself, in a succession of type 7 slots (36), this combination sufficing to enable the embodiment of the helmet that achieves the safety and prevents the re-assembly thereof.
- ii. all the foregoing slots except type 6 slot (35).

[0068] As a result of the geometry of each of the half-shells and of the arrangement of the different slots on the projections and nature thereof, on interlocking the parts of each half-shell and the half-shells therebetween, a continuous duct is defined that runs longitudinally along the joint profile penetrating the projections, said continuous duct acting as a compact structural reinforcement beam, increasing structural resistance, both to impact and to perforation and, also, prevents the vibrations and movement of one half-shell with respect to the other. Said structural reinforcement increases with respect to another existing helmet, on passing the joint strip through both half-shells in such a manner as to occupy all the available duct space, conferring the same resistance that would be provided by a beam made of steel or other high impact resistant material.

[0069] Therefore, as a result of the previously described characteristics, a helmet is developed that prevents the reassembly of the two half-shells once separated on removing the spring-strip that joins them together, maintains a continuous thickness of the impact-absorbing material, both on its upper part and on its lower part, avoiding a reduction in absorbing material and avoiding isolated reductions in absorbing material and, thus, the danger of the rigid parts becoming inserted in or perforating the skull due to not being necessary but rather dangerous; in addition, it improves structural resistance on acting the spring-strip/channel in the manner of a solid beam, without loose spaces that make the half-shells vibrate and move sideways therebetween. The accidental expulsion of the spring-strip is also prevented, in addition to the internal movement thereof, in addition to impeding the entrance of water or wind.

[0070] Having sufficiently described the nature of the

present invention, in addition to the implementation thereof, it is hereby stated that, within its essentiality, it may be implemented in other embodiments that differ to that indicated by way of example and which will also achieve the protection applied for, provided that they do not alter, change or modify its basic principle.

Claims

1. A non-reassemblable divisible helmet comprising:

A helmet shell (1) formed by a right half-shell (2) and a left half-shell (3), wherein each of the half-shells is formed by an outer shell (5) and (7) made of rigid material and an impact-absorbing material (4) and (6), each of the half-shells (2) and (3) having recesses (2.2), (3.2) and projections (2.1) and (3.1), respectively, in such a manner that the recesses of the shell and of the absorbing material of each half-shell interlock, **characterised in that**

- Each of the half-shells is designed in such a manner that, in the joint profile that joins the two half-shells, it has a design such that the shell with part of the absorbing material defines projections interlockable with seats or recesses in the absorbing material of each half-shell, each half-shells having recesses and projections complementary to those defined in the joint profile of the other half-shell;

- In addition, each of the projections defined in the shell of each half-shell has part of the absorbing material adhered thereto with a slot that forms part of the continuous duct and in each projection of the absorbing material of each half-shell there is another duct that also forms part of the continuous duct, such that, on the shell with part of the absorbing material to the rest of the absorbing material of each half-shell and the half-shells therebetween, a continuous duct (11) is defined wherethrough a first spring-strip (9) runs, having a cross-section such that it interlocks in the inner space of the duct, forming a single integral body;

- The continuous duct (11) has one or various slots that offer safety and retention, i.e. that on the one hand prevent the reintroduction of a first spring-strip (9) through the duct upon removing the spring-strip to separate the shells and, on the other, retain the spring-strip inside the continuous duct (11).

2. The non-reassemblable divisible helmet, according to claim 1, **characterised in that** the slots that offer

safety and retention are type 1 slots (30) comprising two flaps (13) and (14) embodied on the slots, both folded towards the inner space of the slot, in such a manner that the free end of the flaps (13) and (14) runs in the longitudinal direction of the slot and, therefore, of the rest of the duct, having opposing inclinations using two wedged assembly parts (15) and (16) which have a wedge vortex (15.1) y (16.1) respectively in correspondence with the free end of the flaps, housable and movable through the interior of the slot and, where applicable, through the rest of the continuous duct.

3. The non-reassemblable divisible helmet, according to claim 1, **characterised in that** the slot(s) that offer(s) safety and retention are type 2 slots (31) comprising two flaps (19) and (20), executed on the slot, both folded towards the inner space of the slot and, therefore, of the rest of the duct, in such a manner that the free end of the flaps (19) and (20) is disposed transversely to the longitudinal direction of the slot, having opposed inclinations and disposed in opposition therebetween, using two prismatic assembly parts (21) and (22) housable and movable through the interior of the slot and, where applicable, through the rest of the continuous duct.
4. The non-reassemblable divisible helmet, according to claim 1, **characterised in that** the slot(s) that offer(s) safety and retention are type 4 slots (33) having a flap (26) with the free edge disposed transversely to the duct.
5. The non-reassemblable divisible helmet, according to claim 2 or 3 or 4, **characterised in that** the slot(s) that offer(s) safety and retention also comprise(s) a type 3 slot (32) which offers blockage of the spring-strip that comprises a recessed end (24) which, in its union with the following slot in the duct, forms a step (25) that prevents the forward movement of the spring-strip.
6. The non-reassemblable divisible helmet, according to claim 1, **characterised in that** the slot(s) that offer(s) safety and retention are type 7 slots (36) having a flap (26) with the free edge disposed transversely to the slot and, therefore, to the rest of the duct, and a recess on one of its ends (24) which, in its union with the following slot in the duct, form a step (25) that prevents the forward movement of the spring-strip.
7. The non-reassemblable divisible helmet, according to any of the preceding claims, **characterised in that**, in addition to the safety and retention slots, any slots from among type 1, type 2, type 3, type 4 and type 7 slots or combinations thereof, it has one or various type 5 standard slots (34), having a smooth

exterior and interior.

8. The non-reassemblable divisible helmet, according to claim 2 or 3, **characterised in that** it has a type 6 slot (35) wherein a first storage (17) is defined which prevents the recovery of the assembly parts (15) (16) or (21) and (22), and has a flap (23) folded towards the interior thereof and in a direction that allows the introduction of said assembly parts in the storage deposit (17) of the slot 6 (35), but not the subsequent removal or recovery thereof.
9. The non-reassemblable divisible helmet, according to any of claims 1 to 8, **characterised in that** the first spring-strip (9) on one of its ends has a projection or pulling grip (9.1).
10. The non-reassemblable divisible helmet, according to any of the preceding claims, **characterised in that**, in the event of being a helmet equipped with a chinrest (8), it has a second chinrest duct (12) where-through a second spring-strip (10) passes, wherein the chinrest duct (12) has a cross-section such that the second spring-strip (10) fits into the inner space of the duct forming a single, integral body and said duct (12) has one or various safety and/or retention ducts that prevent the reintroduction of the spring-strip (10) once removed to separate the half-shells and retain the spring-strip inside the duct.
11. The non-reassemblable divisible helmet, according to claim 10, **characterised in that** the slot(s) that offer(s) safety and retention is a type 1 slot (30) comprising two flaps (13) and (14) executed on the slot (12), both folded towards the inner space of the slot, in such a manner that the free end of the flaps (13) and (14) extends in the longitudinal direction of the slot and, therefore, of the slot, having opposed inclinations using two wedged assembly parts (15) and (16) having a wedge vortex (15.1) and (16.1) respectively in correspondence with the free end of the flaps.
12. The non-reassemblable divisible helmet, according to claim 10, **characterised in that** the slot(s) that offer(s) safety and retention is a type 2 slot (31) comprising two flaps (19) and (20), both folded towards the inner space of the slot, in such a manner that the free end of the flaps (19) and (20) is disposed transversely to the longitudinal direction of the duct, having opposed inclinations disposed in opposition therebetween, using two prismatic assembly parts (21) and (22) housable and movable through the interior of the slot and, therefore, of the rest of the duct.
13. The non-reassemblable divisible helmet, according to claim 10, **characterised in that** the slot(s) that offer(s) safety and retention comprise(s) a fourth

type of slot (33) having a flap (26) towards the interior of the slot with the free end disposed transversely to the slot and, therefore, to the rest of the duct.

14. The non-reassemblable divisible helmet, according to claim 11 or 12 or 13, **characterised in that** the slot(s) that offer(s) safety and retention also comprise(s) a type 3 slot (32) comprising a recessed end (24) which, in its union with the following slot forms a step (25) that prevents the forward movement of the spring-strip. 5 10
15. The non-reassemblable divisible helmet, according to claim 10, **characterised in that** the slot(s) that offer safety and retention are type 7 slots (36) having a flap (26) towards their interior, with the free end disposed transversely to the slot and, therefore, to the duct, and a recess on one of its ends (24) which, in its union with the following duct slot, forms a step (25) that prevents the forward movement of the spring-strip. 15 20
16. The non-reassemblable divisible helmet, according to any of claims 9 to 15, **characterised in that**, in addition to any of the safety and retention slots of among type 1, type 2, type 3 and type 4 and type 7 slots, or combinations thereof, it has a fifth type of slot (34) having a smooth exterior and interior. 25
17. The non-reassemblable divisible helmet, according to claim 11 or 12, **characterised in that** it has a sixth type of slot (35) wherein a second storage deposit (18) is defined that prevents the recovery of the assembly parts (15) (16) or (21) and (22), and has a flap (23) folded in a direction which allows the introduction of said assembly parts in the storage deposit (18) of the duct but not the subsequent removal or recovery thereof. 30 35
18. The non-reassemblable divisible helmet, according to any of claims 10 to 17, **characterised in that** the second spring-strip (10) has a projection or pulling grip (10.1) on one of its ends. 40
19. The non-reassemblable divisible helmet, according to any of the preceding claims, **characterised in that** the outer shell (5) and (7) and the absorbing material (4) and (6) of each half-shell (2), (3) has a geometry such as to allow an interlock in a vertical direction of each of the projections (5.1) and (7.1) of absorbing material associated with the shells (5) and (7) of each half-shell with the recesses (6.2) or seats (6.3) of the rest of the absorbing material of each half-shell in a horizontal direction of each of the recesses (4.2) and (6.2) and projections (4.1) and (6.1) defined in the joint profile that joins the absorbing material of each half-shell, wherein the projections (5.1), (7.1), (4.1) and (6.1) have slots (11.3), (11.1), (11.4) and (11.2), 45 50 55

respectively, such that on interlocking the recesses with the projections a continuous duct (11) is defined.

20. The non-reassemblable divisible helmet, according to claim 20, **characterised in that**, in the case of being a helmet with chinrest, the shell having part of the absorbing material adhered thereto, together with the rest of the absorbing material of each half-shell, and on interlocking the two half-shells, a continuous duct (12) of the chinrest is formed.
21. The non-reassemblable divisible helmet, according to claim 20, **characterised in that** each of the half-shells (2,3) has a series of recesses and projections in the joint profile defined in such a manner as to allow tongue-and-groove interlocking of the two half-shells.

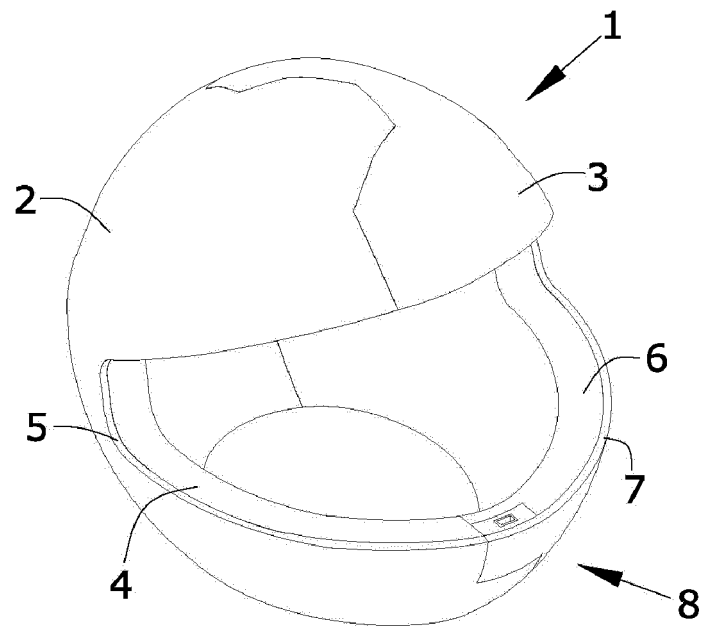


FIG.1

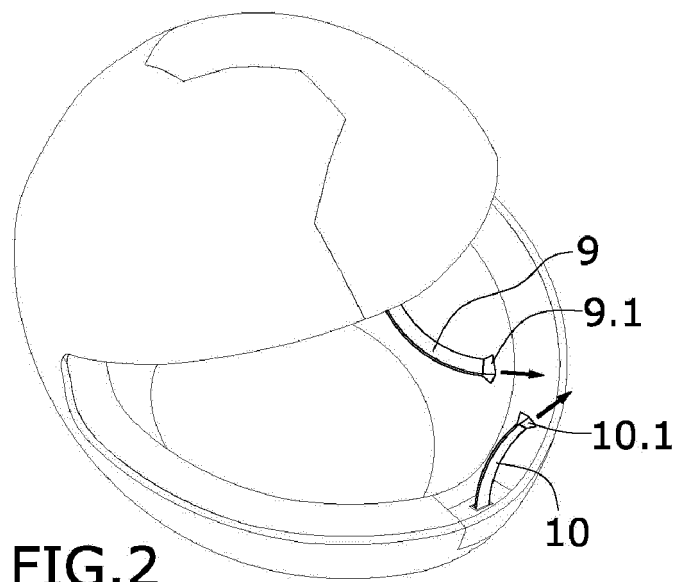
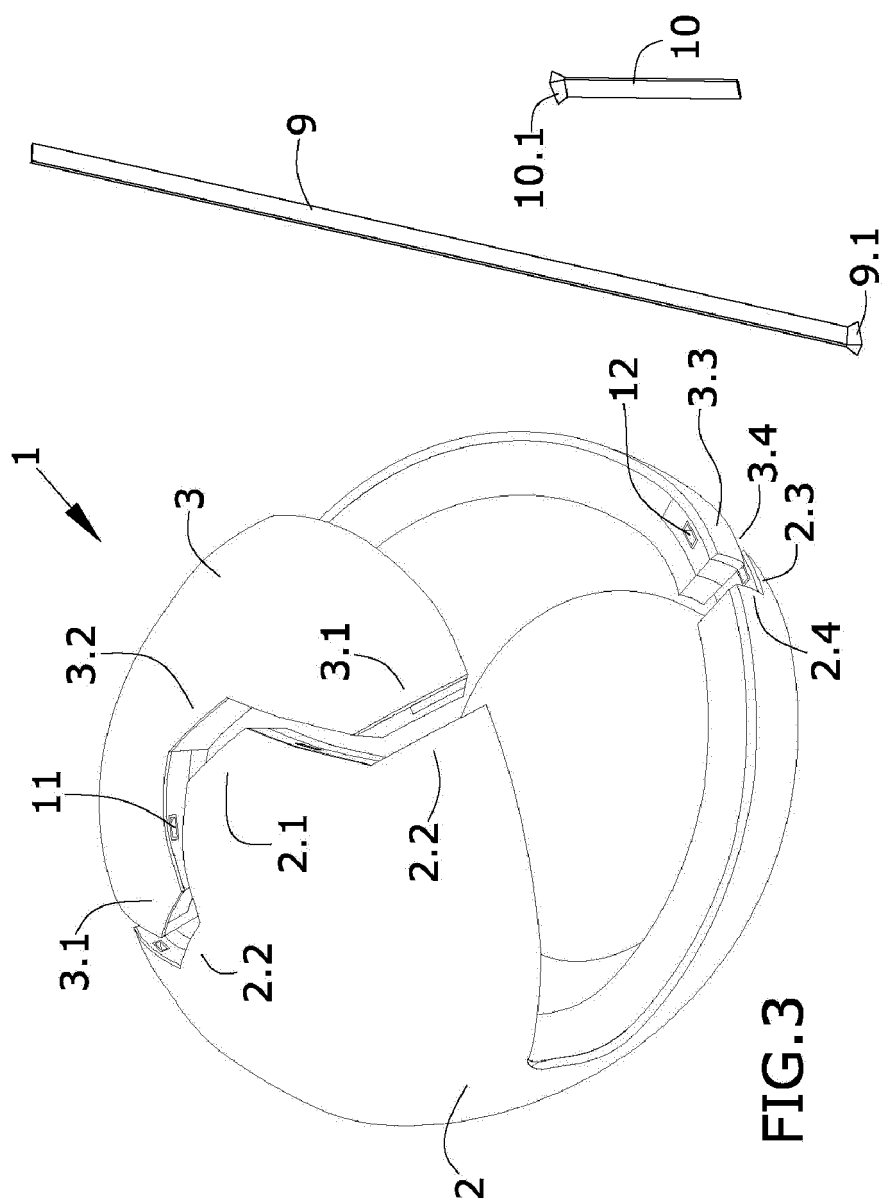


FIG.2



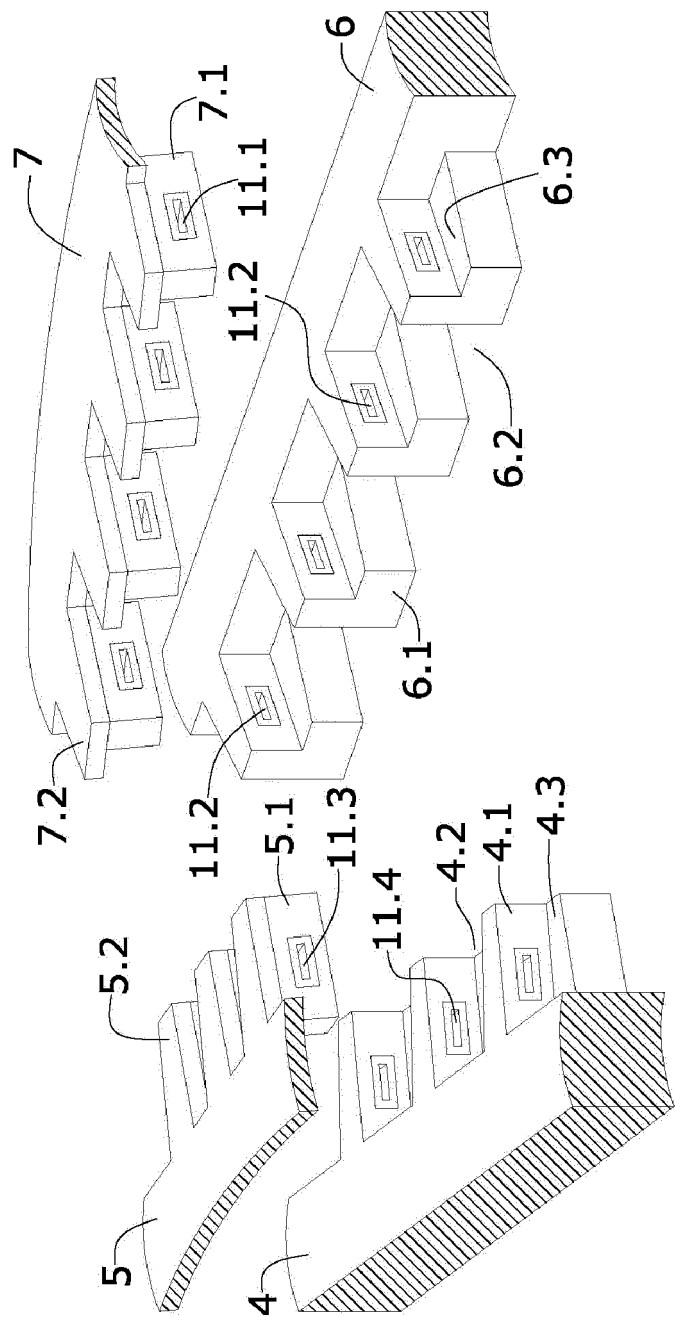


FIG. 4

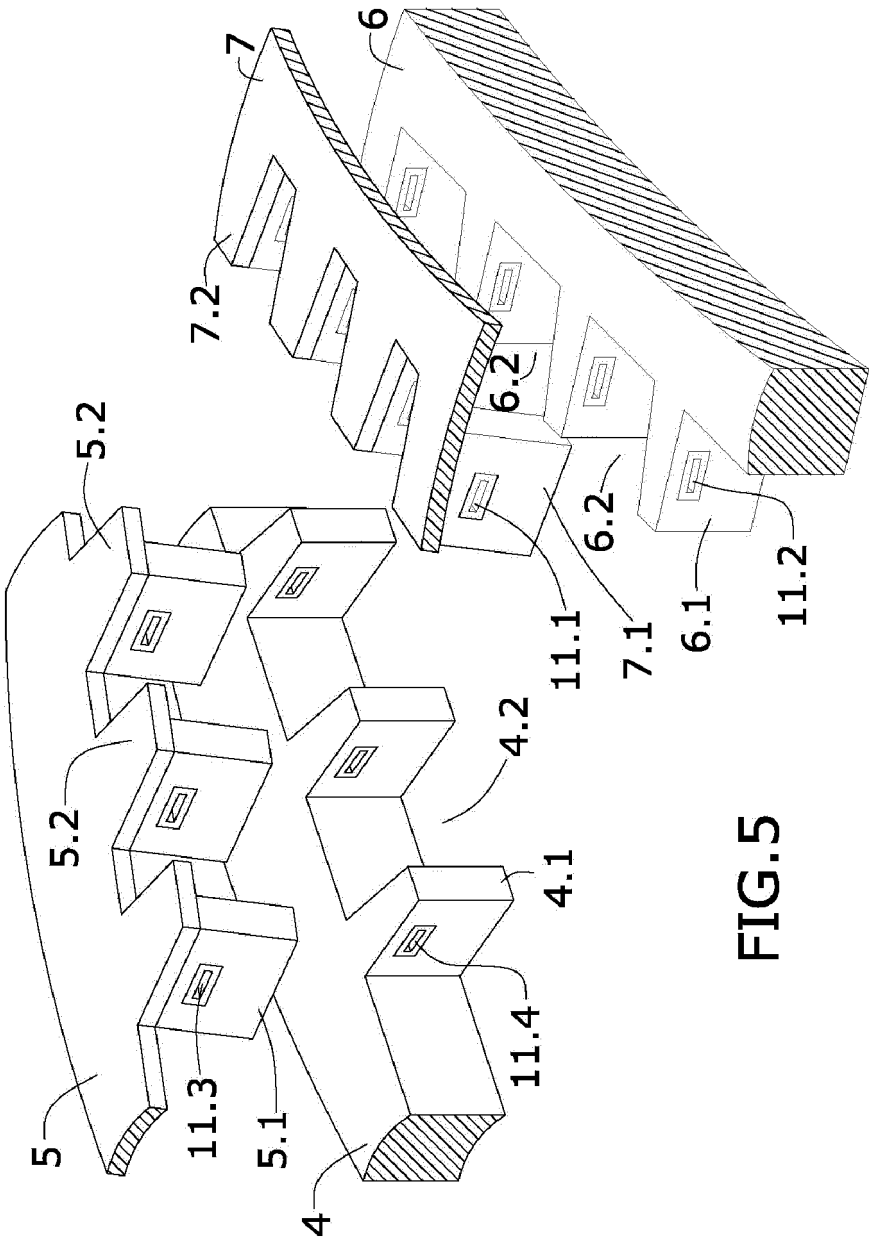


FIG. 5

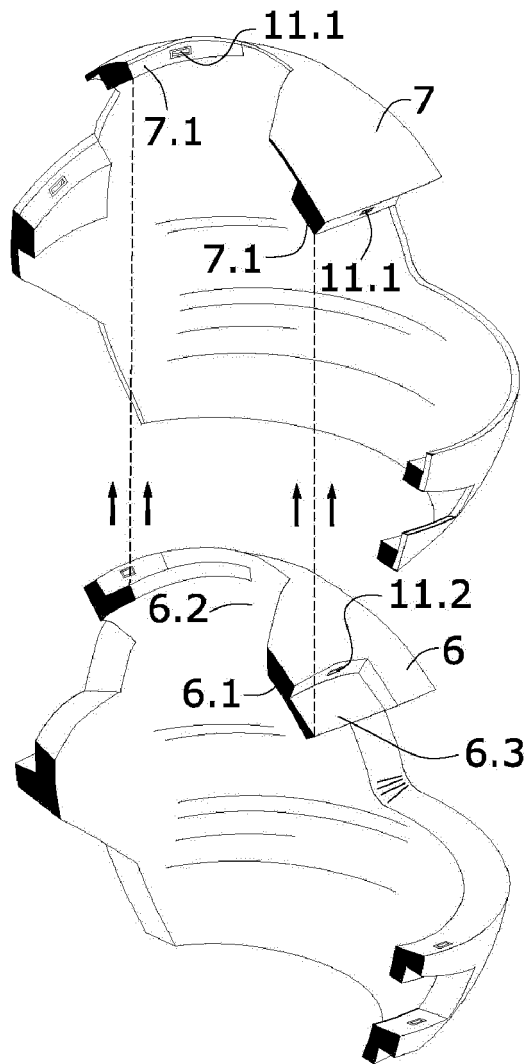


FIG.6

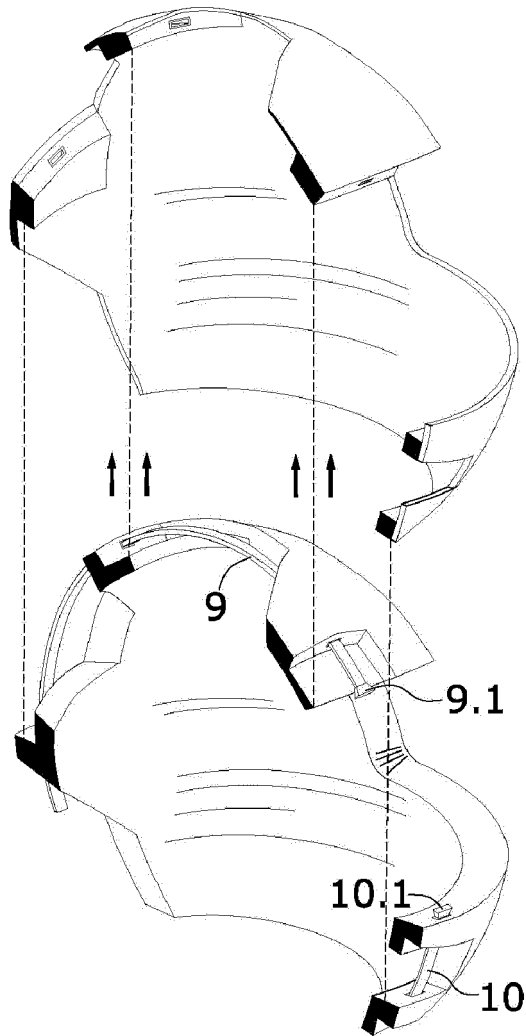


FIG.7

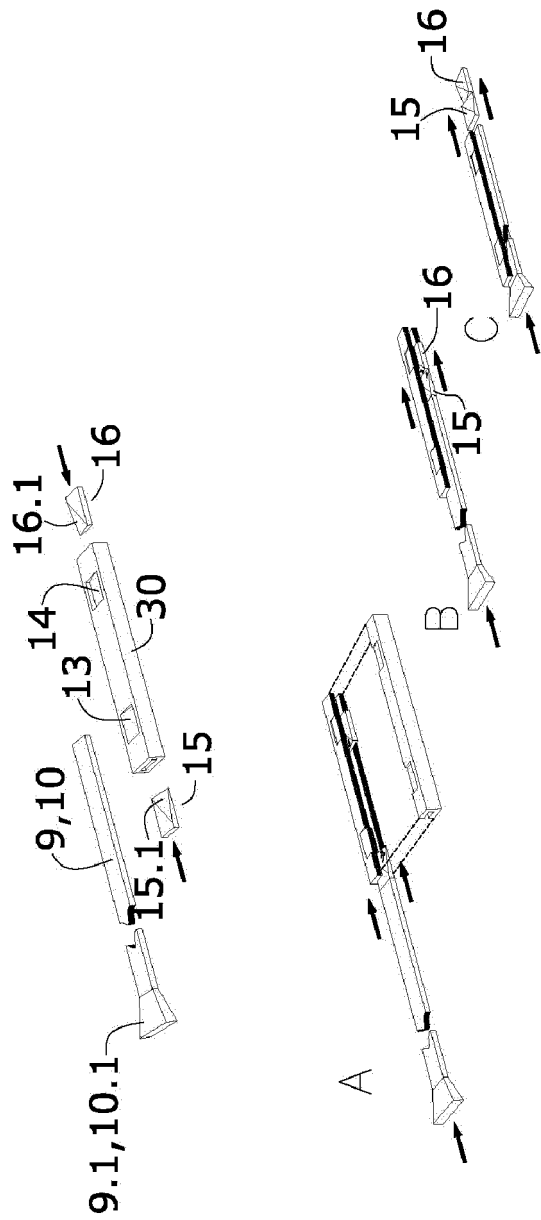


FIG. 8

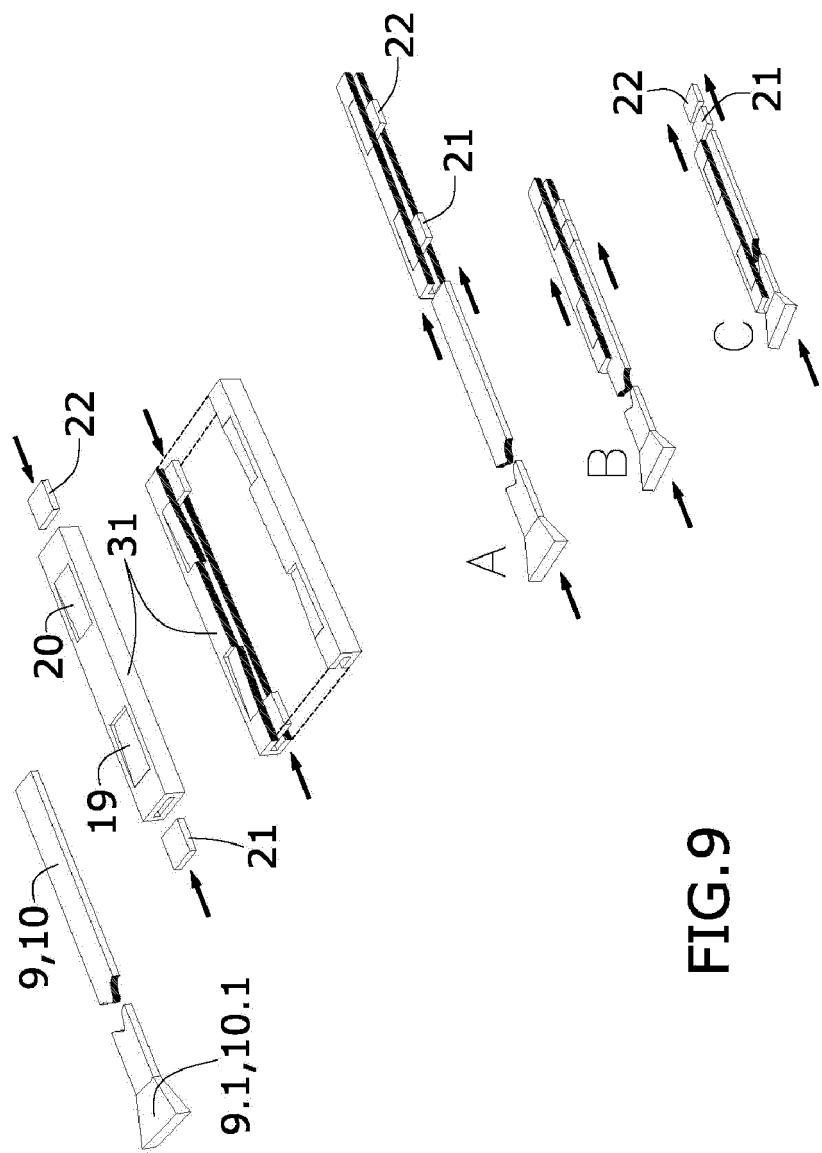


FIG. 9

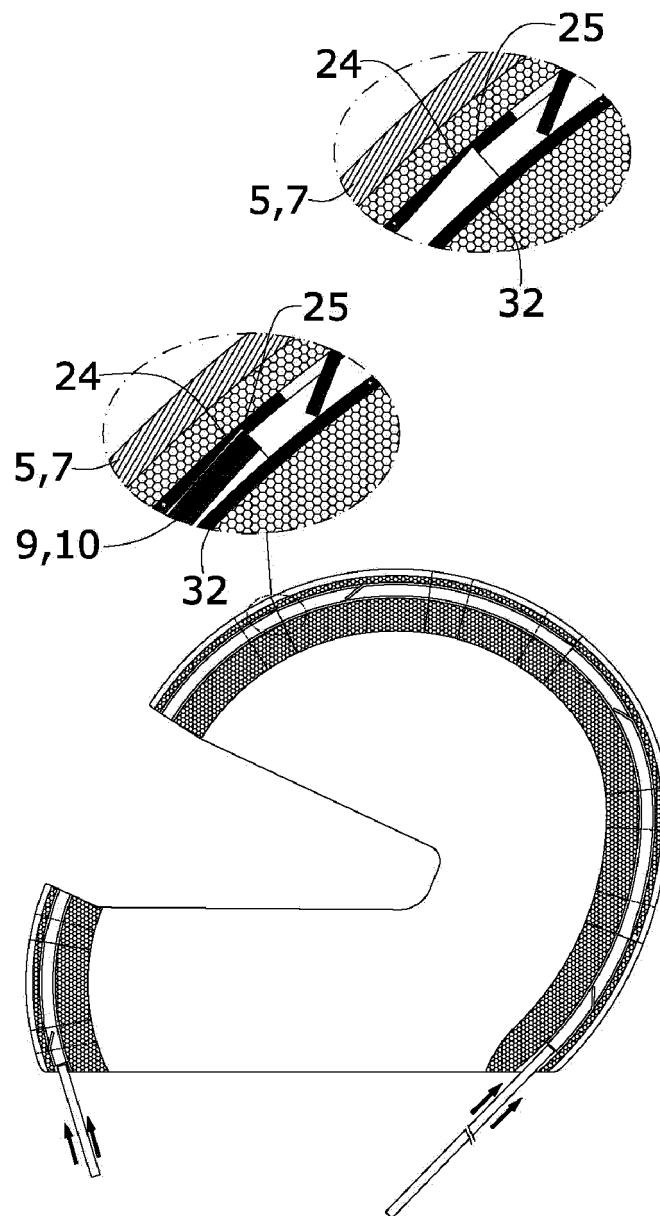


FIG.10

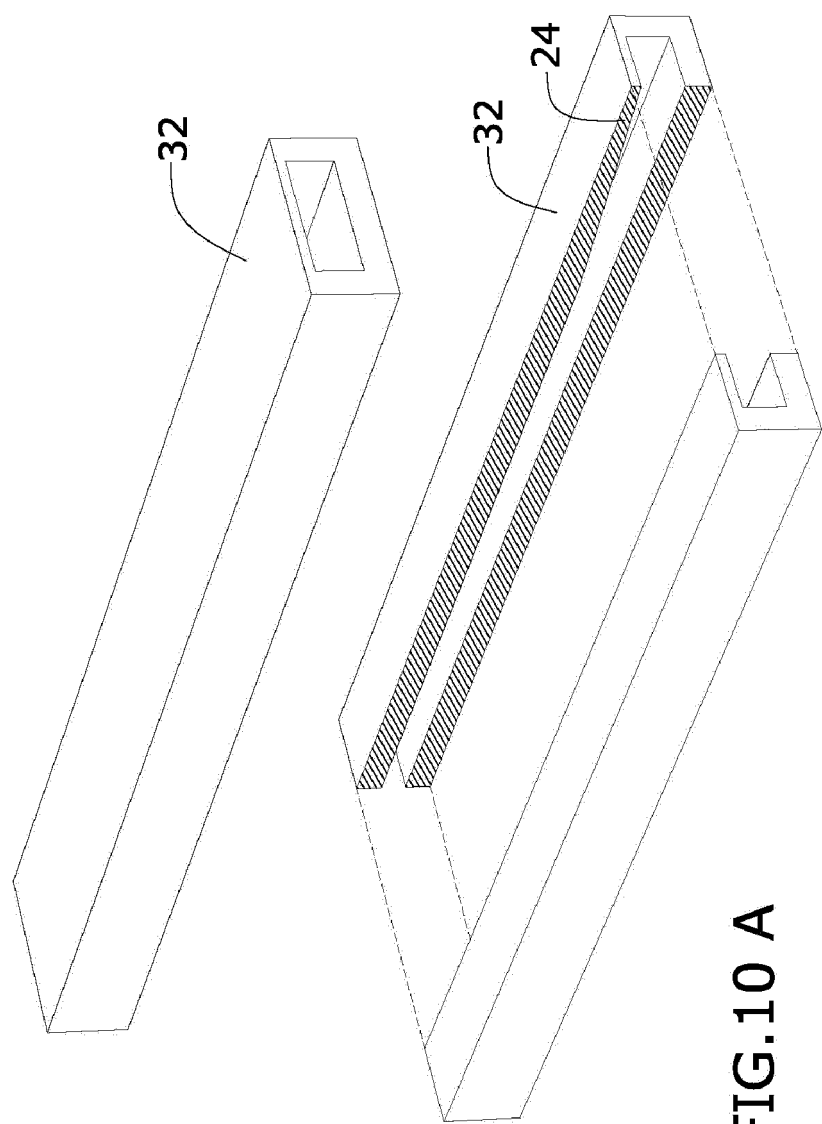


FIG.10 A

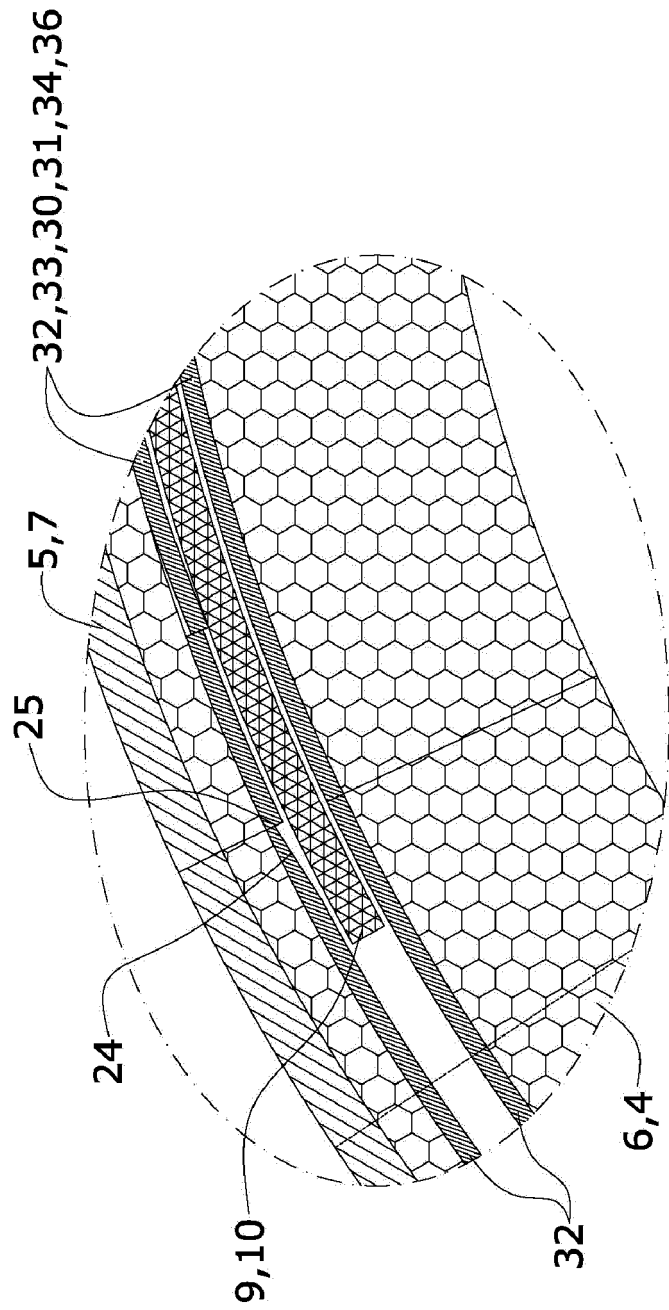


FIG.10 B

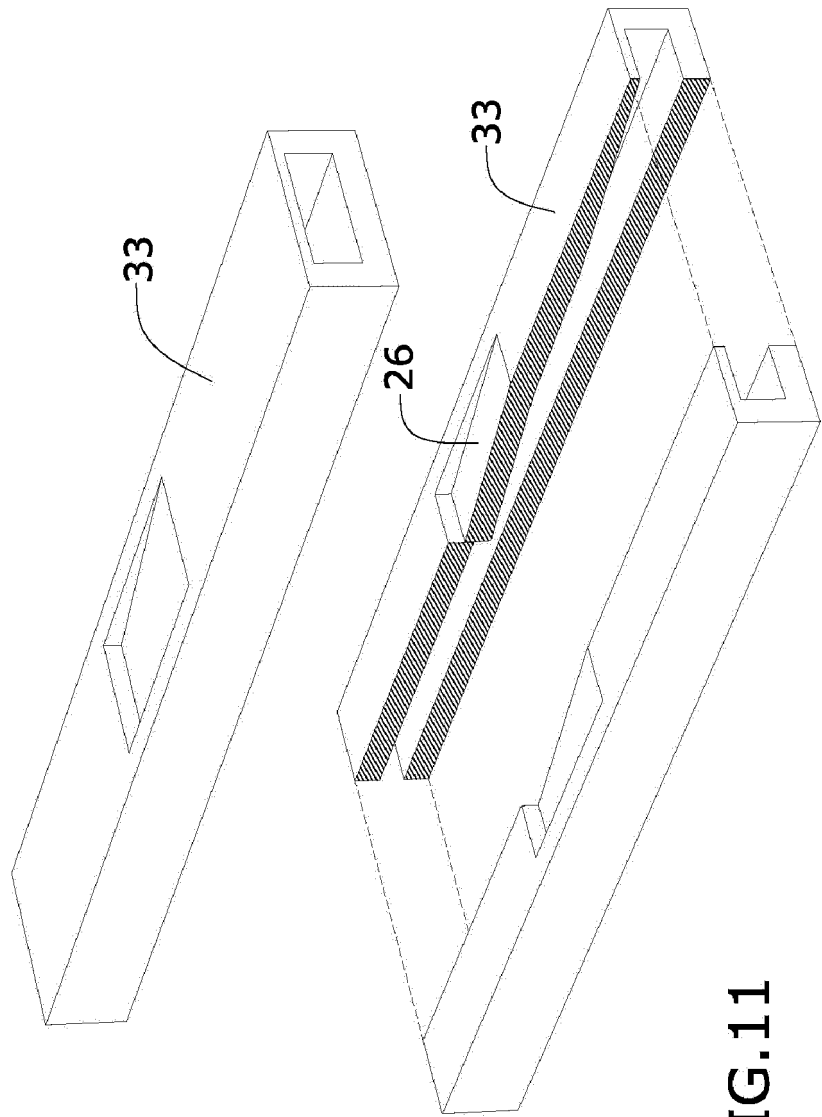


FIG.11

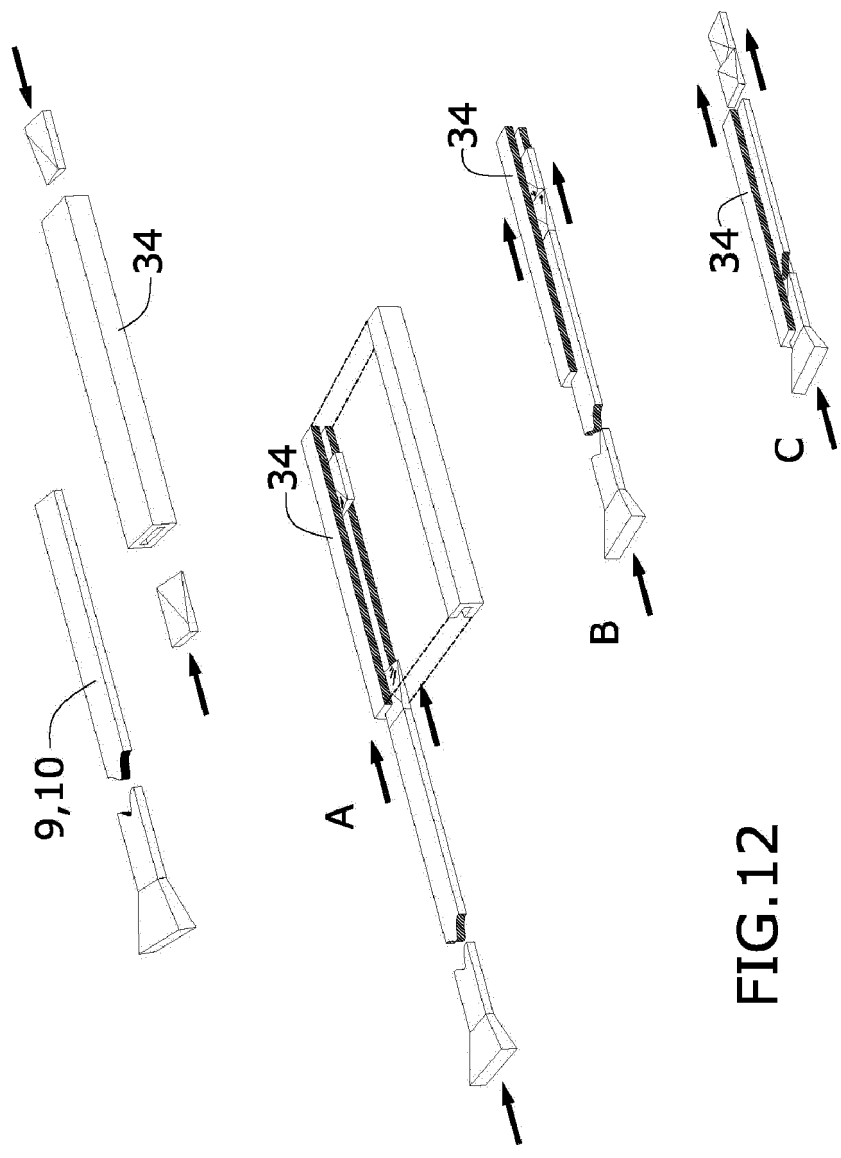


FIG.12

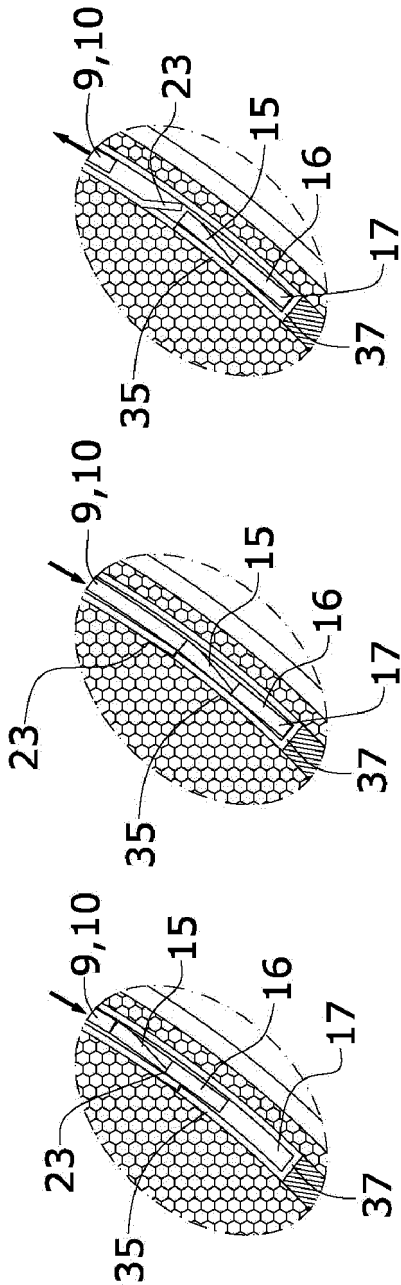


FIG.13C

FIG.13B

FIG.13A

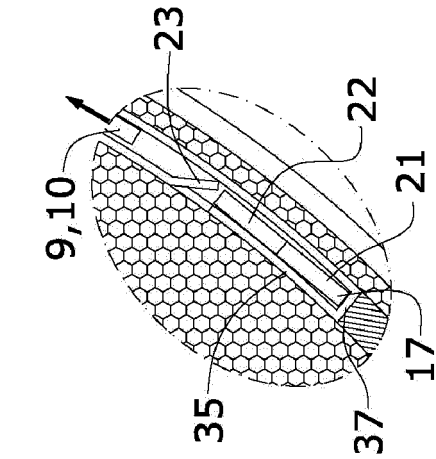


FIG. 14C

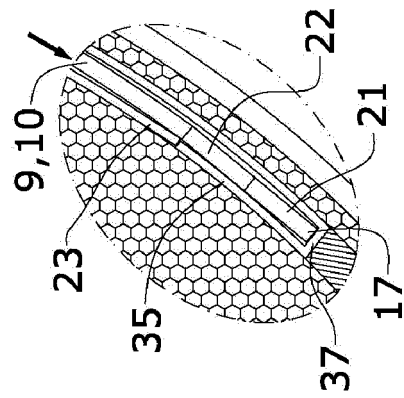


FIG. 14B

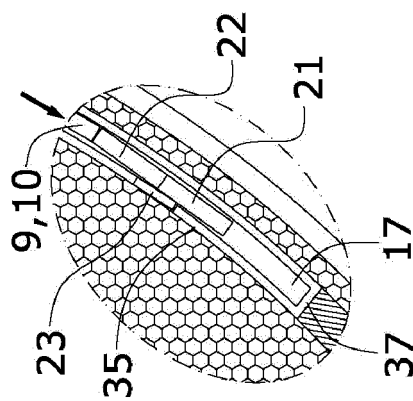


FIG. 14A

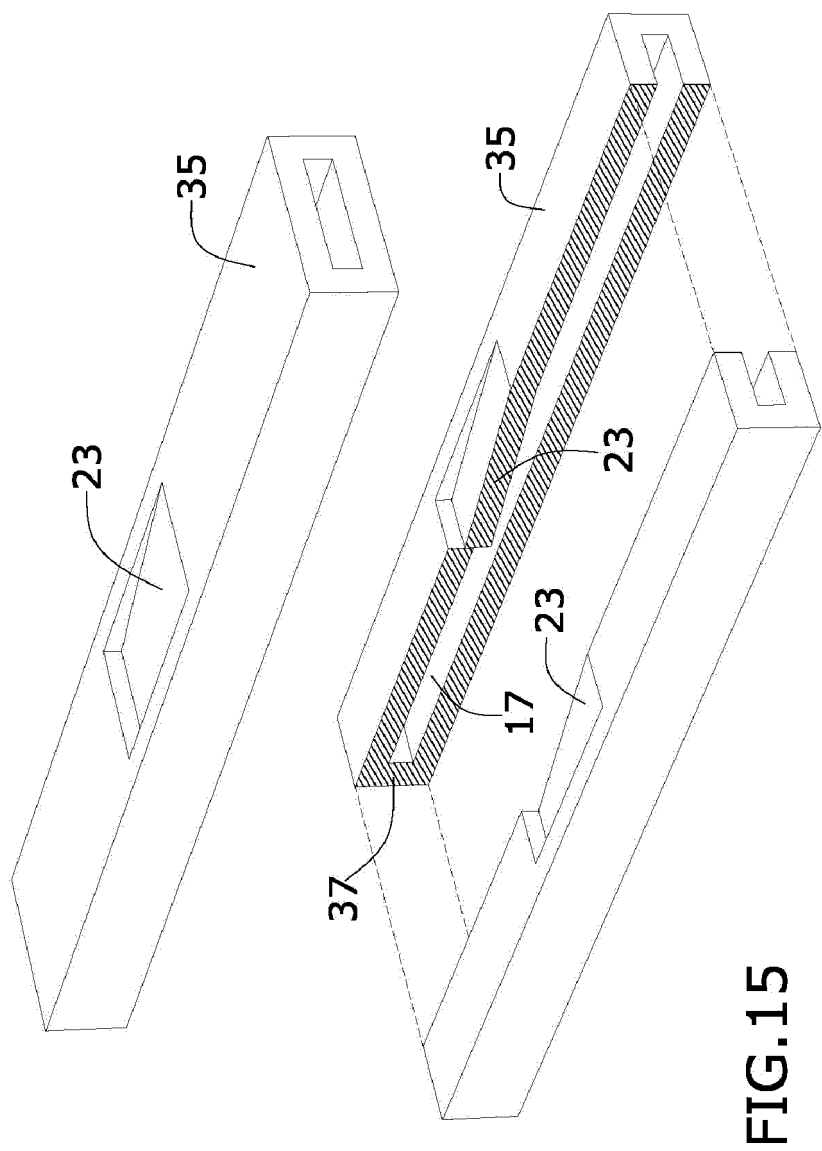


FIG.15

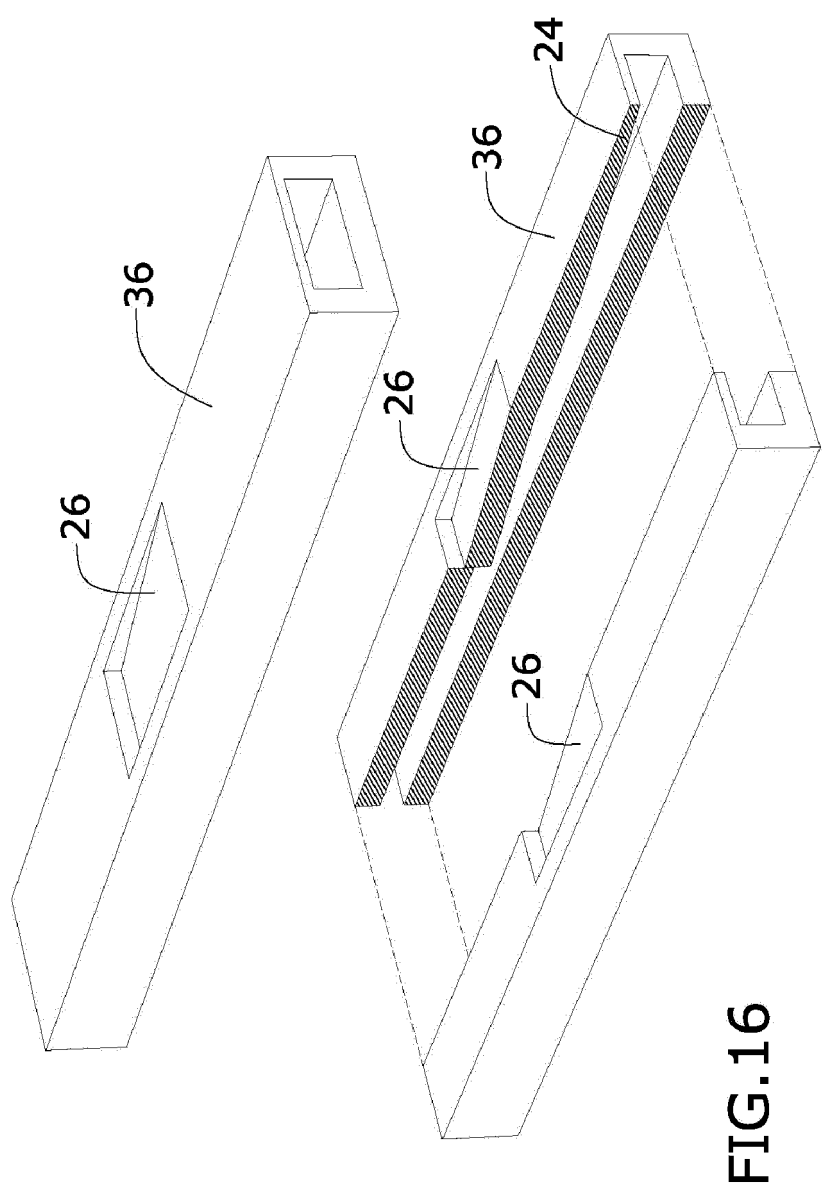


FIG.16

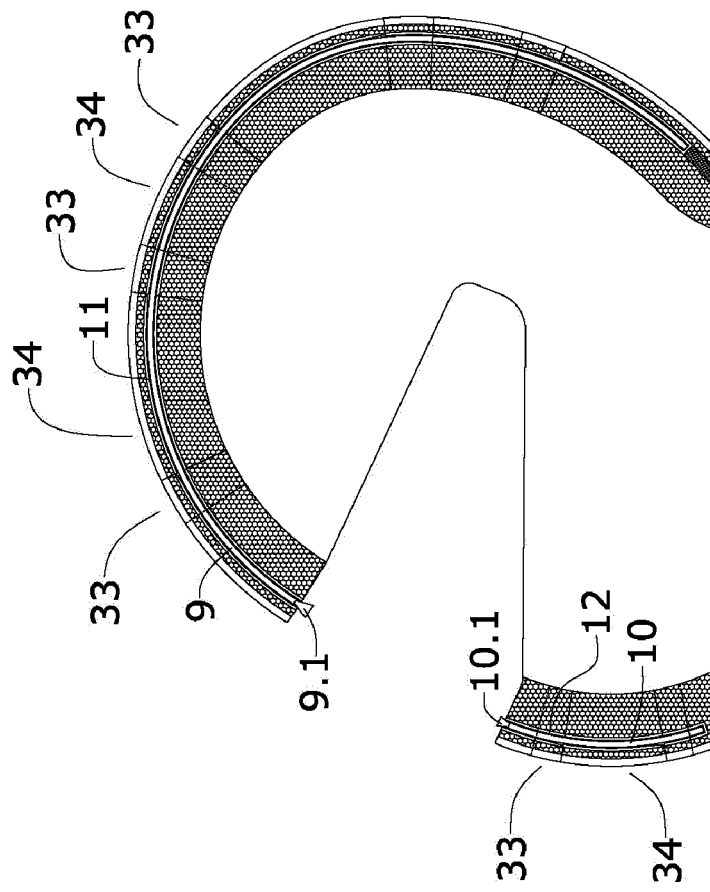


FIG.17

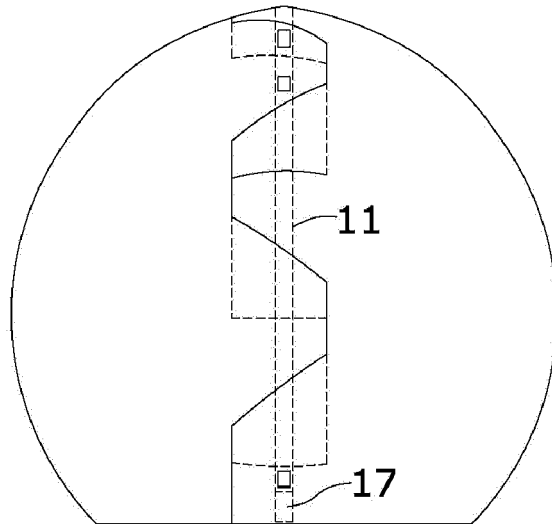


FIG. 18

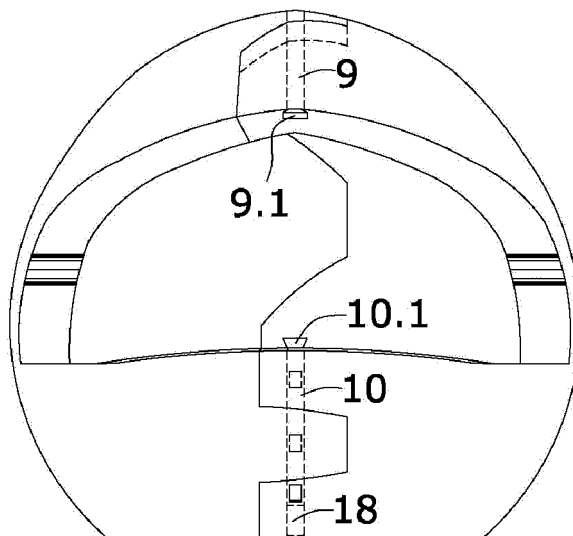


FIG. 19

INTERNATIONAL SEARCH REPORT

International application No
PCT/ES2015/000162

A. CLASSIFICATION OF SUBJECT MATTER
INV. A42B3/32
ADD.

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)
A42B

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)

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.
A	WO 2014/041215 A1 (MARGARITO RANGEL ANA [ES]; ALONSO ZAMORANO JUAN [ES]) 20 March 2014 (2014-03-20) cited in the application abstract; figures 4,5 -----	1-21
A	US 6 418 564 B1 (SHERIDAN PATRICK [US]) 16 July 2002 (2002-07-16) column 7, line 33 - column 8, line 23; figures 1-3 -----	1-21
A	FR 2 410 970 A1 (NAUDASCHER JACQUES [FR]) 6 July 1979 (1979-07-06) claims 1,2; figures 1,2 -----	1-21
A	DE 299 15 066 U1 (STILZ JOACHIM [DE]) 17 February 2000 (2000-02-17) claim 1; figures 3,6 -----	1-21

☐ 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

22 July 2016

Date of mailing of the international search report

28/07/2016

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

D'Souza, Jennifer

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/ES2015/000162

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2014041215 A1	20-03-2014	ES 1152859 U ES 2488515 A2 WO 2014041215 A1	16-03-2016 27-08-2014 20-03-2014
US 6418564 B1	16-07-2002	US 6418564 B1 WO 03026748 A1	16-07-2002 03-04-2003
FR 2410970 A1	06-07-1979	NONE	
DE 29915066 U1	17-02-2000	NONE	

Form PCT/ISA/210 (patent family annex) (April 2005)

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

- WO 2014041215 A [0005]