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(54) **PROTECTION HELMET**

SCHUTZHELM

CASQUE DE PROTECTION

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EP 3 858 178 B1

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Description

TECHNICAL FIELD

[0001] The present invention falls within the scope of protection helmets.

[0002] In particular, the invention relates to protection helmets for sports or work activities, capable of absorbing at least partially the impact force of a collision.

PRIOR ART

[0003] As is known, a protection helmet generally comprises a stiff outer shell and an inner shell of deformable material, typically of expanded polystyrene.

[0004] The outer shell is usually designed to prevent a direct contact of the user's head with stiff bodies and to distribute the collision force generated in the impact therewith on an extended surface of the inner shell, therefore it is designed not to deform during the collisions for which it is intended, while the inner shell is adapted to absorb said collision force which is transmitted through the outer shell.

[0005] Helmets are known in which a plurality of helical compression springs are interposed between the inner shell and the outer shell, which are fastened at one axial end to the inner shell and at the opposite axial end to the outer shell aimed at mitigating the transmission of a collision in the axial direction of the spring. Another helmet featuring isolation dampers is described in WO 2012/109381 A1.

[0006] A need felt in the field is to improve the capability of said helmets to dampen the collision force which develops as a result of an impact.

[0007] It is therefore an object of the present invention to provide a helmet with improved collision-damping capability with respect to prior art devices.

[0008] Such object is achieved by the features of the invention indicated in the independent claim. The dependent claims outline preferred and/or particularly advantageous aspects of the invention.

DISCLOSURE OF THE INVENTION

[0009] The invention particularly provides a protection helmet comprising:

- an outer shell, and
- an inner shell, which is housed in the outer shell and has a stiffness lower than the outer shell,

wherein the inner shell comprises a first portion, which is directly in contact with the outer shell and has a recess, which defines a zone with reduced thickness of the first portion, and a second portion at least partially housed in the recess, said helmet comprising an elastic element, which:

- is entirely housed in said recess,
- is equipped with a first end fastened to the first portion of the inner shell and with a second end fastened to the second portion of the inner shell,
- is configured to deform elastically both along a first direction of the second portion towards or away from/to the recess and along a second direction perpendicular to the first direction.

[0010] Thanks to this solution, the helmet according to the invention allows to mitigate not only collisions in the compression direction of the shells, from the outside toward the inside, but, differently from helmets of the prior art, also forces in the transverse direction which can also cause, if not suitably dampened, frictions at the user's helmet-head interface that may result in abrasions of the user's skin.

[0011] Moreover, thanks to the particular architecture, the helmet according to the invention is particularly simple and quick to assemble with respect to the devices of the prior art. Another aspect of the invention provides that the elastic element may comprise a pad, which comprises a gel core and a coating film that defines a gel holding bag.

[0012] Thanks to this solution, the elastic element is provided with a pad provided with gel, that is, with a material in the form of gel, which is homogeneous and has an isotropic behaviour in response to external stimuli, allowing to respond to the collision force in an equivalent manner regardless of the direction of the development thereof.

[0013] A further aspect of the invention provides that the first end of the elastic element can comprise a respective flat face which contacts the first portion of the inner shell and that the second end can comprise a respective flat face which contacts the second portion of the same inner shell.

[0014] Thanks to this solution, the mounting of the helmet is particularly easy and rapid, thus allowing to minimize the mounting time of the single helmet and therefore to increase the hourly production.

[0015] Still another aspect of the invention provides that the thickness of the elastic element along the first direction can be between 4 and 6 mm.

[0016] Thanks to this solution, the elastic element has a development along said first direction which makes it particularly effective in mitigating of the impact forces along said first direction.

[0017] Another aspect of the invention provides that the elastic element may comprise a conical helical spring.

[0018] Thanks to this solution, the helmet is equipped with an elastic element that is easy to install, robust, reliable, durable and light and able to respond to the collision force in various directions of development of the same force.

[0019] A further aspect of the invention provides that the elastic element can be unique and that its first end can intersect a mid-sagittal plane of the helmet, and that

it can be fastened to a central portion of the recess.

[0020] Thanks to this solution, the helmet can be assembled in a particularly rapid manner thanks to the presence of a unique elastic element, and therefore also the cost of the product is further reduced, while maintaining the high damping capacity of the collision force thanks to its particular position.

[0021] Still another aspect of the invention provides that the elastic element can have an extension along the second direction between 20 mm and 50 mm.

[0022] Thanks to this solution, the elastic element is particularly effective in mitigating the impact forces along said second direction.

[0023] A further aspect of the invention provides that the helmet may comprise a plurality of elastic elements, which are equally spaced from a central point of the recess that lies on a mid-sagittal plane of the helmet.

[0024] Thanks to this solution, the damping effect of the collision forces due to the impact is considerably increased thanks to the use of a plurality of elastic elements, and moreover their particular position makes the helmet particularly effective in homogeneously damping the collision forces which develop along directions that are different from one another.

[0025] Another aspect of the invention provides that the helmet may comprise a belt shaped to surround at least partially the skull along a circumferential direction and having a stiffness lower than the inner shell, which belt is connected through tabs to the first portion of the same inner shell.

[0026] Thanks to this solution, the helmet is internally equipped with a further element that allows to dampen the collision forces before they reach the user's head.

[0027] Still another aspect of the invention provides that the helmet can comprise three elastic elements arranged along the vertices of a triangle whose centre lies on a mid-sagittal plane of the helmet.

[0028] Thanks to this solution, the elastic elements, each of which consists of a pad filled with gel, are arranged in such a way as to make the helmet particularly effective in uniformly damping the collision forces which develop along directions that are different from one another and at the same time, the limited number of elastic elements allows to contain the weight of the helmet. Moreover, this allows an optimal distribution of the pressures in the interface with the skull of the user and between the portions of the inner shell

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] Further features and advantages of the invention will be more apparent after reading the following description provided by way of non-limiting example, with the aid of the accompanying drawings.

Figure 1 is a schematic sectional view of a first embodiment of the helmet according to the invention, sectioned with respect to a mid-sagittal plane of the

helmet which divides the helmet into a left portion and a right portion.

Figure 2 is a schematic sectional view of a second embodiment of the helmet according to the invention, sectioned with respect to said mid-sagittal plane of the helmet.

Figure 3 is a schematic perspective view of a first embodiment of an elastic element of the helmet.

Figure 4 is a schematic perspective view of a second embodiment of the elastic element of the helmet and of a section thereof with respect to a longitudinal mid-plane.

DETAILED DESCRIPTION

[0030] With reference to the figures, the reference numeral 10,10' generally designates a protection helmet 10,10'. This helmet can be suitable for use in sports or even work activities.

[0031] The helmet 10,10' defines an accommodating space 15 for the head of a user, and particularly the helmet 10,10' shown in the attached tables is a so-called "bowl-like" helmet 10,10', that is, it leaves uncovered at least the face and the chin of the user covering only a limited portion of his head; however, it is obvious that the invention can concern any type of helmet 10,10', whether this is of the half-face or full-face type.

[0032] The helmet 10,10' comprises first of all a stiff outer shell 20, for example adapted to cover at least an upper part and a rear part of the user's skull.

[0033] Particularly, the outer shell 20 may be configured to cover at least a portion of the frontal, parietal and temporal bones of the skull, and also the occipital bones of the skull up to the nape.

[0034] The outer shell 20 can be made of a composite material, and more precisely of a material obtained by joining a resin matrix in which reinforcing fibres are embedded. Alternatively, it is possible that the outer shell 20 may be made of a plastic material, for example of ABS (acrylonitrile-butadiene-styrene) or polycarbonate.

[0035] In detail, the outer shell 20 has a first surface 25 turned towards an environment external to the helmet 10,10' and a second surface 30 opposite the first surface 25, which is turned towards the accommodating space 15 defined by the helmet 10,10'.

[0036] Moreover, as is visible in Figures 1 and 2, the outer shell 20 can have slots or holes 35 passing from the first surface 25 to the second surface 30 which, as known to the person skilled in the art, have the function of aeration of the accommodating space 15. The outer shell 20 preferably has a uniform thickness along its entire development, where by thickness it is meant the distance between the first surface 25 and the second surface 30 of the same outer shell 20.

[0037] The helmet 10,10' then comprises an inner shell 40 which has the function of absorbing at least partially the impact forces which develop when a collision occurs.

[0038] The inner shell 40 has a stiffness lower than the

outer shell 20, and is housed in the outer shell 20 so as to be externally completely covered by it.

[0039] In other words, the inner shell 40 is housed in the outer shell 20 in such a way that when the helmet 10,10' impacts an outer body, there can be no direct contact between the inner shell 40 and said outer body, that is, the contact between the helmet 10,10' and said outer body takes place only through the outer shell 20, which then transfers the impact forces due to the collision to the inner shell 40. Unless the impact causes a fracture in the outer shell 20.

[0040] The inner shell 40 can be made of a plastic material, for example it can be made of expanded polystyrene.

[0041] Obviously, it is not excluded that the inner shell 40 can be made of any other material suitable in any case for the purpose of absorbing at least partially the impact forces and which has a stiffness lower than the material of which the outer shell 20 is made.

[0042] As is visible in the accompanying figures, the inner shell 40 comprises first of all a first portion 45 which is equipped with a first surface 50 turned towards the outer shell 20 and a second surface 55, opposite the first surface 50, which is turned towards the accommodating space 15 defined by the helmet 10,10'.

[0043] The first portion 45 of the inner shell 40 is placed in direct contact with the outer shell 20.

[0044] That is, the first surface 50 of the first portion 45 of the inner shell 40 is placed in direct contact, preferably entirely, with the second surface 30 of the outer shell 20 and is fastened thereto.

[0045] Moreover, the first surface 50 of the first portion 45 can have an extension equal to the extension of the second surface 30 of the outer shell 20, so that the second surface 30 of the outer shell 20 is completely superimposed on the first surface 50 of the first portion 45 of the inner shell 40.

[0046] It is possible to provide that the first portion 45 of the inner shell 40 is fastened to the outer shell 20 by gluing, by shape coupling or by any other means suitable in any case for the purpose of fastening said first portion 45 of the inner shell 40 to the outer shell 20.

[0047] The first portion 45 of the inner shell 40 may have a thickness, understood as the distance between the first surface 50 and the second surface 55, greater than the thickness of the outer shell 20.

[0048] Said first portion 45 of the inner shell 40, as is visible in Figures 1 and 2, may have slots or holes 60 passing from the first surface 50 to the second surface 55, in a position corresponding to the slots or holes present on the outer shell 20 so as to make an extension thereof in order to put the accommodating space 15 in gas communication with the outer environment.

[0049] The inner shell 40 then comprises a second portion 65 which has an upper surface 65A, preferably substantially smooth/uniform, turned towards the first portion 45 of the inner shell 40, and an opposite lower surface 65B, preferably substantially smooth/uniform, which is

turned towards the accommodating space 15 defined by the helmet 10,10'. The lower surface 65B is adapted to contact the top of the user's skull, for example it is shaped, that is has an area such as to contact only the top of the user's skull.

[0050] The upper surface 65A and the lower surface 65B are joined together by a perimetric edge 65C which laterally delimits the same second portion.

[0051] Preferably, the inner shell 40 comprises only the first portion 45 and the second portion 65.

[0052] The second portion 65 is located at a non-zero distance from the first portion 45.

[0053] Said second portion 65, as is visible in Figures 1 and 2, can be accommodated at least partially, for example entirely, in a recess 70 made in the first portion 45 of the inner shell 40 and which defines a zone with reduced thickness of the first portion.

[0054] Said recess 70 is substantially shaped like a vat, having a length and width greater than the depth, and has a concavity turned in the opposite direction with respect to the outer shell 20, that is, a concavity turned towards the accommodating space 15 defined by the helmet 10,10'.

[0055] For example, the recess 70 may have a substantially rectangular plan shape.

[0056] The recess 70 comprises a bottom wall 70A, which bottom wall is at a non-zero distance from the first surface 50 of the first portion 45 of the inner shell 40. The recess also comprises an annular perimetric lateral surface 70B developing starting from the second surface 55 of the first portion 45 toward the bottom wall 70A.

[0057] The bottom wall 70A is shaped so as to be complementary (i.e. it has the same curvature) to the upper surface 65A of the second portion 65 and faces onto it.

[0058] The second portion 65 is accommodated, for example entirely, with clearance inside the recess 70.

[0059] There is a gap (of course of non-zero size) between the bottom wall 70A and the upper surface 65A of the second portion 65. In particular, also between the perimetric lateral surface 70B and the lateral edge 65C of the second portion 65 there is a gap (obviously of non-zero size), for example annular, which laterally embraces the second portion. Preferably, the second portion 65 of the inner shell 40 is entirely housed inside the recess 70 made in the first portion 45 so that, in an undisturbed condition in which the helmet 10,10' is not subject to collisions, the lower surface 65B of the second portion 65 is substantially aligned with the second surface 55 of the first portion 45.

[0060] In practice, the inner shell comprises a curvilinear inner surface turned towards the accommodating space 15 made available as a whole by the lower surface 65B of the second portion 65 and by the second surface 55 of the first portion 45.

[0061] In particular, said recess 70 is made only at a central zone of the first portion 45 of the inner shell 40, i.e. a zone of the first portion 45 of the inner shell 40 arranged at a top zone of the skull, that is, only at the

junction zone between the parietal bones and between the parietal bones and the frontal bone.

[0062] Moreover, the recess 70 does not extend for the entire extension of the inner shell 40, that is it remains in any case perimetrically surrounded by the second surface 55 of the first portion 45 of the inner shell 40.

[0063] In other words, the recess 70 can be delimited so as to be arranged in a zone which does not affect at least a lower portion of the frontal bone and at least the occipital bone.

[0064] Furthermore, the recess 70 is made in a zone of the first portion 45 of the inner shell 40 at the intersection between a mid-sagittal plane of the helmet 10,10' and at a mid-frontal plane of the helmet 10,10'.

[0065] It is specified that mid-sagittal plane refers to a (imaginary) centerline plane that divides the helmet 10,10' into two parts, one of which is on the right and one of which is on the left, which can be symmetrical with each other, while the mid-frontal plane refers to a (imaginary) centerline plane that divides the helmet 10,10' into two parts, one in the front and one at the rear.

[0066] Preferably, the recess 70 is made in such a way that the mid-sagittal plane is a centerline plane of the recess 70.

[0067] In particular, the recess 70 can be made so as to be perfectly centred with respect to the intersection between said mid-sagittal plane and said mid-frontal plane, that is, an imaginary central point of the recess 70 is arranged at, or lies on, the imaginary line of intersection between said mid-sagittal plane and said mid-frontal plane.

[0068] The imaginary central point of the recess 70 refers to one of the points that constitute the imaginary line of intersection between the planes connecting the edges of the dihedral angles of the polyhedron that defines the recess 70 and that are internal to the imaginary volume defined by said polyhedron.

[0069] Alternatively, if the shape of the recess 70 is that of a non-polyhedral solid, the imaginary central point of the recess 70 refers to one of the points that constitute the imaginary line of intersection between two centerline planes of the recess that are mutually orthogonal and further orthogonal to the bottom wall 70A and internal to the imaginary volume defined by said non-polyhedral solid.

[0070] Moreover, the recess 70 may have a shape such that it is ideally sected into two symmetrical parts from the mid-sagittal plane, and/or such a shape that it is ideally sected into two symmetrical parts from the mid-frontal plane.

[0071] The recess 70 preferably has an extension along a sectional plane formed by the mid-sagittal plane between 0.5 and 0.7 times the maximum extension along the same plane of the outer shell.

[0072] The helmet 10,10' also comprises an elastic element, i.e. an elastically deformable, which is interposed between the first portion 45 and the second portion 65 of the inner shell 40.

[0073] The elastic element is equipped with a first end fastened to the first portion 45 of the inner shell 40 and with a second opposite end which is fastened to the second portion 65 of the inner shell 40.

[0074] In other words, the elastic element is arranged so as to distance the first portion 45 from the second portion 65 so that said first portion 45 and said second portion 65 of the inner shell 40 are in contact only through the elastic element.

[0075] The elastic element is entirely housed inside the recess 70 made in the first portion 45 of the inner shell 40.

[0076] Said elastic element, by elastically deforming, allows to further dampen the impact forces which develop as a result of a collision of the helmet 10,10' with an outer body.

[0077] In particular, the elastic element is configured to elastically deform, by compression, along a first direction A towards or away from between the second portion and the recess. The first direction A may pass through the first end and through the second end of the elastic element.

[0078] In particular, the first direction A is a direction of the second portion towards or away from/to the bottom surface of the recess.

[0079] Said first direction A is substantially orthogonal to the bottom surface of the recess 70 and to the upper surface of the second portion 65 of the inner shell 40 turned towards the bottom wall. Furthermore, the first direction A is substantially orthogonal to a plane tangent to the bottom surface of the recess 70 at a zone in which the first end is fastened to the bottom surface 70.

[0080] The elastic element is then configured to deform elastically even at least along a second direction B perpendicular to the first direction A.

[0081] The elastic element can also be configured to deform elastically in rotation with respect to an axis substantially parallel to the first direction A.

[0082] In other words, following a collision, the elastic element is able to deform in rotation following a twisting moment which is generated at the interface between the user's head and the helmet 10,10'.

[0083] Furthermore, the elastic element and the helmet are configured to deform elastically at least partially along any direction transverse to the first direction A.

[0084] Said elastic element preferably has, in an undisturbed condition in which it is not subject to external forces, an extension along the first direction A between 3 mm and 8 mm. Moreover, the elastic element preferably has, in said undisturbed condition in which it is not subject to external forces, an extension along the second direction B between 20 mm and 50 mm.

[0085] Figures 3 and 4 illustrate two alternative embodiments of the elastic element.

[0086] In the first embodiment of the elastic element, in Figure 3, the elastic element comprises, that is, it is constituted by, a conical helical spring 90, for example comprising a wire or belt, preferably made of metallic

material, wound helically with respect to a winding axis.

[0087] In particular, said conical helical spring 90 has a single taper, i.e. it is a spring whose development is defined by the winding of a wire or belt about the winding axis and on an imaginary truncoconical surface.

[0088] In detail, the conical helical spring 90, that is, the wire or belt of the conical helical spring, has a first end 90A, adapted to be placed in abutment and fastened, for example hooked, to the bottom wall 70A of the recess 70 made on the first portion 45 of the inner shell 40, and a second end 90B opposite to the first end 90A, which is adapted to be placed in abutment and fastened, for example hooked, to the upper surface 65A of the second portion 65 of the inner shell 40.

[0089] In the case of the conical helical spring 90, the winding axis of the spring defines the first direction A. In practice, the first direction A is parallel, for example co-incident, to the winding axis of the spring.

[0090] In an alternative embodiment, the elastic element may comprise, that is be constituted by, a spiral spring, for example of the type for watches. Said spiral spring comprises a wire or belt, preferably metallic, wound into a spiral with respect to a winding axis so as to develop along a plane perpendicular to the winding axis, winding itself into a spiral from a first end which intersects the winding axis, to a second end which is eccentric with respect to said winding axis. The first end of the spiral spring is adapted to be placed in abutment and fastened, for example hooked, to the bottom wall 70A of the recess 70 made on the first portion 45 of the inner shell 40, and the second end is adapted to be placed in abutment and fastened, for example hooked, to the upper surface 65A of the second portion 65 of the inner shell 40. In the case of the spiral spring, the winding axis of the spring defines the first direction A. In practice, the first direction A is parallel, for example coincident, to the winding axis of the spring.

[0091] Said spring is also configured to feature the properties of the elastic element described above, i.e. to be elastic along the first direction and along any direction perpendicular to the direction A, and preferably also with respect to rotations about the first direction A. Alternatively, the spiral spring could be configured to be stiff with respect to the first direction A and be elastic only with respect to any direction perpendicular to the direction A and with respect to rotations about the first direction A.

[0092] In the second embodiment of the elastic element, in Figure 4, the elastic element comprises a bearing 95 which comprises, that is, it is constituted by, a gel core 100, for example elastomeric polymeric, preferably a two-component polymeric gel 100, and a coating film or sheath 105 defining a holding bag, for example of substantially discoidal shape, which is filled completely by the gel 100.

[0093] In this embodiment, the first direction passes through the first and the second end of the elastic member, that is, of the bearing.

[0094] Said film or sheath 105 is elastically deformable,

and is preferably made of an elastomeric polymeric material.

[0095] The bearing 95 is therefore configured as a whole so as to have a linear elastic isotropic behaviour.

[0096] It is specified that by elastic it is meant that the bearing 95 is elastically deformable, by isotropic it is meant that its properties do not vary with the direction of the forces, and by linear it is meant that the deformation thereof is directly proportional to the forces applied thereto.

[0097] In greater detail, the bearing 95 can have (in an undisturbed condition in which it is not subject to external forces), at the first end, a first substantially flat face 95A which is adapted to contact and to be fastened, for example glued, to the first portion 45 of the inner shell 40, and at the second end thereof, a second substantially flat face 95B, which can be parallel to the first flat face 95A, and is adapted to contact the second portion 65 of the inner shell 40 and to be fastened, for example glued, to the same.

[0098] More precisely, the first flat face 95A is placed in contact and fastened, for example glued, to the bottom wall 70A of the recess 70 made on the first portion 45 of the inner shell 40, while the second flat face 95B is placed in contact and fastened, for example glued, to the upper surface 65A of the second portion 65 of the inner shell 40.

[0099] The helmet 10,10' can comprise a unique elastic element or a plurality of elastic elements, for example as described above.

[0100] In both cases, that is, whether a unique elastic element is present or a plurality of elastic elements is present, the elastic element can be configured like in the first embodiment, that is it can comprise a conical elastic spring 90, or like in the second embodiment, that is, it may comprise the bearing 95 described above.

[0101] If the helmet 10,10' comprises a unique elastic element, it is preferably arranged at a central portion of the recess 70, that is it can be arranged so as to be ideally sected from the mid-sagittal plane of the helmet 10,10'.

[0102] That is, the elastic element can be arranged in such a way that at least one of the first end and the second end, intersects said mid-sagittal plane of the helmet 10,10'. Preferably, said unique elastic element can be arranged in such a way as to be ideally sected from the mid-sagittal plane and from the mid-frontal plane of the helmet 10,10'. Moreover, it is possible to provide that said unique elastic element can be centred on the imaginary line of intersection between the mid-sagittal plane and the mid-frontal plane, i.e. it is possible to provide that the elastic element is ideally sected into symmetrical parts from the mid-sagittal plane and from the mid-frontal plane. Or in other words, still that the first direction lies on the intersection straight line between the mid-sagittal plane and the mid-frontal plane.

[0103] If the helmet 10,10' comprises more elastic elements, they may be arranged so as to be equally spaced from the central zone of the recess, i.e. from the imaginary central point of the recess 70.

[0104] Moreover, said elastic elements are arranged at the vertices of an imaginary polygon whose geometric centre falls within the central zone of the helmet, i.e. the geometric centre can coincide with said imaginary central point of the recess 70.

[0105] In a first embodiment of the helmet shown in Figure 1, the helmet 10 comprises a unique elastic element, and the elastic element is configured like in the first embodiment of the elastic element, that is, it comprises a single conical helical spring 90 provided with at least one of the characteristics described above and positioned according to at least one of the characteristics of the embodiment in which the helmet comprises a unique elastic element.

[0106] In a second embodiment of the helmet shown in Figure 2, the helmet 10' comprises a plurality of elastic elements, namely three in number, which are arranged at the vertices of an imaginary triangle.

[0107] In this second embodiment shown in Figure 2, each elastic element is configured like in the second embodiment, i.e. each elastic element comprises a bearing 95 provided with at least one of the characteristics described above.

[0108] The bearings 95 are arranged in such a way that two are arranged symmetrically with respect to the mid-sagittal plane of the helmet 10' whereas the third is arranged in such a way that it is sected, for example in two equal parts, from the mid-sagittal plane.

[0109] The helmet 10,10', in each of the embodiments presented, may further comprise a belt 110 made of a material whose stiffness is lower than the stiffness of the material of which the inner shell 40 is made and also lower than the stiffness of the material of which the outer shell 20 is made.

[0110] Said belt 110 is preferably made of plastic material, for example it is made of polyurethane.

[0111] The belt 110 is closed into a loop on itself, and is arranged circumferentially in contact with the inner shell 40 along a whole circumferential development thereof.

[0112] In this way, the belt 110 is configured and shaped to surround at least partially the skull of a user of the helmet 10,10' along a circumferential direction.

[0113] The belt 110 has an irregular shape and can have, as is visible in Figures 1 and 2, a plurality of through slots which can have a polygonal shape different from one another. As said, the belt 110 is placed in contact with the inner shell 40, and more precisely it is placed in direct contact only with the first portion 45 thereof.

[0114] For example, it is possible to provide that said belt 110 can be embedded in the inner shell 40, that is it can be inserted to size in a housing seat obtained in the inner shell 40 and more precisely in the first portion 45 thereof.

[0115] The belt 110 is also placed indirectly in contact with the second portion 65 of the inner shell 40.

[0116] For this purpose, the helmet 10,10' comprises at least a plurality of tabs 115, each of which is configured

to connect the belt 110 to the first portion 45 of the inner shell 40.

[0117] In greater detail, the tabs 115 are configured to removably fasten the belt 110 to the portion.

[0118] Each tab 115 has a first axial end connected to the belt 110 and a second axial end connected to the second portion 65 of the inner shell 40, for example at the lower surface thereof.

[0119] In detail, each end of the tab 115 can be hinged respectively to the belt 110 and to the second portion 65 of the inner shell 40 by means of a connection pin, for example a so-called mushroom-type pin known to the person skilled in the art.

[0120] Each tab 115 is inextensible, and can be made of plastic material, for example it can be made of the same plastic material of which the belt 110 is made, preferably polyurethane.

[0121] For example, it is possible to provide that also each tab 115 can be accommodated in a respective seat made in the inner shell 40, said seat being communicating with the seat for housing the belt 110 and opening up at the top at the recess 70 in which the second portion 65 of the inner shell 40 is accommodated.

[0122] The helmet 10,10' may also have a harness for fastening to the user's head (not shown in the attached figures).

[0123] Said harness may be in the form of a pair of straps, each of which has a first end fastened to the helmet 10,10' at a respective end thereof with respect to said mid-sagittal plane, and an opposite free end adapted to surround the face of the user below the chin and to hook with the free end of the other strap by means of a connection mechanism which allows to adjust their connection so as to adapt the harness to the face of the user.

[0124] Obviously, the fastening harness can be in any other form already present on the market and therefore known to a person skilled in the art.

[0125] The invention thus conceived is susceptible to several modifications and variations, all falling within the scope of the inventive concept that is only limited by the appended claims.

[0126] Moreover, all the details can be replaced by other technically equivalent elements.

[0127] In practice, the materials used, as well as the contingent shapes and sizes, can be whatever according to the requirements without for this reason departing from the scope of protection of the following claims.

Claims

1. A protection helmet (10,10') comprising:

- an outer shell (20), and
- an inner shell (40), which is housed in the outer shell (20) and has a stiffness lower than the outer shell (20),

wherein the inner shell (40) comprises a first portion (45), which is directly in contact with the outer shell (20) and has a recess (70), which defines a zone with reduced thickness of the first portion, and a second portion (65) at least partially housed in the recess (70),
said helmet (10,10') comprising an elastic element (90,95), which:

- is entirely housed in said recess (70),
- is equipped with a first end (90A,95A) fastened to the first portion (45) of the inner shell (40) and a second end (90B,95B) fastened to the second portion (65) of the inner shell (40),
- is configured to deform elastically both along a first direction (A) of the second portion towards or away from/to the recess and along a second direction (B) perpendicular to the first direction (A).

2. The helmet (10') according to claim 1, wherein the elastic element (90,95) comprises a pad (95), which comprises a gel core (100) and a coating film (105) that defines a gel holding bag (100).
3. The helmet (10') according to claim 1 or 2, wherein the first end comprises a respective flat face (95A), which contacts the first portion (45) of the inner shell (40) and the second end (95B) comprises a respective flat face, which contacts the second portion (65) of the same inner shell (40).
4. The helmet (10,10') according to claim 1, wherein the thickness of the elastic element (90,95) along the first direction (A) is between 3 and 8 mm.
5. The helmet (10) according to claim 1, wherein the elastic element comprises a conical helical spring (90).
6. The helmet (10,10') according to any one of the preceding claims, wherein the elastic element (90,95) is unique and its first end (90A,95A) intersects a mid-sagittal plane of the helmet (10,10'), and is fastened to a central portion of the recess (70).
7. The helmet (10,10') according to claim 6, wherein the elastic element (90,95) has an extension along the second direction (B) between 20 mm and 50 mm.
8. The helmet (10,10') according to any one of claims 1 to 5, comprising a plurality of elastic elements (90,95), which are equally spaced from a central point of the recess (70) that lies on a mid-sagittal plane of the helmet (10,10').
9. The helmet (10,10') according to any one of the preceding claims, comprising a belt (110) shaped to sur-

round at least partially the skull along a circumferential direction and having a stiffness lower than the inner shell (40), which belt (110) is connected through tabs (115) to the first portion (45).

10. The helmet (10,10') according to claim 1, comprising three elastic elements (90,95) arranged along the vertices of a triangle whose centre lies on a mid-sagittal plane of the helmet (10,10').

Patentansprüche

1. Schutzhelm (10, 10'), umfassend:

- eine Außenschale (20), und
- eine Innenschale (40), die in der Außenschale (20) untergebracht ist und eine geringere Steifigkeit als die Außenschale (20) aufweist,

wobei die Innenschale (40) einen ersten Abschnitt (45), der direkt in Kontakt mit der Außenschale (20) steht und eine Ausnehmung (70) aufweist, die eine Zone mit verringerter Dicke des ersten Abschnitts definiert, und einen zweiten Abschnitt (65) umfasst, der mindestens teilweise in der Ausnehmung (70) untergebracht ist,
wobei der Helm (10, 10') ein elastisches Element (90, 95) umfasst, das:

- vollständig in der Ausnehmung (70) untergebracht ist,
- mit einem ersten Ende (90A, 95A), das am ersten Abschnitt (45) der Innenschale (40) befestigt ist, und einem zweiten Ende (90B, 95B), das am zweiten Abschnitt (65) der Innenschale (40) befestigt ist, ausgestattet ist,
- so konfiguriert ist, dass es sich sowohl entlang einer ersten Richtung (A) des zweiten Abschnitts zur Ausnehmung hin oder von ihr weg als auch entlang einer zweiten Richtung (B), die senkrecht zur ersten Richtung (A) verläuft, elastisch verformt.

2. Helm (10') nach Anspruch 1, wobei das elastische Element (90, 95) ein Polster (95) umfasst, das einen Gelkern (100) und eine Beschichtungsfolie (105) umfasst, die einen Gelhaltebeutel (100) definiert.
3. Helm (10') nach Anspruch 1 oder 2, wobei das erste Ende eine entsprechende flache Fläche (95A) umfasst, die den ersten Abschnitt (45) der Innenschale (40) berührt, und das zweite Ende (95B) eine entsprechende flache Fläche umfasst, die den zweiten Abschnitt (65) derselben Innenschale (40) berührt.
4. Helm (10, 10') nach Anspruch 1, wobei die Dicke des elastischen Elements (90, 95) entlang der ersten

Richtung (A) zwischen 3 und 8 mm beträgt.

5. Helm (10) nach Anspruch 1, wobei das elastische Element eine konische Schraubenfeder (90) umfasst. 5
6. Helm (10, 10') nach einem der vorstehenden Ansprüche, wobei das elastische Element (90, 95) einzigartig ist und sein erstes Ende (90A, 95A) eine mittlere Sagittalebene des Helms (10, 10') schneidet und an einem zentralen Abschnitt der Ausnehmung (70) befestigt ist. 10
7. Helm (10, 10') nach Anspruch 6, wobei das elastische Element (90, 95) eine Ausdehnung entlang der zweiten Richtung (B) zwischen 20 mm und 50 mm aufweist. 15
8. Helm (10, 10') nach einem der Ansprüche 1 bis 5, umfassend eine Vielzahl von elastischen Elementen (90, 95), die gleichmäßig von einem zentralen Punkt der Ausnehmung (70) beabstandet sind, der in einer mittleren Sagittalebene des Helms (10, 10') liegt. 20
9. Helm (10, 10') nach einem der vorstehenden Ansprüche, umfassend einen Gurt (110), der so geformt ist, dass er den Schädel entlang einer Umfangsrichtung mindestens teilweise umgibt und eine geringere Steifigkeit als die Innenschale (40) aufweist, wobei der Gurt (110) über Laschen (115) mit dem ersten Abschnitt (45) verbunden ist. 25 30
10. Helm (10, 10') nach Anspruch 1, umfassend drei elastische Elemente (90, 95), die entlang der Spitzen eines Dreiecks angeordnet sind, dessen Mittelpunkt auf einer mittleren Sagittalebene des Helms (10, 10') liegt. 35

Revendications 40

1. Casque de protection (10,10') comprenant :
 - une coque extérieure (20), et
 - une coque intérieure (40), qui est logée dans la coque extérieure (20) et présente une rigidité inférieure par rapport à la coque extérieure (20),
 dans lequel la coque intérieure (40) comprend une première portion (45), qui est directement en contact avec la coque extérieure (20) et présente un évidement (70), qui définit une zone avec une épaisseur réduite de la première portion, et une seconde portion (65) au moins partiellement logée dans l'évidement (70), ledit casque (10, 10') comprenant un élément élastique (90,95), qui :
 - est entièrement logé dans ledit évidement (70),

- est équipée d'une première extrémité (90A,95A) fixée à la première portion (45) de la coque intérieure (40) et d'une seconde extrémité (90B,95B) fixée à la seconde portion (65) de la coque intérieure (40),
 - est configuré pour se déformer élastiquement à la fois le long d'une première direction (A) de la seconde portion loin de/vers l'évidement et le long d'une seconde direction (B) perpendiculaire à la première direction (A).

2. Casque (10') selon la revendication 1, dans lequel l'élément élastique (90,95) comprend un coussinet (95), qui comprend un noyau en gel (100) et un film de revêtement (105) qui définit une poche de conservation de gel (100).
3. Casque (10') selon la revendication 1 ou 2, dans lequel la première extrémité comprend une face plate (95A) respective, qui est en contact avec la première portion (45) de la coque intérieure (40) et la seconde extrémité (95B) comprend une face plate respective, qui est en contact avec la seconde portion (65) de la même coque intérieure (40).
4. Casque (10,10') selon la revendication 1, dans lequel l'épaisseur de l'élément élastique (90,95) le long de la première direction (A) est comprise entre 3 et 8 mm.
5. Casque (10) selon la revendication 1, dans lequel l'élément élastique comprend un ressort hélicoïdal conique (90).
6. Casque (10,10') selon l'une quelconque des revendications précédentes, dans lequel l'élément élastique (90,95) est unique et sa première extrémité (90A,95A) coupe un plan mi-sagittal du casque (10,10'), et est fixée à une portion centrale de l'évidement (70).
7. Casque (10,10') selon la revendication 6, dans lequel l'élément élastique (90,95) a une extension le long de la seconde direction (B) comprise entre 20 mm et 50 mm.
8. Casque (10,10') selon l'une quelconque des revendications 1 à 5, comprenant une pluralité d'éléments élastiques (90,95), qui sont également espacés d'un point central de l'évidement (70) qui se trouve sur un plan mi-sagittal du casque (10,10').
9. Casque (10,10') selon l'une quelconque des revendications précédentes, comprenant une ceinture (110) conformée pour entourer au moins partiellement le crâne le long d'une direction circonférentielle et présentant une rigidité inférieure par rapport à la coque intérieure (40), laquelle ceinture (110) est re-

liée par des pattes (115) à la première portion (45).

10. Casque (10,10') selon la revendication 1, comprenant trois éléments élastiques (90,95) disposés le long des sommets d'un triangle dont le centre se trouve sur un plan mi-sagittal du casque (10,10').

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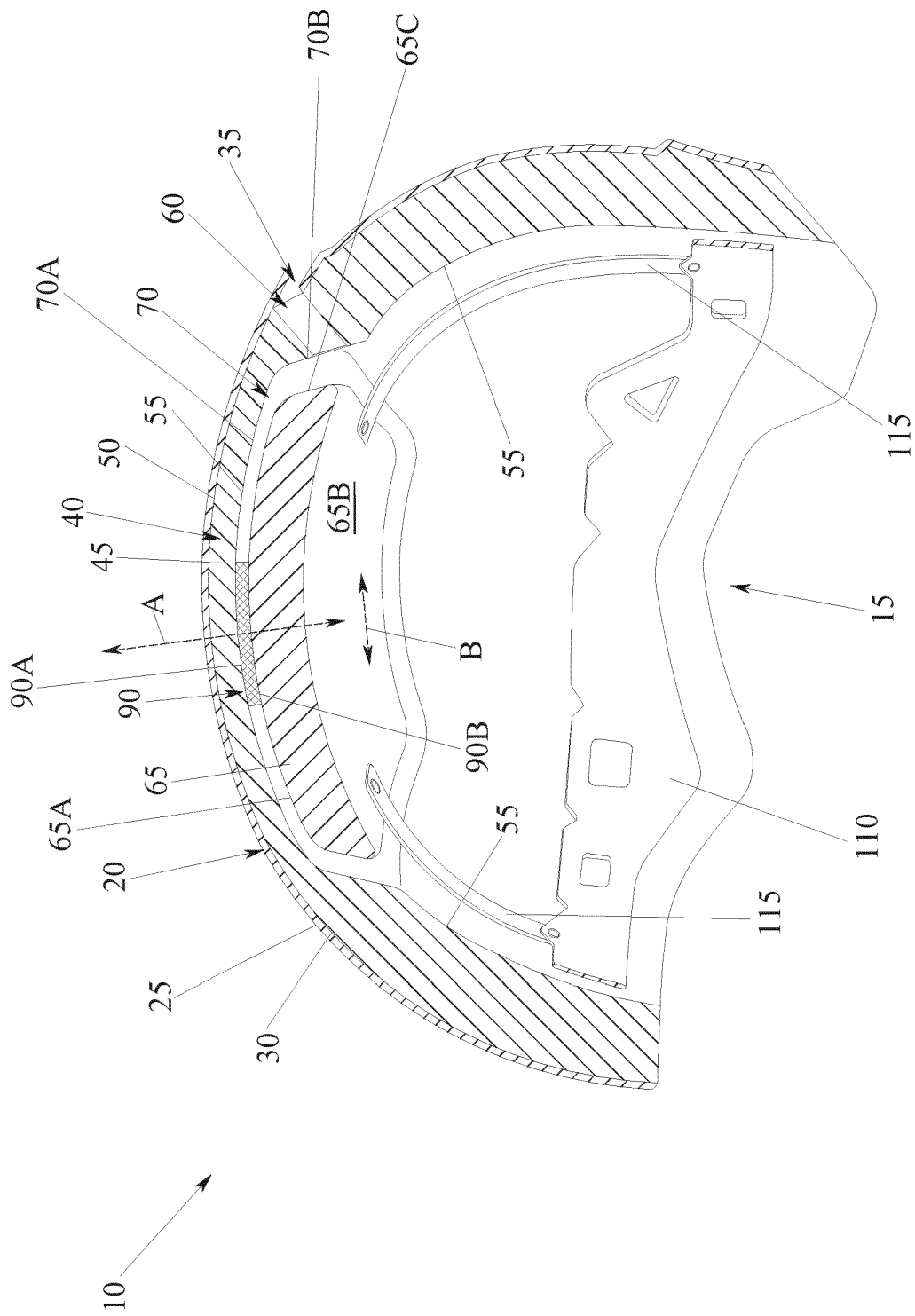


FIG. 1

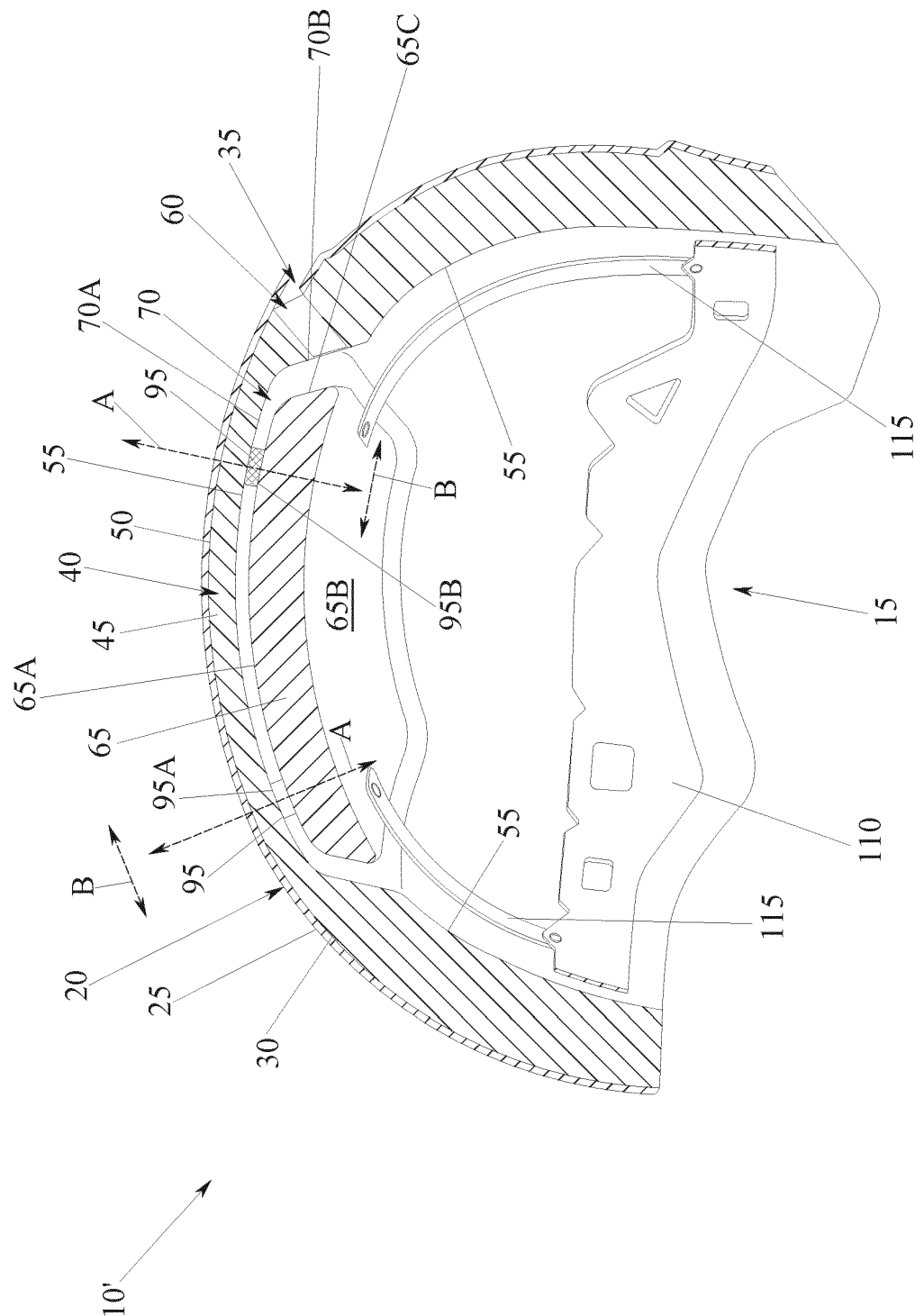
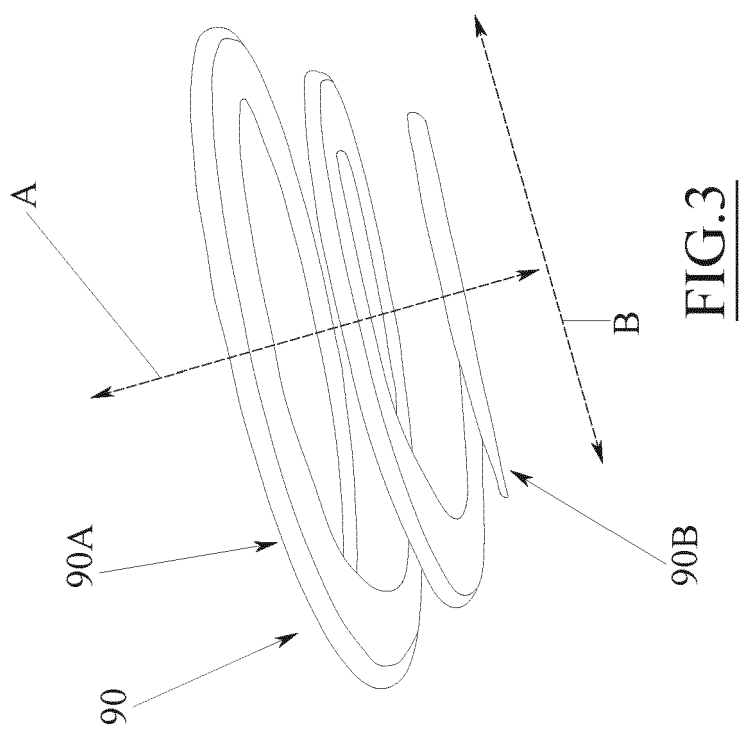
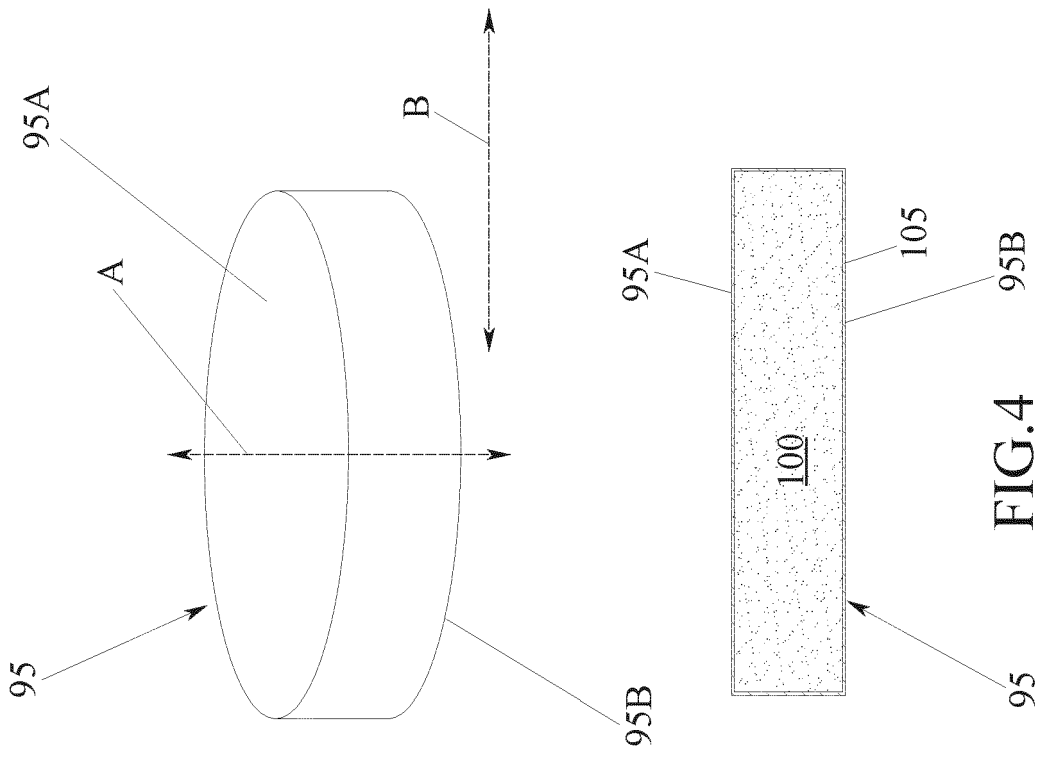


FIG. 2



REFERENCES CITED IN THE DESCRIPTION

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