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(54) **HELMET**

(57) This disclosure relates to a helmet (100) comprising a shell (10) and a protective shield (20), in which said protective shield (20) is configured to take on, with respect to said shell (10), a closed position of said protective shield (20), an open position of said protective shield (20), and an intermediate position between said closed position of said protective shield (20) and said open position of said protective shield (20). The helmet (100) further comprises an opening-closing device (30) of said protective shield (20) configured to rotatably associate said protective shield (20) with said shell (10) and to allow a passage of said protective shield (20) with respect to said shell (10) from said closed position of said protective shield (20) to said intermediate position and to said open position of said protective shield (20), or from said open position of said protective shield (20) to said intermediate position and to said closed position of said protective shield (20). In particular, the opening-closing device (30) is configured to cause a first movement of said protective shield (20) with respect to said shell (10) from said closed position to said intermediate position between said closed position and open position, along a first direction (A), at least in a region (21) of said protective shield (20) for connection with said shell (10), in which said first direction (A) is a substantially orthogonal direction, in use, with respect to an advancing direction of said helmet (100).

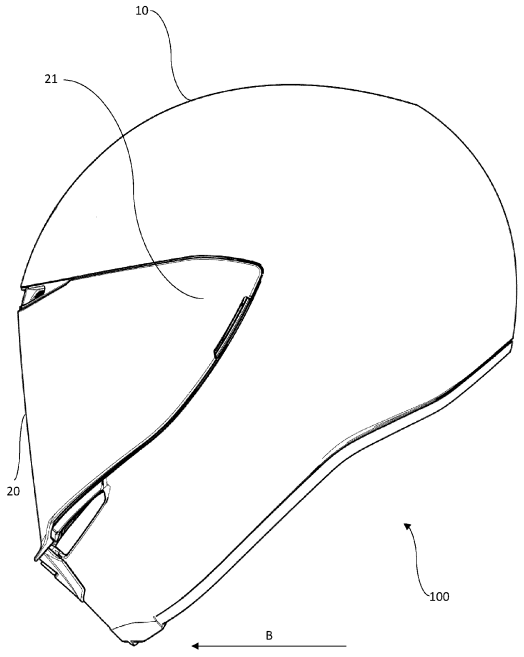

Fig. 1

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Description

[0001] This disclosure generally refers to a helmet. More in detail, this disclosure refers to a helmet comprising a shell and a protective shield rotatably mounted on said shell so that the helmet can take on a first position, in which the protective shield is closed with respect to the shell, and a second position in which the protective shield is open with respect to the shell.

[0002] In many activities, the use of a protective helmet is essential for the safety of a user. In some of these activities, such as in some sports, in particular in motorcycling or motor racing, full-face helmets are used, i.e. equipped with a protective shell and a visor which is movable with respect to said shell at least between a closed position and an open position, which provide the user with the greatest possible protection.

[0003] In order to guarantee the opening and closing of the visor, helmets of the type described comprise a mechanism configured to rotatably associate the visor itself with the shell so that the former can take on a first configuration, or closed or lowered configuration, and a second configuration, or open or raised configuration, with respect to the latter.

[0004] Typically, said mechanism is arranged in a right-hand temporal area and in a left-hand temporal area of the shell and is configured to associate, with the latter, respectively a right-hand connection area and a left-hand connection area of the visor. In this way, the visor consequently is rotatable with respect to the shell around an axis of rotation passing through the right-hand temporal area and the left-hand temporal area of the shell.

[0005] However, the configuration of this type of visor opening and closing mechanism represents a major drawback in known helmets, primarily due to the fact that it does not guarantee effective closure of the visor with respect to the shell.

[0006] In order to allow the simple rotation of the visor with respect to the shell, a discontinuity, or a gap, must be provided between the surface of the shell and the surface of the visor, at least in a frontal area of the helmet and in the temporal areas of the helmet in which the visor is associated with the shell.

[0007] This discontinuity, or gap, is particularly disadvantageous from the point of view of a hermetic seal of the helmet. The presence of this discontinuity does not ensure an efficient waterproofing of the helmet under wet conditions, for example under rainy conditions. Furthermore, the presence of the gap between the shell and the visor can generate, during the use of the helmet, turbulent air flows that generate hissing that can be particularly annoying, as well as dangerous. Finally, such turbulent air flows negatively affect the aerodynamic aspect of the entire helmet.

[0008] These problems have been partially overcome with the introduction of mechanisms for associating the visor with the shell and rotating the visor with respect to the shell which, in addition to the simple rotation of the visor, also allow translating the same with respect to the shell.

[0009] In detail, such mechanisms are configured, like the previous ones, to associate a right-hand connection area of the visor to the shell with a right-hand temporal area of the shell, and a left-hand connection area of the visor to the shell with a left-hand temporal area of the shell. However, unlike the mechanisms previously described, starting from a closed, or lowered, configuration of the visor, these mechanisms provide a first translation movement of the latter with respect to the shell along a direction, in use, of travel or of advancement, of a user using the helmet, and a subsequent rotation of the visor with respect to the shell. In other words, these mechanisms provide for a roto-translation movement of the visor with respect to the shell in a passage from a closed, or lowered, configuration to an open, or raised, configuration of the visor with respect to the shell.

[0010] The advantage of these mechanisms lies mainly in a better closure of the visor, in particular in the frontal area of the helmet, thanks to a partial elimination of the gaps or discontinuity between the visor and the shell at least in the frontal area of the helmet.

[0011] However, while being an improvement with respect to the previous visor coupling and rotation mechanisms, this solution does not completely eliminate gaps or steps between the outer surface of the helmet shell and the outer surface of the visor, in particular in the coupling region of the visor to the shell, i.e. in the temporal areas of the helmet.

[0012] The aforesaid problems highlighted with reference to the known art can occur in combination with or as an alternative to the visor also with a movable chin guard between a closed position and an open position.

[0013] This disclosure aims to provide a helmet which allows overcoming the aforementioned drawbacks with reference to the known art and/or achieving further advantages.

[0014] This is achieved through a helmet and a method as defined in the respective independent claims. Secondary features and particular embodiments of the object of the disclosure are defined in the corresponding dependent claims.

[0015] The helmet according to this disclosure comprises a shell and a protective shield.

[0016] The protective shield is arranged in a frontal area or anterior area of the shell, and in which a rear or nape area of the shell is opposite to a frontal area, and in which side portions of the protective shield are each connected in a rotatable way around a pivot axis to the shell in respective lateral regions of the shell, or right-hand and left-hand regions of the shell, by means of an opening-closing device. In detail, the protective shield is configured to take on, with respect to the shell, at least one closed position of the protective shield and one open position of the protective shield. In other words, the protective shield can take on a lowered position so as to frontally close a front opening of the shell, and at least

one raised position, in which said front opening remains open instead.

[0017] Furthermore according to this disclosure, the protective shield is configured to further take on an intermediate position between the closed position, or lowered position, of the protective shield, and the open position, or raised position, of the protective shield, with respect to the shell. The opening-closing device of the protective shield is such as to allow a passage of the protective shield with respect to the shell from the closed position to the intermediate position and to the open position of the protection visor, or between the open position, to the intermediate position and to the closed position of the protective shield itself. In detail, the opening-closing device of the protective shield is configured to cause a first movement of the side portions of the protective shield with respect to the shell, in a lateral direction away from the protective shield, and vice versa, towards the protective shield. Even more particularly, a passage from said closed position to said intermediate position corresponds to each corresponding side portion of the protective shield moving away from the shell in a lateral direction, and a passage from said intermediate position to said closed position corresponds to each lateral portion of the protective shield moving towards the shell in a lateral direction.

[0018] The lateral direction is a direction parallel to a direction from right side to left side and vice versa, substantially orthogonal or transverse in use, with respect to a forward-back direction of the helmet, i.e. between the nape zone or rear area and the anterior area of the helmet. More preferably, the lateral direction is a direction parallel to the pivot axis.

[0019] In other words, the opening-closing device substantially is configured to move a lateral region of the protective shield which is connected to the shell along said lateral direction, which therefore becomes a movement away from the shell itself when the protective shield is brought from the closed position to the intermediate position, and towards the shell itself when the protective shield is brought from the intermediate position to the closed position. In other words again, the opening-closing device of the protective shield is configured to cause a temporary widening of the protective shield at each lateral portion of the protective shield where it is connected to the shell.

[0020] In this way, it advantageously is possible to eliminate any type of step or slot in an area for connection between the protective shield and the shell when the former is in a closed, or lowered, position with respect to the latter, in particular where the opening-closing device is placed. In particular, the widening movement of the protective shield, or of moving away from the shell along the lateral direction, allows a hermetic closure of the helmet when the protective shield is in the lowered position and at the same time, a moving away of the connection region of the protective shield with the shell in the intermediate position with respect to the latter so that the protective shield itself can rotate and pass to the open, or raised, configuration. For example, by suitably shaping the shell in the frontal area or anterior area, it is possible to slide the protective shield with respect to the shell from the lowered position to the raised position, while ensuring the absence of steps and/or gaps.

[0021] The opening-closing device comprises a first element associated with the shell, a second element associated with the protective shield and a third element, or connecting element, configured to associate the second element with the first element. In particular, according to a preferred aspect, the third element, or connecting element, is an arm element rotatably associated with the first element and the second element. In this way, an articulated arm system is created, which is configured in such a way that the second element can perform a roto-translation movement with respect to the first element associated with the shell. In detail, the configuration of the opening-closing device is such that a connection region of the protective shield with the shell can, at the same time and through a roto-translation movement, move away from or detach from the shell along a lateral direction and translate along a front-rear direction in a movement of the protective shield from the closed position to the intermediate position between the open position and the closed position. More specifically, preferably the second element is associated with the first element by means of a third and fourth element, in which similarly to the third element, the fourth element is configured to associate and allow a movement of the second element, or element associated with the protective shield, and the first element, or element associated with the shell. Preferably, the overall configuration of the first, second, third and fourth elements of the opening-closing device of the protective shield is such as to form an articulated quadrilateral in which the second element rotates and translates with respect to the first, while remaining parallel to the latter.

[0022] In particular, the second element of the opening-closing device is movable with respect to the first element at least between a first position, in which the second element preferably abuts against, or touches, the first element, and a second position, in which the second element is spaced apart with respect to the first element along the lateral direction, and vice versa. In particular, according to this aspect, the first position of the second element of the opening-closing device corresponds to the closed position of the protective shield, while the second position of the second element corresponds to the intermediate position of the protective shield, between the closed position and the open position. In other words, given the configuration of the opening-closing device, the second position of the second element of the opening-closing device corresponds to a condition in which said second element is - with respect to the first element - moved away, or spaced apart, from the latter along the lateral direction and the front-rear direction. In other words again, the third element, or arm element, or con-

necting element, of the opening-closing device is configured in such a way that the second element performs, with respect to the first element, a roto-translation movement that leads it to move away from the latter, both in said lateral direction and in said front-rear direction. Advantageously therefore, the protective shield is configured in such a way that a connection region thereof with the shell can move away from the latter along the lateral direction and can translate - again with respect to the shell - along the front-rear direction in such a way as to release the protective shield itself with respect to a region of the shell configured to accommodate the protective shield itself in its closed, or lowered position, and consequently allow the protective shield to rotate freely to move to the open, or raised, position.

[0023] Furthermore, the opening-closing device further comprises an energy storage element configured to store energy when the second element, or element associated with the protective shield, is kept in the first position. In other words, the element configured to store energy is configured, in use, to bring the first element into a distanced position, preferably along the lateral direction with respect to the second element, or element associated with the shell. In this way, the protective shield is easily brought, and therefore kept, in the intermediate position between the closed position, or lowered position, and the open position, or raised position.

[0024] The energy storage element is charged when the protective shield is in the closed position so that the movement to the intermediate position and then the open position takes place under the push action generated by the release of energy by the energy storage element.

[0025] The energy storage element can be a spring. The configuration of the opening-closing device with the first element, second element and third element associated with each other, is compatible and suitable for combination with said energy storage element to obtain the push effect by the energy storage element and facilitate the movement of the protective shield.

[0026] In other words, advantageously the opening-closing device comprises an articulated parallelogram mechanism configured to move from an enclosed or collapsed configuration, in which the second element associated with the protective shield is in a close, or proximal, or abutment, position with the first element, or element associated with the shell, to an extended, or resting, configuration, in which the second element, or element associated with the protective shield, is spaced apart, or in a distant position, with respect to the first element, or element associated with the shell, and vice versa. In particular, the opening-closing device is brought to the extended configuration, or resting configuration, by the energy storage element, that is, configured to store energy, which in this extended configuration releases all the energy. In other words, when the articulated parallelogram or the articulated mechanism is under an enclosed or collapsed condition, energy storage occurs, which favours the displacement into the open position when the shell is brought from the closed position to the intermediate position.

[0027] In other words again, when the opening-closing device is in the enclosed configuration, the energy storage element is configured to store energy and to facilitate the opening of the protective shield, i.e. the passage of the latter from the first position to the second position or to the intermediate position, releasing this energy stored in it.

[0028] It follows that advantageously and preferably, in the closed position of the protection visor, the region of the protective shield itself for connection with the shell abuts with, or touches, the shell itself, while in the intermediate position between the closed position and the open position, said region of the protective shield for connection with the shell, is spaced from the shell along this lateral direction. In other words, in the closed position of the protective shield, the region of the protective shield itself for connection with the shell is in contact with the latter, consequently closing the helmet, preferably in a hermetic way, preferably by means of a gasket.

[0029] According to a further preferred aspect of this disclosure, the opening-closing device is further configured to cause a second movement of the protective shield with respect to the shell, in particular along a front-rear direction, when the protective shield is brought from the closed position to the intermediate position, or vice versa. In other words, according to this aspect, the opening-closing device is configured in such a way that the protective shield can perform a translational movement with respect to the shell, preferably along a direction orthogonal to the direction of the pivot axis. In particular, in a passage from the closed position, or lowered position, of the protective shield to the intermediate position, the protective shield preferably is configured to translate, or slide, preferably away from the shell, both in a lateral direction, preferably parallel to the rotation axis, and in a front-rear direction, preferably in a direction orthogonal to the rotation axis. It is therefore a roto-translation, in which the translation takes place in at least two directions. It follows that advantageously, according to this aspect, the helmet with the protective shield in the closed or lowered position can have a continuous surface also in a frontal area of the helmet itself, in particular in a region between the protective shield and the shell, without preventing - thanks to the second translation movement of the protective shield - the possibility of rotating the latter with respect to the shell.

[0030] In other words, in light of the geometries indicated above, the opening-closing device is configured to cause three movements of the protective shield with respect to the shell. This involves a double translation and a rotation of the protective shield with respect to the shell. Rotation occurs when the protective shield is in the intermediate position. In other words, according to this preferred aspect, starting from the intermediate position between the closed position and the open position of the protective shield, the opening-closing device is config-

ured to rotate the protective shield with respect to the shell. In particular therefore, a displacement of the protective shield from the closed position to the open position firstly provides a widening of the protective shield at least in a connection region of the same with the shell, preferably a forwards translation of the protective shield itself, and then a rotation of the protective shield with respect to the shell.

[0031] This combination of movements of the protective shield with respect to the shell allows the helmet a substantial absence of steps or gaps between the shell and the protective shield in the closed position which, in addition to the advantages already listed, allows increasing the general safety of the helmet, in particular in the event of an accident, as there are no longer elements which during an accident could cause an unwanted opening of the protection visor, for example due to a protruding surface of the protective shield in contact with the ground.

[0032] As mentioned, the movements are allowed through the opening-closing device.

[0033] According to a further preferred aspect, the helmet comprises an actuation device of the opening-closing device of the protective shield, operatively associated with this opening-closing device and configured to control a displacement of the protective shield with respect to the shell between the closed position of the protective shield to the intermediate position of the same. In detail, according to a preferred aspect, the actuation device is operatively associated with the opening-closing device by means of a tie rod element configured to oppose the action of the element configured to store energy in such a way as to keep the second element of the opening-closing device in the first position. In particular in other words, the device configured to store energy is configured to keep the second element of the opening-closing device in the second position, or position spaced apart from the first element of the opening-closing device itself. This condition corresponds to an intermediate position of the protective shield between the closed position and the open position, in which the region of the protective shield configured to be associated with the shell is spaced apart from the shell itself. The tie rod element is operatively associated with the second element of the opening-closing device in such a way that the second element itself can be kept - through the action of the tie rod element - in the first position with respect to the first element and opposing the action of the element configured to store energy. In other words, by means of the actuation device, advantageously it is possible to move the protective shield from the closed position to the intermediate position, specifically by loosening the tension of the tie rod element, which allows an action of the element configured to store energy and the consequent roto-translation of the second element with respect to the first element. Stated otherwise, the opening-closing device is an articulated quadrilateral, or articulated parallelogram, and the element configured to store energy is configured to keep this articulated quadrilateral, or parallelogram, in an open condition in which the second element of the opening-closing device is spaced apart from the first element of the same opening-closing device. The tie rod element is configured to oppose the action of the element configured to store energy in such a way as to keep, in its tensioned condition, the articulated quadrilateral, or parallelogram, in its closed condition in which the first element and the second element of the opening-closing device are in contact, or substantially in contact, with each other. This condition of contact or substantial contact between the first and the second element of the opening-closing device of the protective shield corresponds to the closed position of the protective shield, while the distanced condition between the first and the second element of the opening-closing device of the protective shield, favoured by the action of the element configured to store energy, corresponds to an intermediate position of the protective shield, in which the region of the protective shield itself configured to be associated with the shell is rotated and translated with respect to the latter. A loosening of the tensioned condition of the tie rod element corresponds to an opening of said articulated quadrilateral and a consequent passage of the protective shield from the closed position to the intermediate position. In other words again, the tie rod element is configured to allow a storage of energy in the element configured to store energy and a consequent approach of the second element associated with the protective shield to the first element associated with the shell. This approach corresponds to a closed position of the protective shield with respect to the shell. Thanks to the action of the tie rod element, the energy stored in the element configured to store energy can then be used to favour a movement of the second element away from the first element of the opening-closing device, and a consequent passage of the protective shield from the closed position to the intermediate position or to the open position.

[0034] Preferably, according to an aspect of this disclosure, the actuation device comprises an element for locking the movement of the protective shield in the closed position. In other words, the actuation device is further configured to keep the protective shield in the closed position. Specifically, according to one aspect, the locking device preferably is configured to keep the tie rod element in a tensioned condition, or opposing the action of the element configured to store energy, in order to keep the articulated quadrilateral, or parallelogram, in the closed condition, or in other words, the protective shield in the closed position. Preferably, an intervention on this locking device, preferably by means of a button, preferably placed in a chin guard region of the helmet, is configured to loosen this tensioned condition of the tie rod element in such a way as to allow the element configured to store energy to move the second element of the opening-closing device into the second position and consequently, the articulated parallelogram, or quadrilateral, to pass from its closed configuration to its opened configuration, thus bringing the protective shield from the

closed position to the intermediate position.

[0035] According to a further preferred aspect, the opening-closing device is a first opening-closing device placed in a right-hand temporal area of the helmet and configured to rotatably associate a right-hand connection region of the protective shield to the shell; the helmet further comprises a second opening-closing device placed in a left-hand temporal area of the helmet and configured to rotatably associate a left-hand connection region of the protective shield with the shell.

[0036] A further object of this disclosure is a method of opening-closing a protective shield with respect to a shell of a helmet. This method involves a step of moving the protective shield from a closed position, or lowered position with respect to the shell, to an open position, or raised position with respect to the shell. This step involves moving the protective shield from the closed position to an intermediate position between the closed position and the open position, by moving at least one region of the protective shield for connection with the shell along a lateral direction preferably parallel to a pivot axis of the protective shield to the shell. In other words, this step provides a widening, at least at the region of the protective shield for connection with the shell along this lateral direction. According to this disclosure, the step of moving the protective shield from the closed position to the intermediate position between the closed position and the open position takes place through an element configured to store energy. In other words, this element configured to store energy is configured to move at least one region of the protective shield for connection with the shell along this lateral direction, thus moving this region away from the shell of the protective helmet. In other words again, the element configured to store energy is configured to pass from an active, or energy storage, configuration when the protective shield is in the closed position and said region of the protective shield for connection with the shell is associated with, or abuts against, the shell itself, to a resting configuration, or release condition of the stored energy, when the protective shield is in the closed or intermediate position and this region of the protective shield for connection with the shell is spaced apart, or distanced, from the shell itself. The energy stored by the element configured to store energy when the protective shield is in the closed position can be advantageously used to facilitate the movement of the protective shield from the closed position to the intermediate position or to the open position.

[0037] According to a preferred aspect, the step of moving the protective shield from the closed position to the intermediate position provides moving the connection region of the protective shield from a position in which said region abuts with the shell to a position in which said region is spaced apart from the shell along the lateral direction.

[0038] According to a further preferred aspect, the step of moving the protective shield from the closed position to the intermediate position further provides moving the protective shield with respect to the shell along a front-rear direction, extending between an anterior area and a rear area of the helmet, or in other words, substantially parallel, in use, to an advancing direction of the helmet.

[0039] Preferably, according to a further aspect, the method provides a step of moving the protective shield itself from the intermediate position to the open position by means of a rotation of the protective shield with respect to the shell.

[0040] According to a preferred aspect, the step of moving the protective shield from the closed position to the intermediate position along the first and the front-rear direction provides a roto-translation movement of a second element of an opening-closing device of the protective shield with respect to a first element of said opening-closing device of the protective shield, in which the second element is associated with the connection region of the protective shield, while the first element is associated with the shell. In practice, the step of moving the protective shield from the open position to the intermediate position provides roto-translating an element associated with the protective shield with respect to an element associated with the shell, preferably through a third connecting element between the first element and the second element.

[0041] Preferably, according to a further aspect, this roto-translation movement is actuated by a actuation device of the helmet operatively associated with the opening-closing device of the protective shield by means of a tie rod element. Preferably, said tie rod element opposes the action of an element configured to store energy and configured to keep the second element in an abutment, or contact, position with respect to the first element of the opening-closing device for keeping the protective shield from the closed position. In other words, the tie rod element is configured to allow a storage of energy in said element configured to store energy. Stated otherwise, the tie rod element is configured to oppose an action of the element configured to store energy. According to a further aspect of this disclosure, the method provides releasing a movement of the protective shield from the closed position to the intermediate position.

[0042] Preferably, this step takes place by releasing a locking element of the movement of the protective shield in the closed position of the actuation device. Preferably, the locking element is configured to keep the protective shield in the closed position. In other words, the locking element, preferably by means of the tie rod element, in particular in its tensioned condition, is configured to keep the parallelogram, or quadrilateral, articulated in its closed condition, opposing the action of the element configured to store energy or stated otherwise, the second element of the opening-closing device in contact with, or abutting against, the first element.

[0043] Preferably, a loosening of a tensioned condition of the tie rod element, by means of releasing the locking element of the actuation device, is configured to allow an action of the element configured to store energy and a

consequent opening of the articulated quadrilateral, therefore with a passage of the protective shield from the closed position to the open position. Preferably, the step of releasing a movement of the protective shield takes place by means of a button, preferably configured to loosen a tension of the tie rod element.

[0044] Further advantages, characteristics and methods of use of the object of this disclosure will become evident from the following detailed description of its embodiments, presented merely by way of non-limiting examples.

[0045] It is however evident that each embodiment of the object of this disclosure can have one or more of the advantages listed above; however, no embodiment is required to simultaneously have all the listed advantages.

[0046] Reference will be made to the figures of the attached drawings, in which:

- Figure 1 is a side view of a helmet in which a protective shield of said helmet is in a closed position with respect to a shell of the same helmet, according to an aspect of this disclosure;
- Figure 2 is a front view of a helmet in which a protective shield of said helmet is in a closed position with respect to a shell of the same helmet, according to an aspect of this disclosure;
- Figure 3 is a side view of a helmet in which a protective shield of said helmet is in an intermediate position between a closed position and an open position with respect to a shell of the same helmet, according to an aspect of this disclosure;
- Figure 4 is a front view of a helmet in which a protective shield of said helmet is in an intermediate position between a closed position and an open position with respect to a shell of the same helmet, according to an aspect of this disclosure;
- Figure 5 is a perspective view of an opening-closing device of the protective shield in a first position, corresponding to a closed position of the protective shield with respect to the shell, according to an aspect of this disclosure;
- Figure 6 is a perspective view of an opening-closing device of the protective shield in a second position, corresponding to an intermediate position of the protective shield with respect to the shell, according to an aspect of this disclosure;
- Figure 7 is a further perspective view of an opening-closing device of the protective shield in a second position, corresponding to an intermediate position of the protective shield with respect to the shell, according to an aspect of this disclosure;
- Figure 8 is a sectional view of an opening-closing device of the protective shield in a first position, corresponding to a closed position of the protective shield with respect to the shell, according to an aspect of this disclosure;
- Figure 9 is a sectional view of an opening-closing device of the protective shield in a second position, corresponding to an intermediate position of the protective shield with respect to the shell, according to an aspect of this disclosure;
- Figure 10 is a view of an actuation device of the opening-closing device, according to an aspect of this disclosure;
- Figure 11 is a view of a portion of an actuation device of an opening-closing device of the protective shield, in which the protective shield is in a first position, corresponding to a closed position of the protective shield with respect to the shell, according to an aspect of this disclosure;
- Figure 12 is a perspective view of a helmet showing an arrangement of the actuation device, according to an aspect of this disclosure;
- Figure 13 is a sectional view of an actuation device of an opening-closing device of the protective shield corresponding to a closed position of the protective shield with respect to the shell, according to an aspect of this disclosure;
- Figure 14 is a further sectional view of a portion of an actuation device of an opening-closing device of the protective shield corresponding to an intermediate position of the protective shield with respect to the shell, according to an aspect of this disclosure;
- Figure 15 is a further sectional view of an actuation device of an opening-closing device of the protective shield corresponding to a further intermediate position of the protective shield with respect to the shell, according to an aspect of this disclosure;
- Figure 16 is a further view of an actuation device of an opening-closing device of the protective shield corresponding to a closed position of the protective shield with respect to the shell, according to an aspect of this disclosure;
- Figure 17 is a further view of a portion of an actuation device of an opening-closing device of the protective shield corresponding to an intermediate position of the protective shield with respect to the shell, according to an aspect of this disclosure.

[0047] With reference to the accompanying drawings, an embodiment of helmet according to this disclosure is denoted with reference numeral 100.

[0048] The helmet 100 specifically comprises a protective shell 10, configured to provide a user with protection against possible impacts, for example in the event of an accident.

[0049] The helmet 100 further comprises a protective shield 20 associated with the shell 10. Preferably, the protective shield 20 is configured to be associated with the shell 10, in particular rotatably mounted with respect to the latter, at least at a region 21 of the protective shield 20 for connection with the shell 10. Preferably, this region 21 is a first end region of the protective shield 20, or right-hand end region of the protective shield 20. Preferably moreover, the protective shield 20 can be associated with

the shell 10, in particular rotatably mounted with respect to the latter, also at a second region 22, or left-hand end region of the protective shield 20.

[0050] In the context of this disclosure, "protective shield" means a closing element of a front opening of the helmet 100. For example, preferably the protective shield 20 is a visor. In combination or alternatively, the protective shield 20 is a chin guard.

[0051] In detail, with particular reference to Figures 1 to 4, the protective shield 20 of the helmet 100 according to this disclosure is configured to take on at least one closed position and one open position with respect to the shell 10. In detail, in the closed position, the protective shield 20 is configured to close, preferably in a hermetic or substantially hermetic or airtight way, an opening of the shell 10. On the contrary, in the open position, the protective shield 20 is configured to leave free this opening in the shell 10. In particular, Figures 1 and 2 show the protective shield 20 in the closed position, while Figures 3 and 4 show the protective shield 20 in the intermediate position between the closed position and the open position.

[0052] Furthermore, the protective shield 20 of the helmet 100 is configured to take on an intermediate position between the open position of the protective shield 20 and the closed position of the protective shield 20 itself.

[0053] In other words, the protective shield 20 is movable with respect to the shell 10 at least between a closed position, an intermediate position and an open position, or vice versa.

[0054] The helmet 100 according to this disclosure further comprises an opening-closing device 30 of the protective shield 20, shown in Figures 5, 6, 7, 8 and 9. This opening-closing mechanism 30 is configured both to associate the protective shield 20 in a rotatable manner with the shell 10, and to allow the protective shield 20 to pass from the closed position, to the intermediate position, and to the open position, or vice versa, with respect to the shell 10.

[0055] In detail, in a movement of the protective shield 20 from the closed position to the intermediate position, the opening-closing device 30 of the protective shield 20 is configured to cause a first movement of the protective shield 20 with respect to the shell 20 at least in the region 21 of the protective shield 20 for connection with the shell 10, along a lateral direction A. This first direction A is a direction which is parallel or substantially parallel to a pivot axis of the protective shield 20 to the shell 10, or in other words, orthogonal, in use, to an advancing direction of the helmet 100. In other words, the opening-closing device 30 is configured to move the protective shield 20, in particular the region 21 for connection of the protective shield 20 with the shell 10, along the lateral direction A.

[0056] More specifically, in the closed position of the protective shield 20, the region 21 for connection of the protective shield 20 to the shell 10 abuts with the shell 10, or touches the shell 10. In other words, in the closed position, the region 21 is in contact with the shell 10. Preferably, this arrangement of the protective shield, in particular in the region 21 of the protective shield, with respect to the shell 10, causes a sealing situation, in particular to fluids such as water, between the protective shield and the shell 10. In other words, this arrangement causes an external surface substantially free of discontinuity in the helmet 100 also in the border region between the shell 10 and the protective shield 20 when the latter is in the closed or lowered position.

[0057] According to this aspect, in the intermediate position between the closed position of the protective shield 20 and the open position of the same, the region 21 is spaced apart from the shell along the lateral direction A. In other words, in the intermediate position, the region 21 of the protective shield 20 is substantially not in contact, or not in abutment, with the shell 10. In other words again, this region 21 is spaced apart in the intermediate position with respect to the shell along the lateral direction A. Preferably, the protective shield 20 in the intermediate position is widened with respect to the shell with respect to when the protective shield 20 is in the closed position. In other words, in the intermediate position, the protective shield 20 forms, with the shell 10, an external surface of the helmet 100 comprising a discontinuity, or a step. Preferably, in the intermediate position, the protective shield 20, and in particular the region 21 of the protective shield 20, is located externally, or outside, with respect to a recess of said shell 10 configured to receive the protective shield 20 when it is in the closed position. Furthermore, according to this aspect, both the right-hand region 21 of the protective shield 20 and the left-hand region 22 of the protective shield 20 itself are preferably spaced apart with respect to the shell 10 along the lateral direction A.

[0058] According to a further preferred aspect, the opening-closing device 30 is further configured to cause a second movement, in particular a translation movement, of the protective shield 20 with respect to the shell 10 when the protective shield is moved from the closed position to the intermediate position. Preferably, this second movement occurs along a front-rear direction B, extending between an anterior area and a rear area of the helmet, or in other words, substantially parallel, in use, with respect to an advancing direction of the helmet 100. Consequently, the lateral direction A and the front-rear direction B are orthogonal, or substantially orthogonal, to each other. In particular, according to this aspect, the opening-closing device 30 preferably is configured to translate the protective shield 20 along the front-rear direction B, in particular forwards with respect to the shell 10. Preferably, in the intermediate position, the protective shield 20 is external, or outside, or further forward, with respect to the recess of the shell 10 configured to receive the protective shield 20 itself.

[0059] Consequently, in the intermediate position, the protective shield is released from, or does not interfere with, the recess of the shell 10 configured to receive it in the closed position. It follows that advantageously, the

protective shield 20 can take on a closed position in which it is completely inserted in the recess of the shell, and a position in which the same protective shield 20 protrudes from, or does not interfere with, said recess. In this intermediate position therefore, the protective shield 20 is free to rotate with respect to the shell 10 up to the open position.

[0060] According to an aspect of this disclosure, the opening-closing device 30 is further configured to cause a third movement of the protective shield 20 with respect to the shell 10 from the intermediate position to the open position, in which this third movement is a rotation movement of the protective shield 20 with respect to the shell 10.

[0061] Consequently, in the passage from the closed position to the intermediate position and finally to the open position of the protective shield 20 with respect to the shell 10, the opening-closing device allows the protective shield to make a first movement along a lateral direction A, in particular of a region 21 of the protective shield for connection with the shell 10, a second movement of the protective shield 20 along a direction B, which is substantially orthogonal to the lateral direction A, and a rotation of the protective shield 20 with respect to the shell 10. Preferably, the first movement and the second movement occur simultaneously or substantially simultaneously, while said first and second movements anticipate the rotation of the protective shield in a passage of the protective shield 20 from a closed configuration to an open configuration. On the contrary, in the passage of the protective shield from the open configuration to the closed configuration, the rotation of the protective shield 20 anticipates the first and second movements of the same, which preferably occur simultaneously or substantially simultaneously when the protective shield 20 reaches the intermediate position and passes to the closed position.

[0062] According to a preferred aspect, the opening-closing device 30 comprises a first element 31, a second element 32, and a third element 33, or connecting element between the first element 31 and the second element 32. In detail, the first element 31 is associated with the shell, while the second element 32 is associated with the protective shield 20. The overall configuration of the opening-closing device 30 is such that the second element 32 is movable with respect to the first element 31. In detail, the third element 33 is an arm element associated in a rotatable manner both with the first element 31 and the second element 32 in such a way that the latter can perform a roto-translation movement with respect to the first element 31, or element associated with the shell 10. Preferably, the second element 32 associated with the protective shield 20 is movable with respect to the first element 31 both along the lateral direction A and along the front-rear direction B. In detail, the first element 31 and the second element 32 are plate-like elements, or substantially plate-like elements, configured to be arranged substantially overlapping each other. In this configuration, the third element 33 is configured to associate an end region of the first element 31 with a corresponding end region of the second element 32, in which this end region of the second element 32 is arranged substantially overlapping the end region of the first element 31.

[0063] Preferably, the opening-closing device 30 of the protective shield 20 further comprises a fourth element 34 configured to movably associate the second element 32 with the first element 31. More specifically, preferably the fourth element 34 is an arm element associated with both the first element 31 and the second element 32. Preferably, the overall arrangement of the first, second, third and fourth elements 31, 32, 33 and 34, respectively, is such as to form an articulated quadrilateral in which the second element 32 moves parallel to the first element 31. Preferably, thanks to the third and fourth elements 33, 34, the second element 32 is configured to rotate and to translate with respect to the first element 31, preferably parallel to the latter.

[0064] In detail, preferably the second element 32 associated with the protective shield 20 is movable with respect to the first element 31 associated with the shell 10 at least between a first position, shown in Figure 5 and in Figure 8, in which the second element abuts with, or touches, the first element 31, and a second position, shown in Figures 6, 7 and 9, in which the second element 32 is spaced apart with respect to the first element 31 along the lateral direction A, and vice versa. In particular moreover, the first position of the second element 32, or element associated with the protective shield 20, corresponds to the closed position of the protective shield 20 with respect to the shell 10, while the second position of the second element 32 with respect to the first element 31 corresponds to the intermediate position of the protective shield 20 with respect to the shell 10.

[0065] According to a further aspect moreover, the second element 32, or element associated with the protective shield 20, comprises a device 36 configured to allow the protective shield 20 to rotate with respect to this second element 32. In particular, preferably this device 36 comprises a rotating element with respect to a main body, or plate-like body, of the second element 32. Consequently, the configuration and arrangement of the first, second, third and fourth elements 31, 32, 33, 34, respectively, allow the protective shield 20 to perform the first and second movement, i.e. a widening and translation movement with respect to the shell 10, while the device 36 of the second element 32 allows the protective shield 20 to perform the third movement, that is the rotation, with respect to the shell 10.

[0066] Preferably, the opening-closing device 30 comprises an element 35 configured to store energy and to keep the second element in the second position. In other words, the element 35 configured to store energy is configured to keep the protective shield in the intermediate position with respect to the shell 10. Preferably, this element for storing energy 35 is an elastic element, preferably a spring. Preferably moreover, this element for

storing energy 35 is associated with one of the third element 33 and the fourth element 34.

[0067] According to a further aspect, the helmet 100 further comprises an actuation device 40 of the opening-closing device 30 of the protective shield 20, shown in particular in Figures 8 and 9. In particular, this actuation device 40 is operatively associated with the opening-closing device 30, in particular with the second element 32, or element associated with the protective shield 20, and is configured to control a displacement of the protective shield 20 with respect to the shell 10 at least between the closed position of the protective shield 20 and the intermediate position of the protective shield 20, or vice versa.

[0068] Specifically, the actuation device 40 is associated with the opening-closing device 30 by means of a tie rod element 41. Preferably, this tie rod is associated on one side with a button 42 of the actuation device 40 and on the other with the second element 32 of the opening-closing device 30 of the protective shield 20. The tie rod element 41 is configured to oppose the action of the element 35 configured to store energy in such a way as to keep the second element 32, or element associated with the protective shield 20, in the first position in a tensioned or traction condition and consequently, the protective shield 20 in the closed position. In detail, in a tensioned condition of the tie rod element 41, the second element 32 is kept in contact with, or touches, the first element 31, opposing the action of the element 35 configured to store energy. Furthermore, preferably upon the operation of the button 42 of the actuation device 40, which button is preferably located in a chin guard area of the helmet 100, the tension of the tie rod element 41 is loosed and the second element 32, due to the action of the element 35 configured to store energy, passes from the first position to the second position, thus moving the second element 32 away from the first element 31 and consequently, the protective shield 20 from the shell 10, at least in the region 21 of the protective shield configured for a connection with the shell. For this purpose, preferably the tie rod element 41 is associated with the second element 32 at a portion of the latter for connection with the third element 33 or fourth element 34, preferably of the other element between the third element 33 and the fourth element 34 with respect to that in which the element 35 configured to store energy is present. This facilitates the maintenance of the second element 32 in the first position opposing the action of the element 35 configured to store energy.

[0069] In other words, preferably an operation of the button 42, preferably associated with the tie rod element 41, is configured to loosen a tensioned condition of the tie rod element 41 itself and consequently, to allow an action of the element 35 configured to store energy aiming to move the second element 32 from the first position to the second position, or in other words, to open the articulated quadrilateral by moving the protective shield 20 away from the shell 10. This movement therefore causes a passage of the protective shield 20 from the closed position to the intermediate position.

[0070] According to a further aspect of this disclosure, the actuation device 40 comprises a locking element 43 of the movement of the protective shield 20 in the closed position of the protective shield 20 itself. Preferably, this locking element 43 is configured to prevent the protective shield from passing from the closed position to the intermediate position between the closed position and the open position. Even more preferably, the locking element is associated with said button 42 and with said tie rod 41 in such a way that, upon operation of this button 42 by a user, the locking element 43 releases a movement of the protective shield from the closed position to the intermediate position and at the same time, a tensioned condition of the tie rod element 41 is loosened so that the second element 32 of the opening-closing device 30 passes from the first position to the second position, thus allowing the protective shield to pass from the closed position to the intermediate position. In other words therefore, the locking element 43 is configured to keep the tie rod element 41 in a tensioned condition, in which in this tensioned condition the tie rod element 41 is configured to oppose an action of the element 35 configured to store energy, thus keeping the second element 32, or element associated with said protective shield 20, in the first position. Preferably, an operation of the button 42 is configured to release said locking element 43, thus allowing a loosening of the tension of the tie rod element 41 and a movement of the second element 32 from the first position to the second position thanks to the action of the element 35 configured to store energy.

[0071] With particular reference to Figures 12 and 13, according to a preferred embodiment of this invention, the protective shield 20 can comprise a coupling element 23 configured to be removably associated with the locking element 43. Preferably, the coupling element 23 and the locking element 43 are associated when the protective shield 20 is in the closed position, and the coupling element 23 and the locking element 43 are disassociated when the protective shield 20 is in the open position or in the intermediate position. Even more preferably, when the coupling element 23 and the locking element 43 are associated, the movement of the protective shield 20 is inhibited.

[0072] The coupling element 23 is preferably cylindrical in shape, and the locking element 43 preferably comprises a coupling seat which is cylindrical, or shaped like a hook, or adapted to house the coupling element in such a way as to keep the coupling element 23 and the locking element 43 associated in a stable manner.

[0073] According to a preferred embodiment, the actuation device 40 can further comprise a sliding element 44 configured to translate along a sliding direction S to pass between an upper position and a lower position, and vice versa. Furthermore, the coupling element 23 can be configured to actuate a translation of the sliding element 44 from the upper position to the lower position,

or vice versa, when the protective shield 20 passes from the closed position to the intermediate position, or vice versa. In particular, preferably the coupling element 23 is configured to actuate a translation of the sliding element 44 from the lower position to the upper position when the protective shield 20 passes from the closed position to the intermediate position, and to actuate a translation of the sliding element 44 from the upper position to the lower position when the protective shield 20 passes from the intermediate position to the closed position.

[0074] In other words, the coupling element 23 is configured to move the sliding element 44 from the upper position to the lower position, or vice versa, for example by means of a direct contact. Furthermore, the coupling element 23 is preferably configured to keep the sliding element 44 in the lower position as long as the coupling element 23 and the locking element 43 are associated.

[0075] For example, the coupling element 23 can be a cylinder capable of sliding along a guide of the actuation device 40 to be associated with the locking element 43, and by sliding the coupling element 23, it can move or push the sliding element 44 from the upper position to the lower position. In other words, the sliding element 44 is in the upper position when the protective shield is in the open position or in the intermediate position, while the sliding element 44 is in the lower position when the protective shield is in the closed position.

[0076] Preferably, the coupling element 23 is fixed to the protective shield 20 in a region in the vicinity of the actuation device 40, for example the coupling element 23 projects from the protective shield 20 in the vicinity of the actuation device 40 in such a way whereby the association between the coupling element 23 and the locking element 43 is favoured. Preferably, when the protective shield passes from the open position or from the intermediate position to the closed position, the coupling element 23 moves within a seat of the actuation device 40 in which it is able to be associated with the locking element 43, for example following a guide of the actuation device 40.

[0077] With particular reference to Figures 14 and 15, according to a preferred embodiment, the sliding element 44 is associated with a crank element 45, preferably by means of a rotoidal coupling. In particular, the sliding element 44 can be configured to actuate a rotation of the crank element 45 when it passes from the upper position to the lower position, or vice versa.

[0078] Furthermore, the crank element 45 is preferably associated in a fixed manner with the tie rod element 41, for example in a distal region of the crank element 45 with respect to the coupling between the sliding element 44 and the crank element 45. In particular, the tie rod element 41 is preferably configured to take on the tensioned condition when the crank element 45 rotates following the passage of the sliding element 44 from the upper position to the lower position. Furthermore, the tie rod element 41 is preferably configured to actuate a rotation in the opposite direction of the crank element 45 when the coupling element 23 and the locking element 43 are disassociated. In other words, preferably the crank element 45 is able to rotate about a rotation axis, and the sliding element 44 is configured to actuate or trigger a rotation of the crank element 45, for example in a direction between a clockwise and an anticlockwise direction, passing from the upper position to the lower position. Furthermore, preferably when the coupling element 23 and the locking element 43 are disassociated, the sliding element 44 is free to move from the lower position to the upper position and the tie rod element 41 can leave the tensioned condition, thanks to the action of the element 35 configured to store energy, and actuate a rotation of the crank element 45, for example in the other direction between the clockwise direction and the counter-clockwise direction, which crank element 45 moves the sliding element 44 from the lower position to the upper position.

[0079] Preferably, this movement of the sliding element 44 favours the passage of the protective shield 20 from the closed position to the intermediate position through the interaction between the sliding element 44 and the coupling element 23. In particular, preferably the sliding element 44 passes from the lower position to the upper position and pushes the coupling element 23 out of its seat in the actuation device 40 if the coupling element 23 and the locking element 43 are disassociated, for example due to the operation of a button 42 of the actuation device 40.

[0080] In other words, the button 42 can actuate the uncoupling between the coupling element 23 and the locking element 43, and consequently the tie rod element 41 can leave or release its tensioned condition and favour the opening of the protective shield 20 by means of the action on the rotation of the crank element 45, which in turn moves the sliding element 44 from the lower position to the upper position, which in turn pushes or moves the coupling element 23, for example outside its seat in the actuation device 40.

[0081] According to a further preferred aspect, the described opening-closing device 30 is a first opening-closing device. In particular, the helmet 100 further comprises a second opening-closing device 30. Preferably, the first opening-closing device 30 is arranged in a right-hand temporal area of the helmet 100 and is configured to rotatably associate a right-hand connection region 21 of the protective shield 20 with the shell 10, while the second opening-closing device 30 is arranged in a left-hand temporal area of the helmet 100 and is configured to rotatably associate the left-hand region 22 for connection of the protective shield 20 with the shell 10. It is understood that with the exception of the arrangement in the helmet 100, the first and second opening-closing devices both comprise the same elements described above in relation to the opening-closing device 30 and are configured to allow the same movements by the protective shield 20 with respect to the shell 10.

[0082] A further object of this disclosure is a method

of opening-closing a protective shield 20 with respect to a shell 10 of a helmet 100.

[0083] In the description of the method, the elements of the compacting device 1 involved in the method and having the same function and the same structure as the elements previously described retain the same reference number and are not again described in detail.

[0084] In detail, the method comprises a step of moving the protective shield 20 from a closed position to an open position. Specifically, the step of moving the protective shield 20 from the closed position to the open position provides in turn moving the protective shield from the closed position to an intermediate position between the closed position and the open position of the protective shield 20 itself. This step of moving the protective shield 20 from the closed position to the intermediate position provides in particular moving at least one region 21 of the protective shield 20 for connection with the shell 10 along a lateral direction A, which is parallel or substantially parallel to a pivot axis of the protective shield 20 to the shell 10, or in other words, substantially orthogonal, in use, to an advancing direction of the helmet 100.

[0085] More in detail, preferably the displacement of this region 21 along the lateral direction A provides moving the region 21 from a position in which it abuts with, or touches, the shell 10, to a position in which the region 21 itself is spaced apart from the shell along the lateral direction A. Preferably, in the closed position, the region 21 of the protective shield 20 is configured, with respect to the shell 10, in such a way as to ensure a sealed closure, in particular to fluids such as water, between the protective shield 20 and the shell 10, and an external surface substantially free of discontinuity in the helmet 100 also in the border region between the shell 10 and the protective shield 20. Consequently, the first movement of the protective shield 20, in particular the movement of the region 21 along the lateral direction A, causes said region 21 to move away from the shell along this lateral direction A and a consequent appearance of a discontinuity, or step, in the outer surface of the helmet 100.

[0086] According to a preferred aspect, the step of moving the protective shield 20 from the closed position to the intermediate position between the closed position and the open position further provides moving the protective shield 20 with respect to the shell 10 along a front-rear direction B. Preferably, according to this aspect, the second direction B extends between an anterior area and a rear area of the helmet 100, or is a substantially parallel direction, in use, with respect to an advancing direction of the helmet.

[0087] It follows that a movement of the protective shield 20 from the closed position to the intermediate position comprises a first movement of at least one region 22 of the protective shield 20 for connection with the shell 10, preferably away from said shell 10 along a lateral direction A, and a second translation movement of the protective shield 20, preferably away from the shell 10, along a front-rear direction B, orthogonal to the lateral direction A. Preferably, the first movement and the second movement are contemporary or substantially contemporary.

[0088] According to a further aspect, the method provides a step of moving the protective shield 20 from the intermediate position between the closed position and the open position of the protective shield 20, to the open position of the same protective shield 20. According to this aspect, this movement, or third movement of the protective shield 20, is a rotation of the latter with respect to the shell 10, starting from the intermediate position up to the open position. Preferably, in a passage of the protective shield 20 from the closed position to the open position, passing through the intermediate position between the closed position and the open position, the first and second movements, i.e. the movement along the lateral direction A, specifically in the region 21 of the protective shield 20 for connection with the shell, and the movement along the front-rear direction B, occur simultaneously or substantially simultaneously and bring the protective shield 20 from the closed position to the intermediate position. Preferably, the third movement, or rotation of the protective shield 20 with respect to the shell 10 from the intermediate position to the open position, takes place successively. On the contrary, in the passage of the protective shield from an open position to a closed position, passing through the intermediate position, the rotation from the open position to the intermediate position preferably takes place before the second and first movement of the protective shield 20, which preferably occur simultaneously or substantially simultaneously.

[0089] Preferably, according to an aspect of this disclosure, the step of moving the protective shield 20 from the closed position to the intermediate position between the closed position and the open position of the protective shield 20 along the lateral direction A and along the front-rear direction B provides a roto-translation movement of a second element 32 of an opening-closing device 20 of the protective shield 20 with respect to a first element 31 of the same opening-closing device 30. In detail, the first element 31 of the opening-closing device is associated with the shell 10 of the helmet 100, while the second element 32 is associated with the protective shield 20, preferably with the region 21 of the protective shield 20 configured for a connection thereof with shell 10. In other words therefore, the displacement of the protective shield 20 from the closed position to the intermediate position provides roto-translating the protective shield 20 itself, in particular a region 21 of the protective shield 20 for connection with the shell 10, with respect to the shell 10 itself, and in particular with respect to a first element 31 of the opening-closing mechanism 30 which is associated with the shell 10.

[0090] In detail, with respect to the first element 31 of the opening-closing device 30, the second element 32 performs a first movement away from the first element 31 along the lateral direction A and a second movement,

or translational movement, along the front-rear direction B. Preferably, the first movement and the second movement of the second element 32 occur simultaneously and are on the whole a roto-translation movement of the second element 32, or element associated with the protective shield 20, with respect to the first element 31, or element associated with the shell 10. Preferably, this roto-translation movement of the second element 32 with respect to the first element 31 is allowed by a third element 33, or connecting element, between the first element 31 and the second element 32, or between the shell 10 and the protective shield 20.

[0091] According to a preferred aspect, the opening-closing device 30 comprises an element 35 configured to store energy and to keep the second element 32 in the first position with respect to the first element 31, or in other words, the protective shield 20 in the closed position with respect to the shell 10.

[0092] Preferably, the roto-translation movement of the second element 32 with respect to the first element 31 is actuated by an actuation device 40 of the helmet 100 operatively associated with the opening-closing device 30 of the protective shield 20, in particular with the second element 32 of the opening-closing device 30, by means of a tie rod element 41. Preferably, this tie rod element 41 is configured to keep the second element 32 in the first position, or in other words, the protective shield 20 in the closed position, opposing the action of the element 35 configured to store energy. Preferably, the tie rod element 41 is configured to keep the second element 32 in the first position in a tensioned condition thereof, which prevents an action of the element 35 configured to store energy. Advantageously, an actuation of this actuation device 40 of the helmet 100 is configured to allow a movement of the second element 32 from the first position to the second position, preferably by means of a roto-translation movement, along the lateral direction A and the front-rear direction B, with respect to the first element 31, and a consequent displacement of the protective shield 20 from the closed position to the intermediate position.

[0093] According to a further preferred aspect of this disclosure, the method further comprises a step of releasing a movement of the protective shield 20 from the closed position to the intermediate position between the closed position and the open position. In detail, according to this aspect, the movement of the protective shield between said positions is preferably prevented by a locking element of the actuation device 40. Consequently according to this aspect, it is necessary for a user to intervene on the actuation device 40 itself, in particular on a button 42 of the latter, in order to release this locking element and thus allow movement of the protective shield from the closed position to the intermediate position.

[0094] In detail, a releasing of the locking element, preferably by means of a button 42, is configured to release a tensioned condition of the tie rod element 41 and to allow an action of the element 35 configured to store energy which causes a displacement of the second element 32 from the first position to the second position.

[0095] Consequently, the step of releasing the movement of the protective shield 20 with respect to the shell 10, preferably by means of the button 42, corresponds to the displacement of the protective shield 20 from the closed position to the intermediate position.

[0096] In practice, the displacement of the protective shield 20 from the closed position to the intermediate position takes place under the push action generated by a release of energy by the energy storage element.

[0097] According to a preferred embodiment, the method initially provides for the protective shield 20 to be in the closed position, and a coupling element 23 of the protective shield 20 is removably associated with a locking element 43 of the actuation device 40. Furthermore, preferably the actuation device 40 comprises a sliding element 44 configured to lock the tie rod element 41 in a tensioned condition when the coupling element 23 and the locking element 43 are associated, where in the tensioned condition, the tie rod element 41 is preferably configured to block the roto-translation movement of the second element 32. Furthermore, preferably the actuation device 40 comprises a button 42 configured to disassociate the coupling element 23 and the locking element 43. The method preferably comprises the steps described below. An actuation step, in which the button 42 is operated in such a way that the coupling element 23 and the locking element 43 are disassociated, and the sliding element 44 releases the tie rod element 41 from its tensioned condition.

[0098] For example, the sliding element 44 is associated with a crank element 45 of the coupling device 40, preferably by means of a rotoidal coupling, and the sliding element 44 can be configured to actuate a rotation of the crank element 45, which is preferably associated in a fixed manner with the tie rod element 41. Consequently, the sliding element 44 can release or discharge the tie rod element 41 from the tensioned condition by means of the rotation of the crank element 45.

[0099] In a consequent opening step, the tie rod element 41 actuates the roto-translation motion of the second element 32 in such a way that the protective shield 20 passes from the closed position to the open position.

[0100] Preferably, the method can comprise a further closing step, in which the protective shield 20 is made to move into the closed position, for example by a user of the helmet 100, and the coupling element 23 and the locking element 43 are re-associated. Furthermore, preferably the coupling element 23 actuates a translation of the sliding element 44 in such a way that the tie rod element 41 is locked in the tensioned condition. For example, the translation of the sliding element 44 actuates a rotation of the crank element 45, which locks the tie rod element 41 in the tensioned condition.

[0101] The object of this disclosure has thus far been described with reference to its embodiments. It is to be understood that there may be other embodiments per-

taining to the same inventive core, all falling within the scope of protection of the claims set forth below.

Claims

1. Helmet (100) comprising a shell (10) and a protective shield (20), wherein the protective shield (20) is arranged in a frontal area of the shell (10), and wherein a rear or nape area of the shell (10) is opposite to the frontal area, the protective shield (20) is connected in a rotatable way around a pivot axis to the shell in respective lateral regions (21), or right-hand and left-hand regions, of the shell by means of an opening-closing device (30), wherein the protective shield is configured to take on, with respect to said shell (10), a closed position of said protective shield (20), an open position of said protective shield (20), and an intermediate position between said closed position of said protective shield (20) and said open position of said protective shield (20),

   wherein said opening-closing device (30) of said protective shield (20) is configured to allow a passage of said protective shield (20) with respect to said shell (10) from said closed position of said protective shield (20) to said intermediate position and to said open position of said protective shield (20), or from said open position of said protective shield (20) to said intermediate position and to said closed position of said protective shield (20),
   and wherein, by means of said opening-closing device (30), a passage from said closed position to said intermediate position corresponds to a movement away of a corresponding lateral region (21) of the protective shield (20) from the shell (10) in the lateral direction (A), and a passage from said intermediate position to said closed position corresponds to a movement of the lateral region (21) of the protective shield (20) towards the shell (10) in the lateral direction,
   wherein said opening-closing device (30) comprises a first element (31) associated with said shell (10), a second element (32) associated with said protective shield (20), and a third element (33) or connecting element, associated with said second element (32) and said first element (31), or configured to associate said second element (32) with said first element (31),
   wherein said second element (32), or element associated with said protective shield (20), is movable with respect to said first element (31), or element associated with said shell (10), at least between a first position and a second position, wherein said first position of the second element (32), or element associated with said protective shield (20), is closer to said first element (31), or element associated with said shell (10), than said second position of the second element (32), or element associated with said protective shield (20), and wherein said first position of the second element (32), or element associated with said protective shield (20), corresponds to said closed position of said protective shield (20), and said second position of the second element (32), or element associated with said protective shield (20), corresponds to said intermediate position of said protective shield (20) between said closed position of said protective shield (20) and said open position of said protective shield (20),
   wherein said opening-closing device (30) comprises an energy storage element (35) configured to store energy, wherein an energy storage condition corresponds to a condition wherein said second element (32), or element associated with said protective shield (20), of the opening-closing device (30) is kept in said first position.

2. Helmet (100) according to claim 1, wherein said second position of the second element (32), or element associated with said protective shield (20), is a spaced apart position of second element (32), or element associated with said protective shield (20), with respect to said first element (31), or element associated with said shell (10).

3. Helmet (100) according to claim 1 or 2, wherein said first position of the second element (32), or element associated with said protective shield (20), is closer than said second position along a lateral direction (A).

4. Helmet (100) according to any one of the preceding claims, wherein in said closed position of said protective shield (20), each lateral region (21) of said protective shield (20) for connection with said shell (10) abuts with or touches said shell (10), and wherein in said intermediate position between said closed position of said protective shield (20) and said open position of said protective shield (20), said terminal portion (21) of said protective shield (20) for connection with said shell (10) is spaced apart with respect to said shell (10) along said lateral direction (A).

5. Helmet (100) according to any one of the preceding claims, wherein said opening-closing device (30) is further configured to cause a second movement of said protective shield (20) with respect to said shell (10) from said closed position to said intermediate position between said closed position and said intermediate position along a front-rear direction (B), wherein said front-rear direction (B) is a direction extending from an anterior area to a rear area of said

helmet (100).

6. Helmet (100) according to claim 5, wherein said opening-closing device (30) is further configured to allow said second movement simultaneously to or together with said first movement.

7. Helmet (100) according to any one of the preceding claims, wherein said third element (33), or connecting element, is an arm element rotatably associated with said first element (31) and said second element (32) in such a way that the second element (32), or element associated with said protective shield (20), can perform a roto-translation movement with respect to said first element (31), or element associated with said shell (10).

8. Helmet (100) according to any one of the preceding claims, wherein said opening-closing device (30) comprises a fourth element (34) configured to associate said second element (32) with said first element (31) and to allow said second element (32) to rotate and translate with respect to the first element (31), remaining parallel or substantially parallel to said first element (31).

9. Helmet (100) according to any one of the preceding claims, comprising an actuation device (40) of said opening-closing device (30) of said protective shield (20), wherein said actuation device (40) is operatively associated with said opening-closing device (30) and is configured to control a displacement of the protective shield (20) with respect to the shell (10) at least between said closed position of said protective shield (20) and said intermediate position between said closed position of said protective shield (20) and said open position of said protective shield (20).

10. Helmet (100) according to claim 9, wherein said actuation device (40) is operatively associated with said opening-closing device (30) by means of a tie rod element (41) configured to oppose said element (35) configured to store energy so as to keep said second element (32), or element associated with said protective shield (20), of the opening-closing device (30) in said first position.

11. Helmet (100) according to claim 9 or 10, wherein said actuation device (40) further comprises a locking element (43) of the movement of said protective shield (20) in said closed position of said protective shield (20).

12. Helmet (100) according to the preceding claim, wherein said tie rod element (41) is configured to take on a tensioned condition, wherein in such tensioned condition, the tie rod element (41) is configured to oppose an action of said energy storage element (35) configured to store energy and to keep said second element (32), or element associated with said protective shield (20), of the opening-closing device (30) in said first position.

13. Helmet (100) according to claim 11 or 12, wherein said protective shield (20) comprises a coupling element (23) configured to be removably associated with said locking element (43), and wherein said coupling element (23) and said locking element (43) are associated when said protective shield (20) is in said closed position, and wherein said coupling element (23) and said locking element (43) are disassociated when said protective shield (20) is in said open position and in said intermediate position, and wherein the movement of said protective shield (20) is inhibited when said coupling element (23) and said locking element (43) are associated.

14. Helmet (100) according to the preceding claim, wherein said actuation device (40) further comprises a sliding element (44) configured to translate along a sliding direction (S) to pass from an upper position to a lower position, and wherein said coupling element (23) is configured to actuate a translation of said sliding element (44) from said upper position to said lower position when said protective shield (20) passes from said intermediate position and/or open position to said closed position.

15. Helmet (100) according to the preceding claim in combination with claim 13 or 14, wherein said sliding element (44) is associated with a crank element (45), and wherein said sliding element (44) is configured to drive a rotation of said crank element (45) passing from said upper position to said lower position, and wherein said crank element (45) is associated with said tie rod element (41) in such a way that said tie rod element (41) is configured to take on said tensioned condition when said crank element (45) rotates following the passage of said sliding element (44) from said upper position to said lower position, and in such a way that said tie rod element (41) is configured to drive a rotation in the opposite direction of said crank element (45) when said coupling element (23) and said locking element (43) are disassociated.

16. Helmet (100) according to any one of the preceding claims, wherein said opening-closing device (30) is a first opening-closing device (30), wherein said helmet (100) further comprises a second opening-closing device (30), wherein said first opening-closing device (30) is placed in a right-hand temporal area of said helmet (100) and is configured to rotatably associate a right-hand connection region (21) of said protective shield (20) with said shell (10), and where-

in said second opening-closing device (30) is placed in a left-hand temporal area of said helmet (100) and is configured to rotatably associate a left-hand connection region (21) of said protective shield (20) with said shell (10).

17. Method of opening-closing a protective shield (20) with respect to a shell (10) of a helmet (100), comprising a step of moving said protective shield (20) from a closed position of said protective shield (20) to an open position of said protective shield (20), wherein said step of moving said protective shield (20) from the closed position to the open position provides moving said protective shield (20) into an intermediate position between said open position and said closed position; said step of moving said protective shield (20) from said closed position to said intermediate position between said closed position and said closed position of the protective shield (10) provides moving at least one region (21) of said protective shield (20) for connection with said shell (10) along a lateral direction (A), parallel to a pivot axis of the protective shield (20) to the shell (10), wherein said step during which it moves at least one region (21) of said protective shield (20) for connection with said shell (10) along the lateral direction (A), parallel to a pivot axis of the protective shield (20) to the shell (10), occurs under the push action generated by a release of energy by an energy storage element.

18. Method according to the preceding claim, wherein said step of moving said protective shield (20) from said closed position to said intermediate position between said closed position and said open position of the protective shield provides moving said region (21) of said protective shield (20) for connection with said shell (10) from a position wherein said region (21) abuts with, or touches, said shell (10), to a position wherein said region (21) is spaced apart with respect to said shell (10) along said lateral direction (A).

19. Method according to claim 17 or 18, wherein said step of moving said protective shield (20) from said closed position to said intermediate position between said closed position and said closed position of the protective shield provides moving said protective shield (20) with respect to said shell (10) along a front-rear direction (B), wherein said front-rear direction is a direction extending from an anterior area to a rear area of said helmet (100).

20. Method according to claim 19, further comprising a step of moving said protective shield (20) from said intermediate position to said open position by rotating said protective shield (20) with respect to said shell (10).

21. Method according to claim 19 or 20, wherein said step of moving said protective shield (20) from said closed position to said intermediate position between said closed position and said open position of the protective shield along said first direction and along said front-rear direction (B) provides a roto-translation movement of a second element (32) of an opening-closing device (30) of said protective shield (20) with respect to a first element (31) of said opening-closing device (30) of said protective shield, wherein said second element (32) is associated with said region (21) of said protective shield (20) for connection with said shell (10), and wherein said first element (31) is associated with said shell (10).

22. Method according to the preceding claim, wherein said roto-translation movement is actuated by an actuation device (40) of said helmet (100) operatively associated with said opening-closing device (30) of said protective shield (20) by means of a tie rod element (41).

23. Method according to claim 21 or 22, wherein said protective shield (20) initially is in said closed position,

and wherein a coupling element (23) of said protective shield (20) is removably associated with a locking element (43) of said actuation device (40),
and wherein said actuation device (40) comprises a sliding element (44) configured to lock said tie rod element (41) in a tensioned condition when said coupling element (23) and said locking element (43) are associated, wherein in said tensioned condition, said tie rod element (41) is configured to lock said roto-translation movement of said second element (32),
and wherein said actuation device (40) comprises a button (42) configured to disassociate said coupling element (23) and said locking element (43),
said method comprising the following steps:

- actuation, wherein said button (42) is operated in such a way that said coupling element (23) and said locking element (43) are disassociated and said sliding element (44) releases said tie rod element (41) from said tensioned condition;
- opening, wherein said tie rod element (41) actuates said roto-translation motion of said second element (32) in such a way that said protective shield (20) passes from said closed position to said intermediate position.

24. Method according to the preceding claim, compris-

ing a further closing step, wherein said protective shield (20) is made to move into said closed position, and wherein said coupling element (23) and said locking element (43) are re-associated, and wherein said coupling element (23) actuates a translation of said sliding element (44) in such a way that said tie rod element (41) is locked in said tensioned condition.

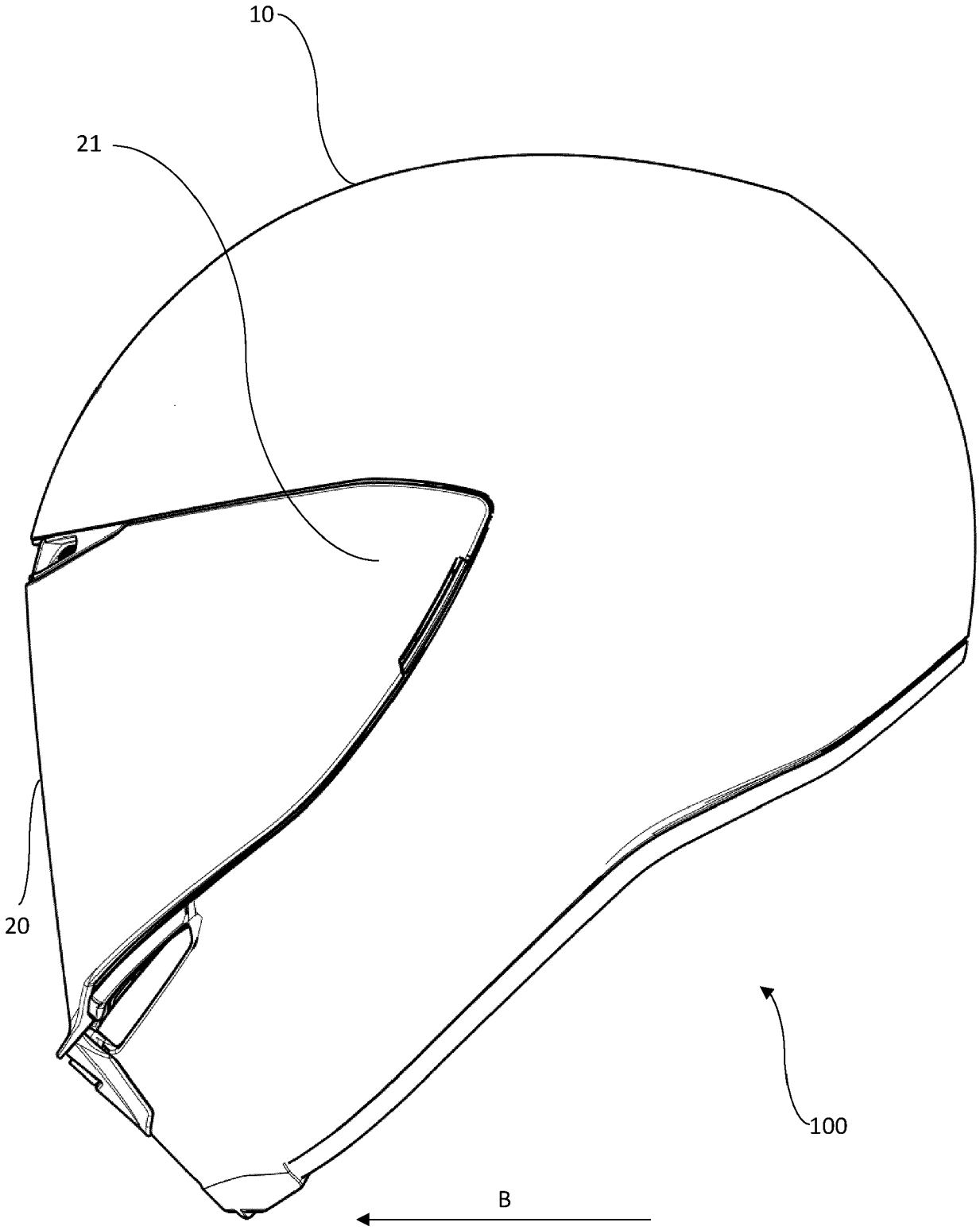

Fig. 1

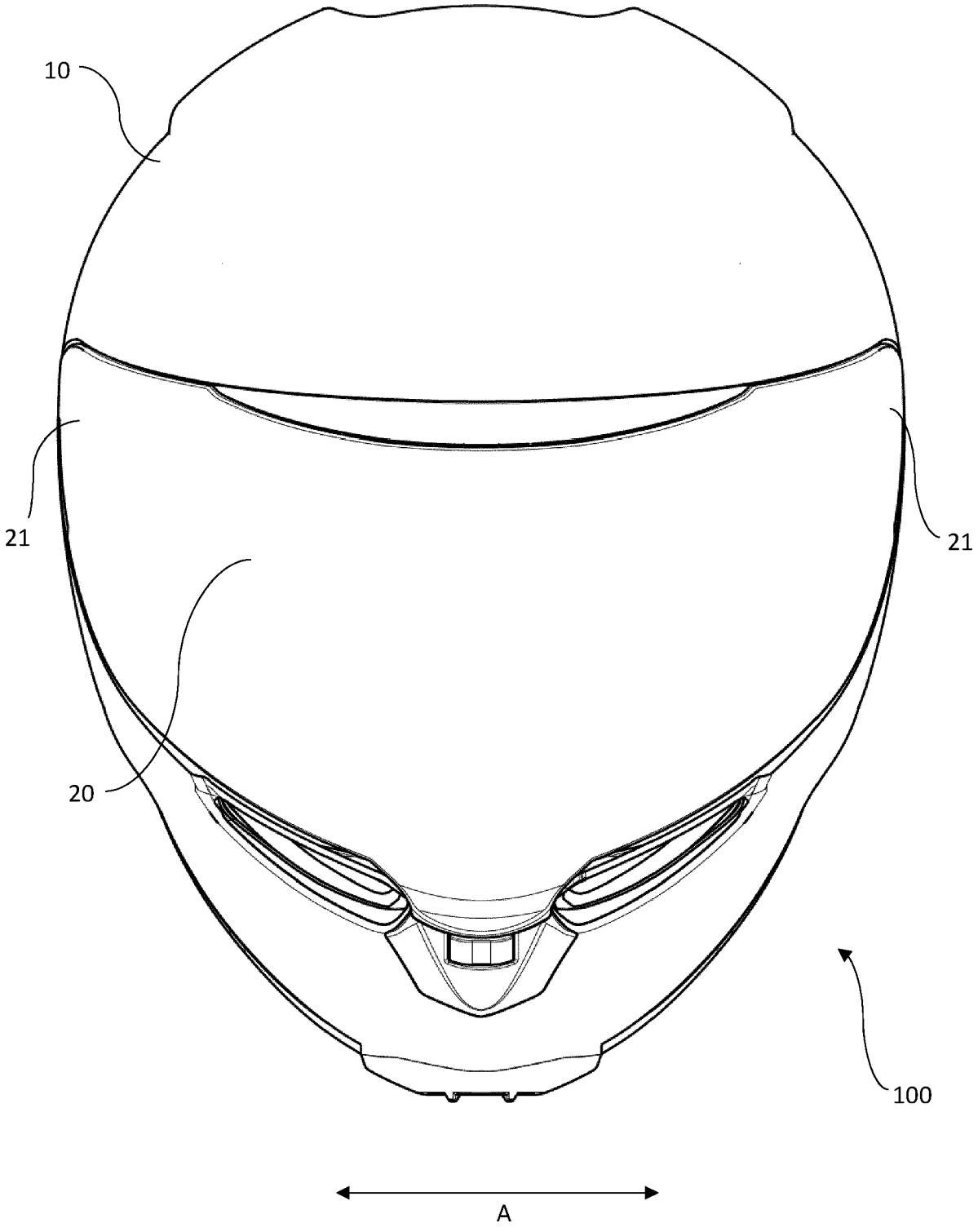

Fig. 2

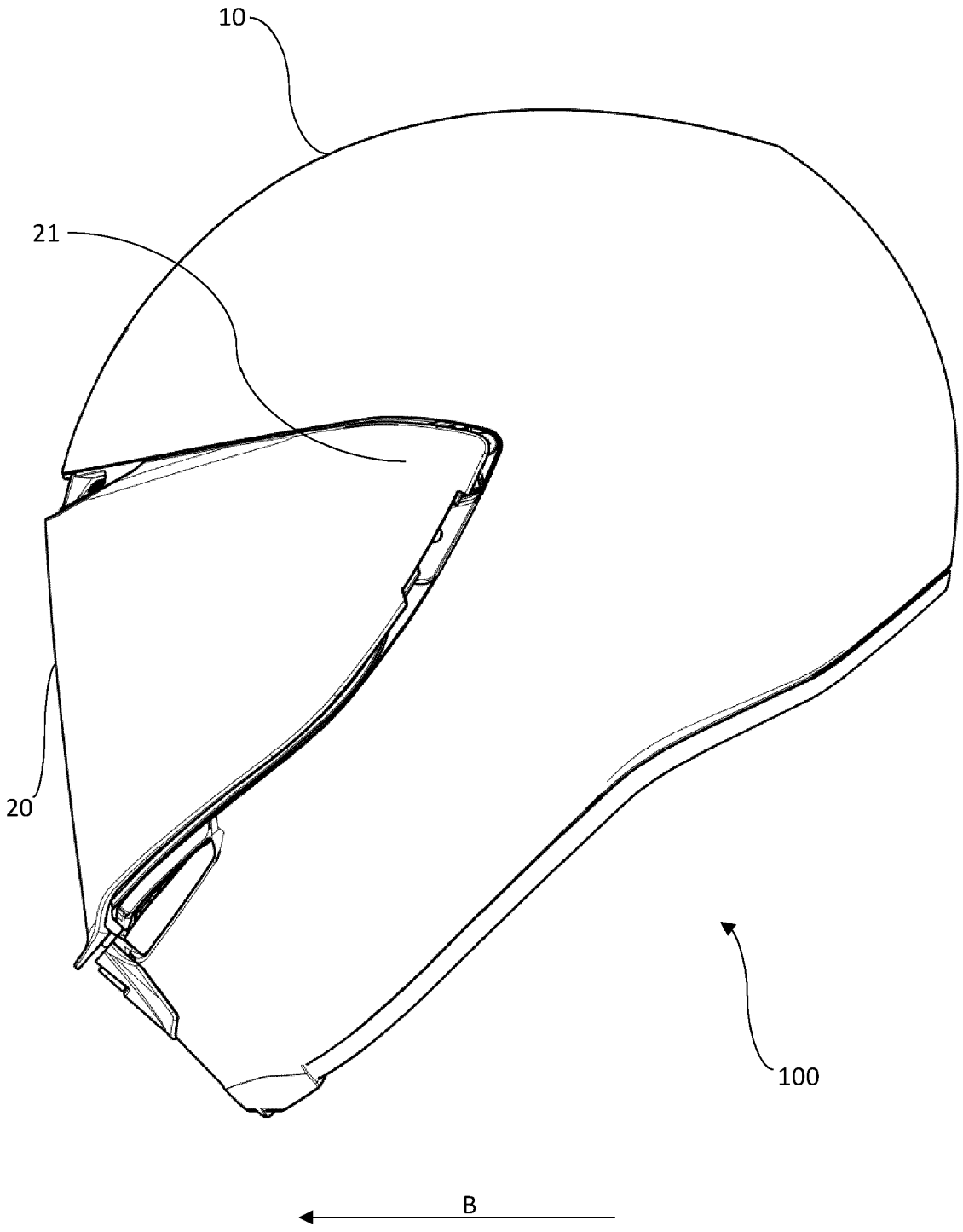

Fig. 3

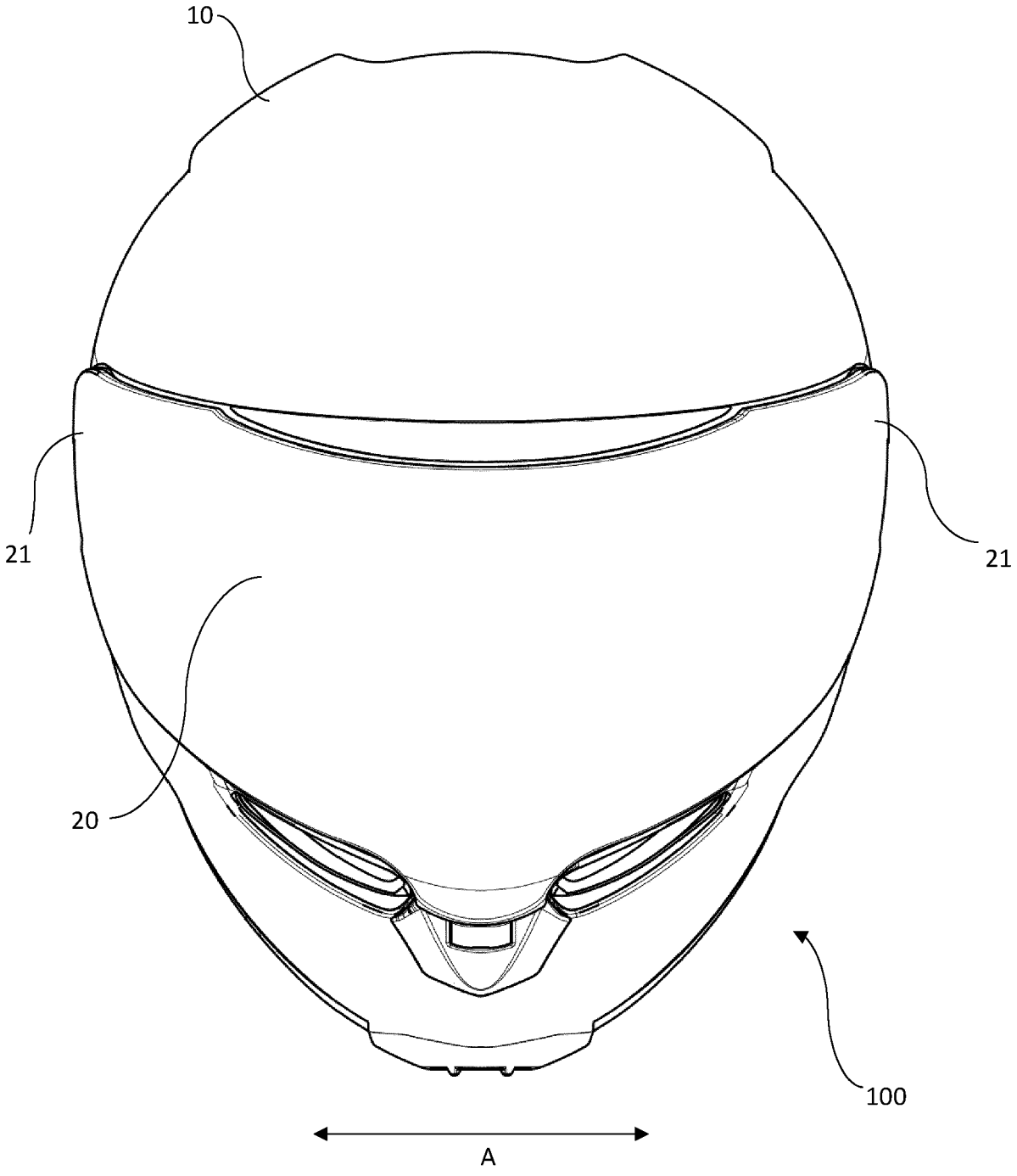

Fig. 4

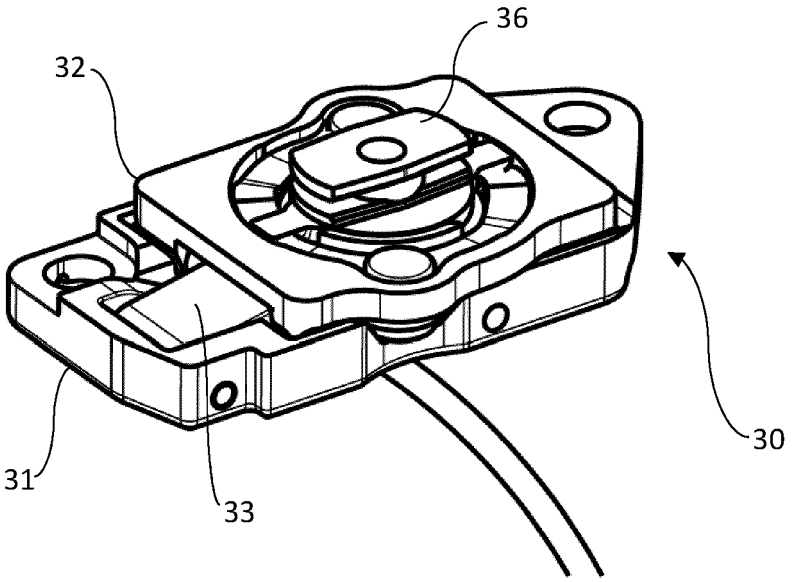

Fig. 5

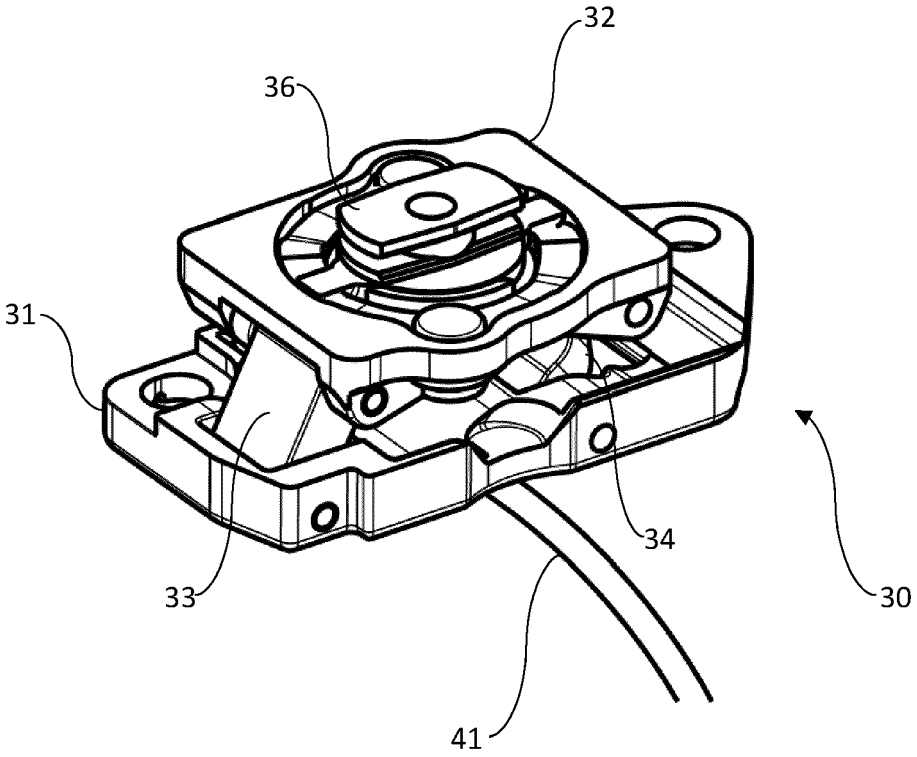

Fig. 6

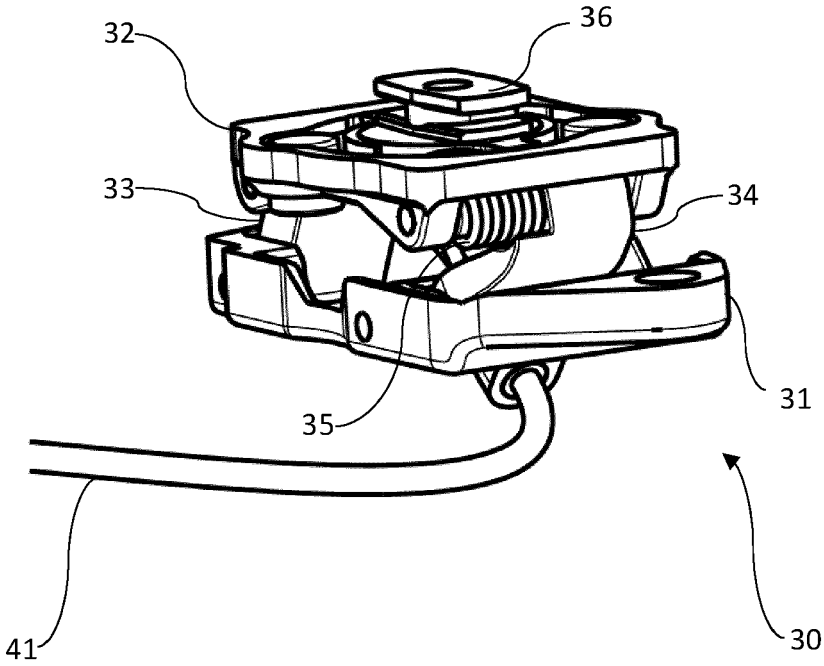

Fig. 7

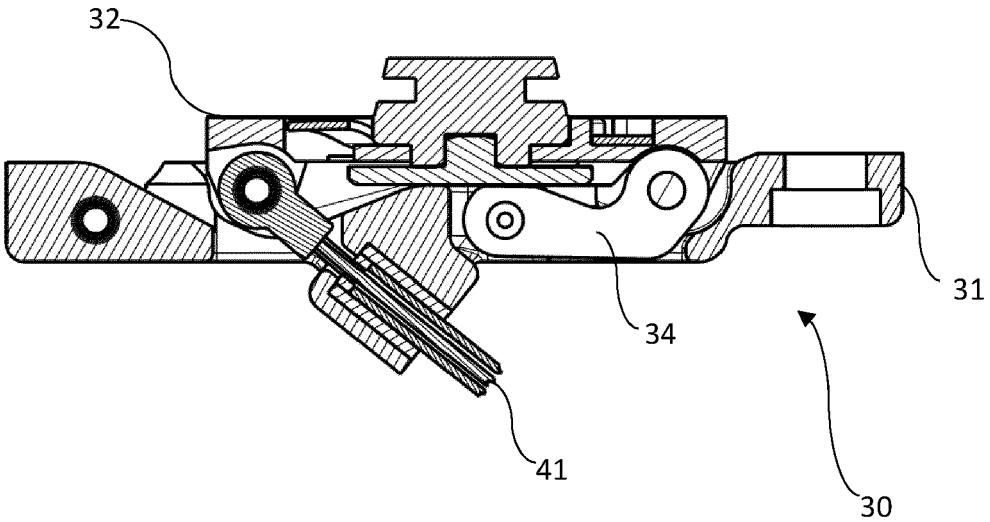

Fig. 8

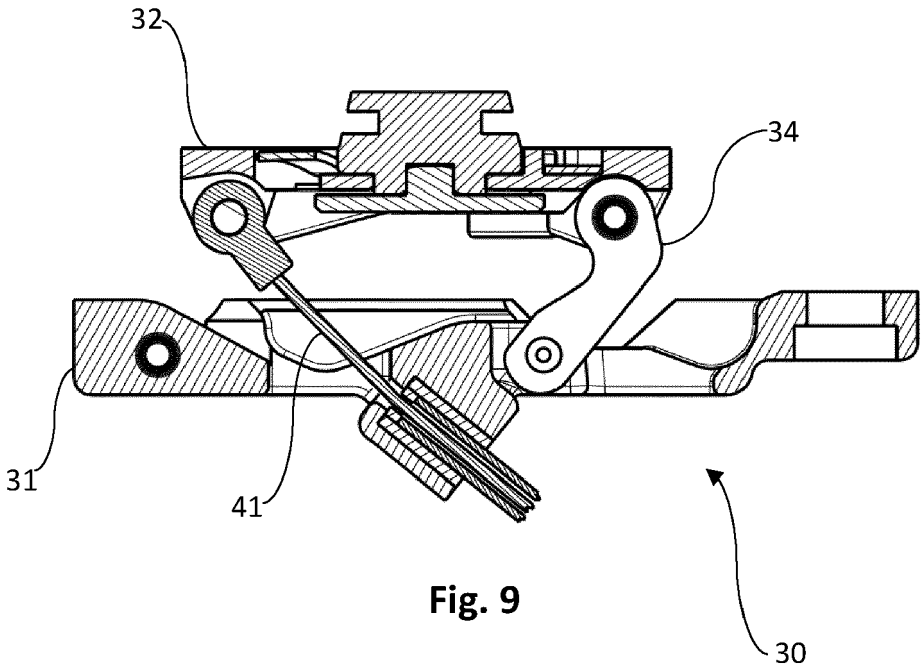

Fig. 9

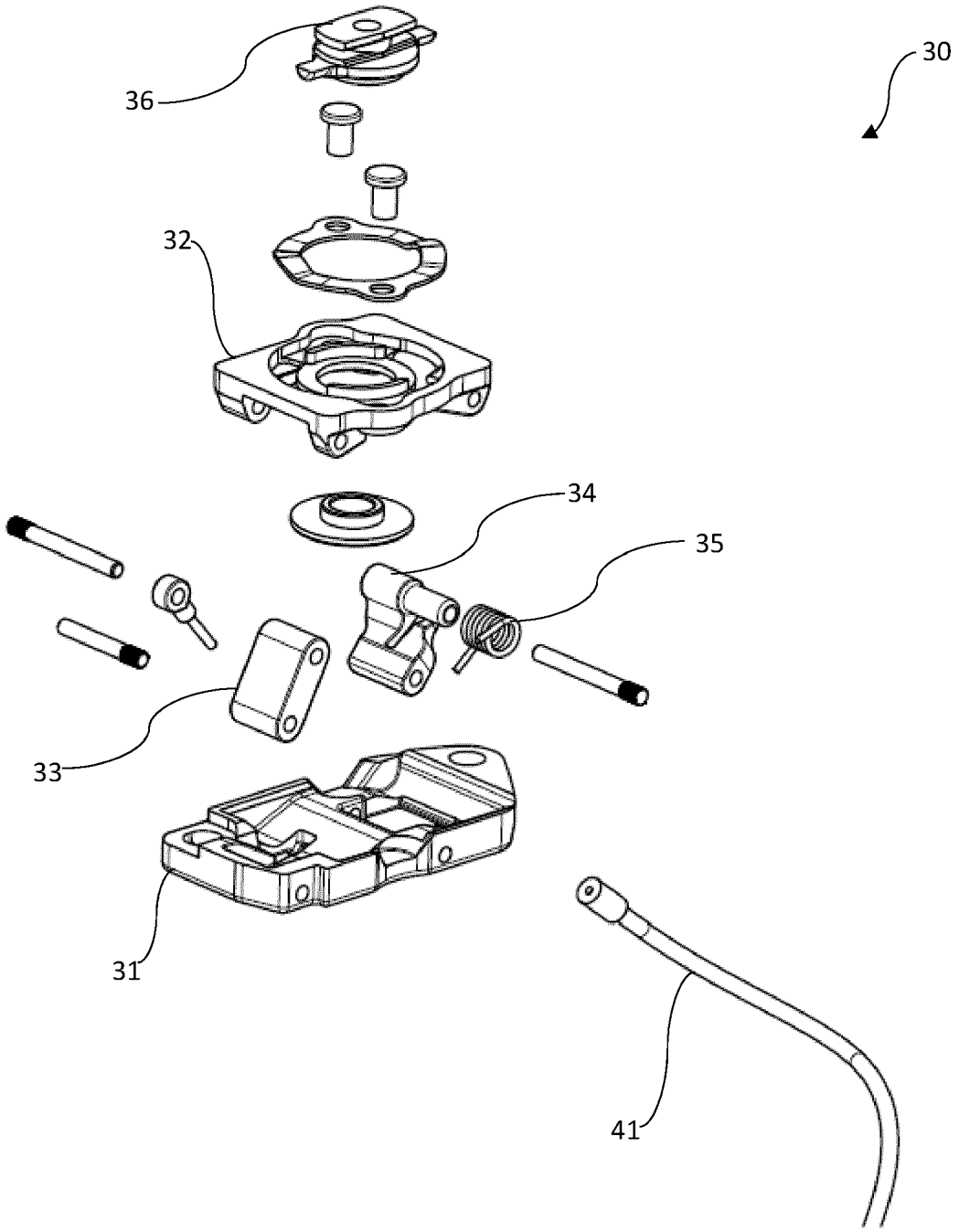

Fig. 10

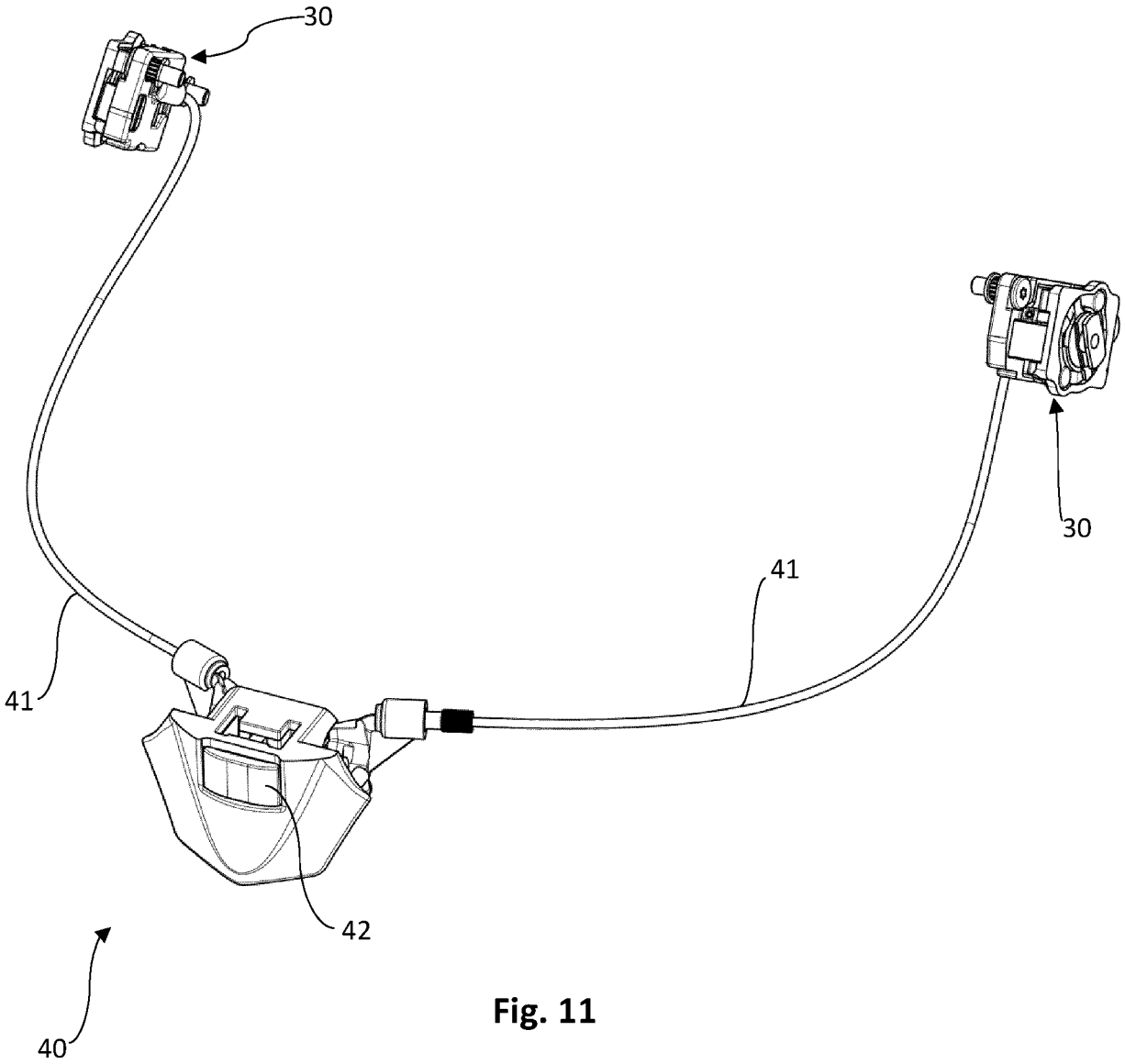

Fig. 11

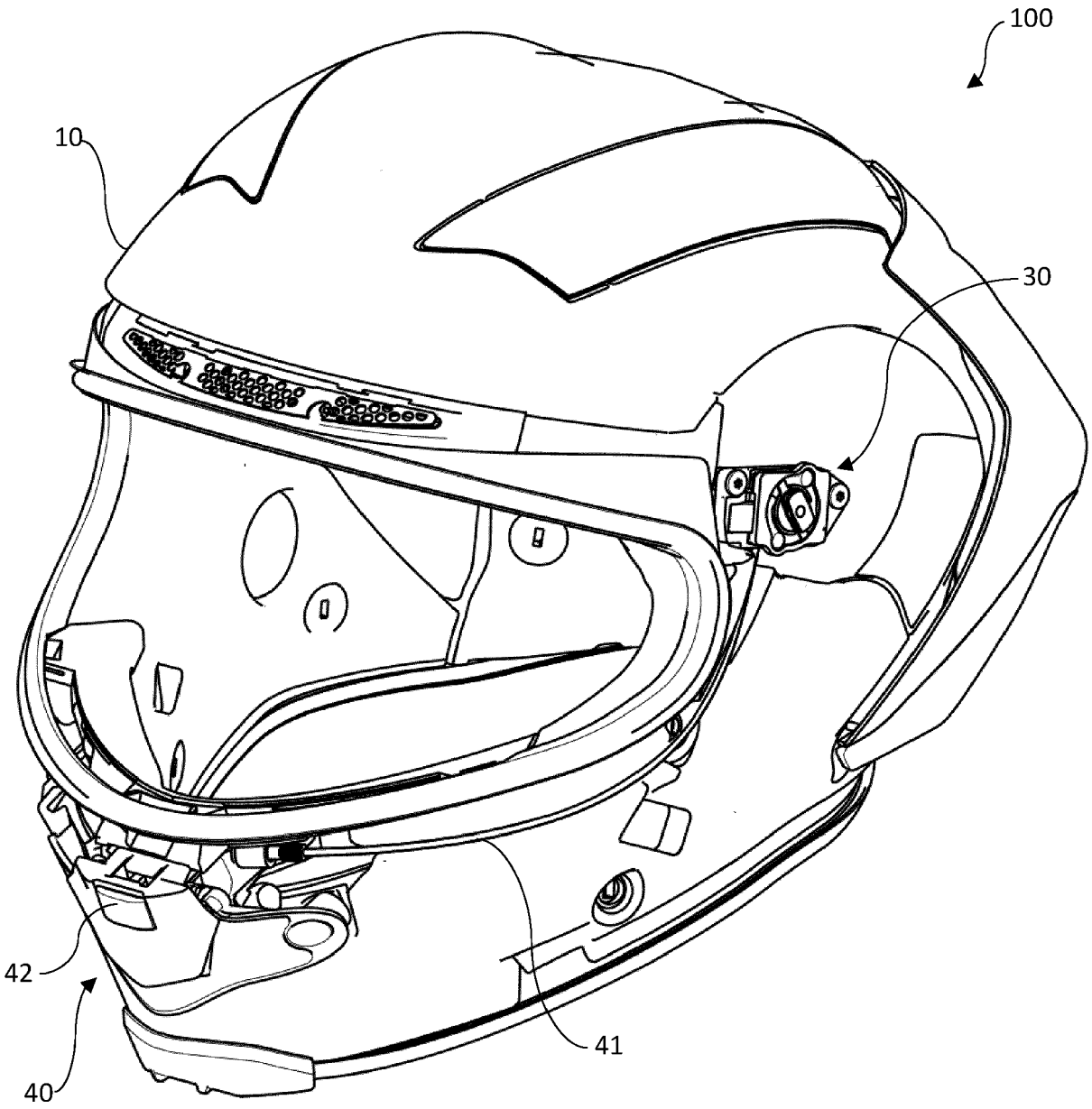

Fig. 12

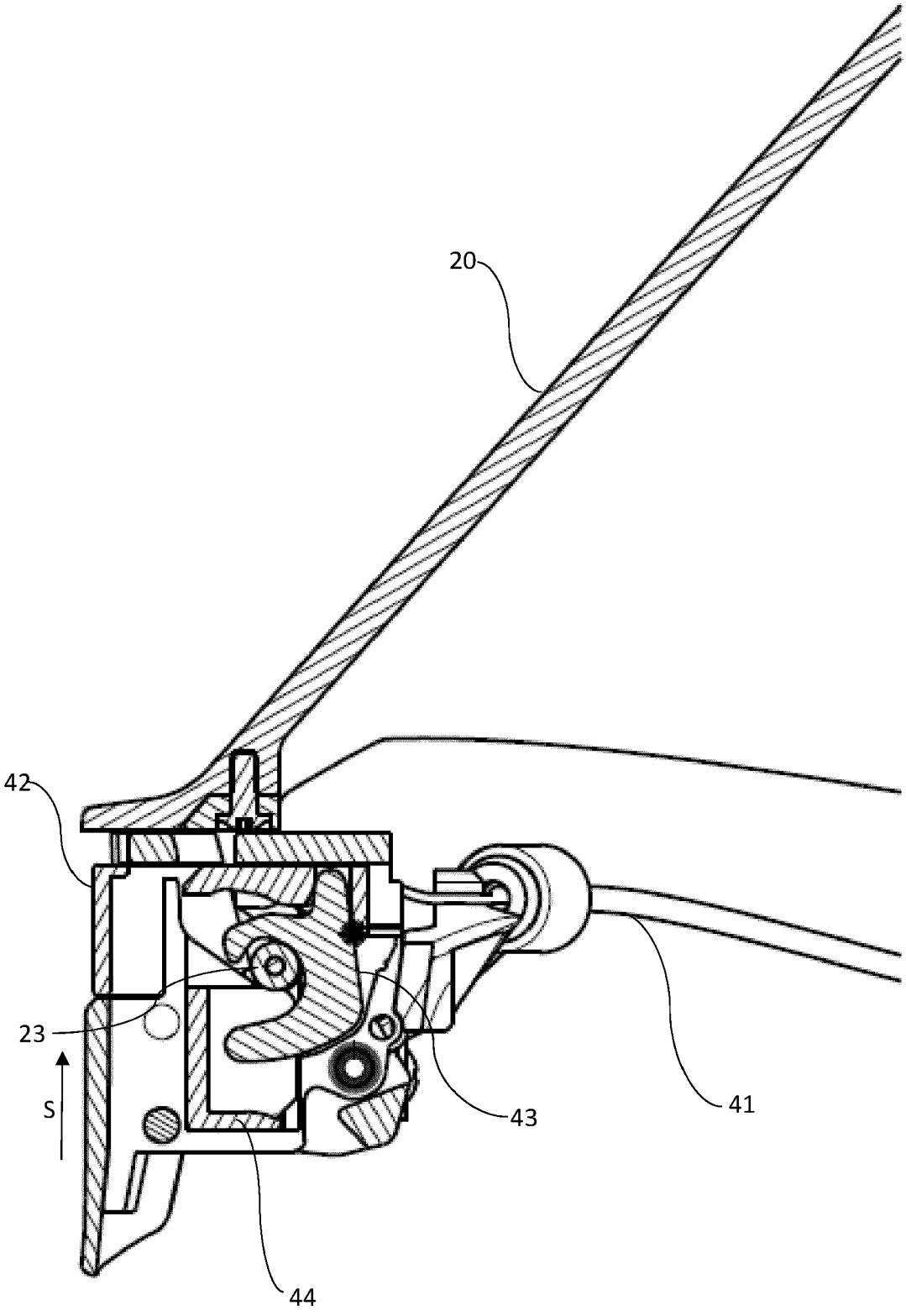

Fig. 13

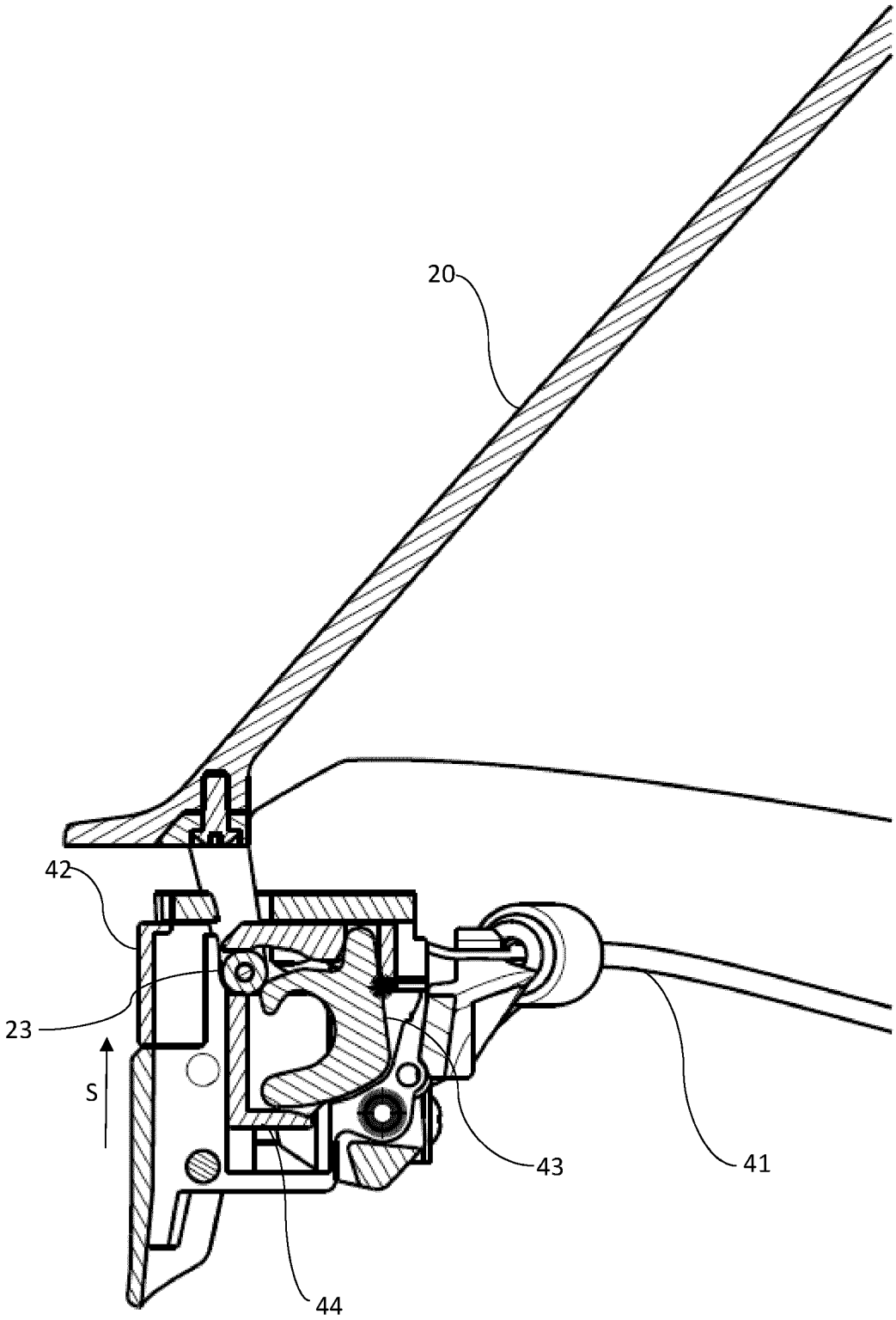

Fig. 14

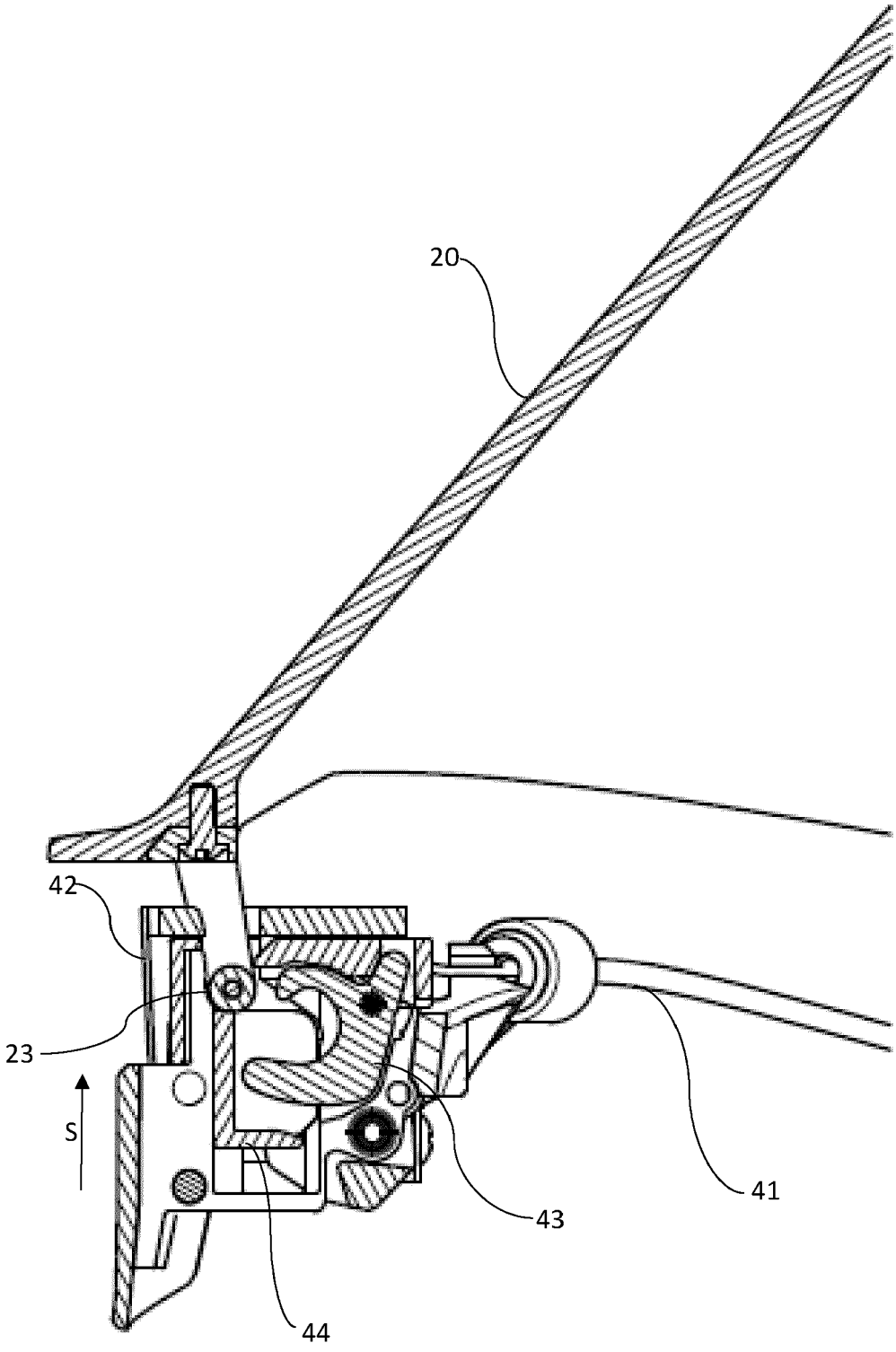

Fig. 15

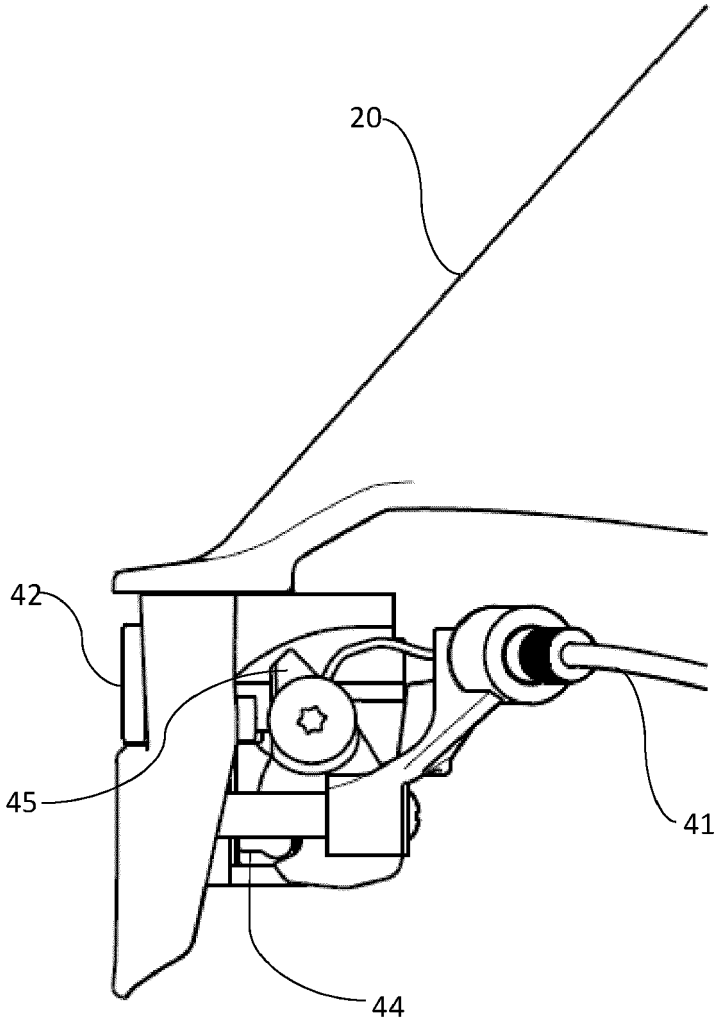

Fig. 16

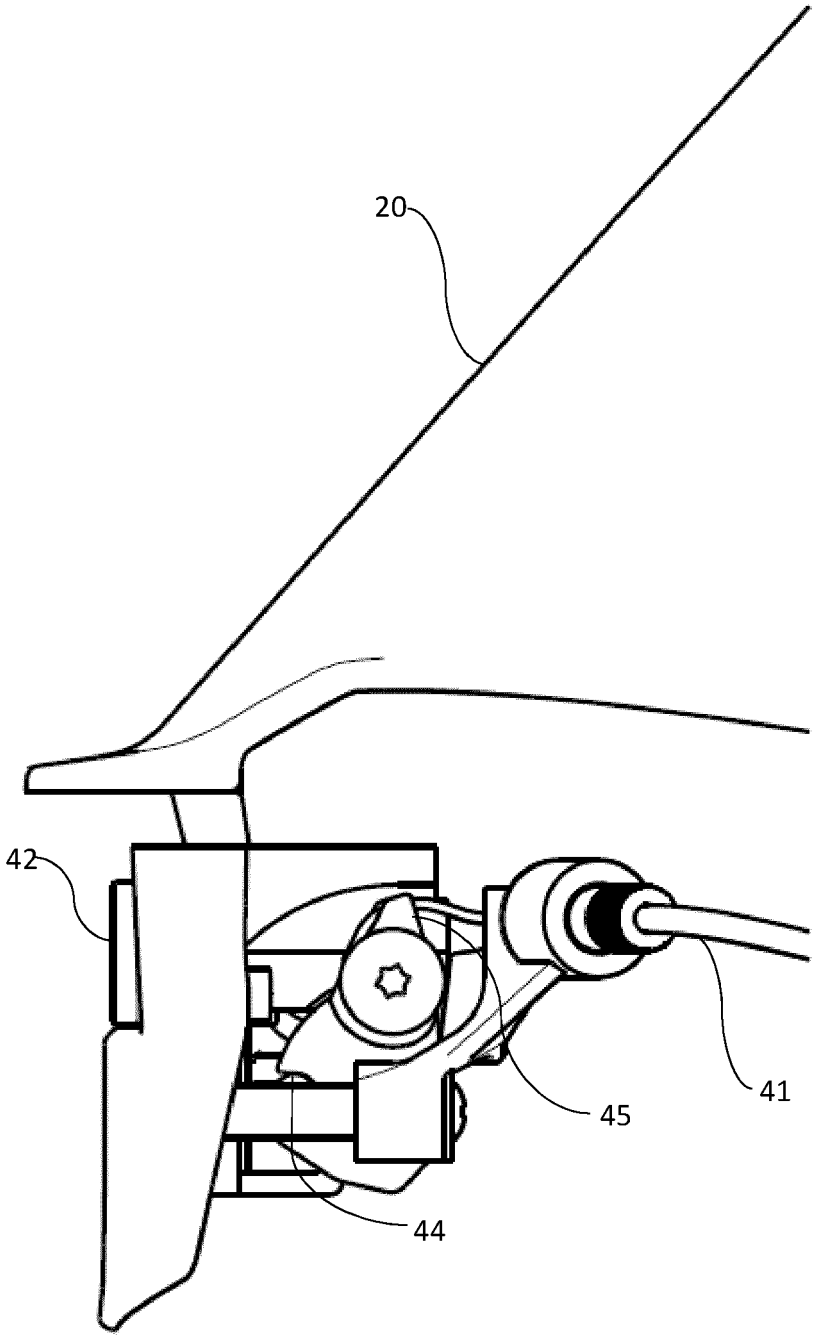

Fig. 17

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EUROPEAN SEARCH REPORT

Application Number
EP 21 21 7699

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2013/191976 A1 (PIZZI VLADIMIRO [IT]) 1 August 2013 (2013-08-01)	17-22	INV. A42B3/22
A	* paragraphs [0033], [0038], [0041] - [0043]; figures 3a,6,7,11,12,17 *	1-16,23, 24	
A	GB 1 552 743 A (KIWI SA) 19 September 1979 (1979-09-19) * column 3, lines 22-62; figure 6 *	1-24	
A	US 2003/051289 A1 (GAFFORIO LUCA [IT] ET AL) 20 March 2003 (2003-03-20) * claim 1; figure 1 *	1-24	
			TECHNICAL FIELDS SEARCHED (IPC)
			A42B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	23 May 2022	D'Souza, Jennifer

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 21 21 7699

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23-05-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2013191976 A1	01-08-2013	NONE	
GB 1552743 A	19-09-1979	BE 862776 A	02-05-1978
		CH 610740 A5	15-05-1979
		DE 2801510 A1	20-07-1978
		FR 2377165 A1	11-08-1978
		GB 1552743 A	19-09-1979
		IT 1115588 B	03-02-1986
		NL 7800183 A	19-07-1978
US 2003051289 A1	20-03-2003	EP 1293138 A1	19-03-2003
		JP 2003183926 A	03-07-2003
		US 2003051289 A1	20-03-2003

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