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(54) Title: CONNECTION DEVICE FOR A HELMET FOR CONNECTING A FIRST ELEMENT OF THE HELMET TO A SECOND ELEMENT OF THE HELMET

(57) Abstract: The present disclosure relates to a connection device (10) for a helmet (12) for connecting a first element (16) of the helmet (12) to a second element (14) of the helmet (12). The device (10) includes a base body (20) apt to be associated with the second element (14), and a slider (22) inserted into a corresponding seat (26) of the base body (20). The slider (22) is at least partly elastically deformable and includes an engagement element (23, 123) which engages with a portion of said first element (16).
CONNECTION DEVICE FOR A HELMET FOR CONNECTING A FIRST ELEMENT 
OF THE HELMET TO A SECOND ELEMENT OF THE HELMET

DESCRIPTION

The present disclosure relates in general to a connection device for a helmet. In 
particular the present disclosure relates to a connection device for a helmet for 
connecting a first element of the helmet to a second element of the helmet, and vice 
versa; for example, in a helmet including a visor and a shell, the connection device 
is able to connect the visor to the shell in a stably connected condition, or for 
example in a helmet including a chin bar or a top protection guard, the connection 
device is able to connect the chin bar, or top guard, to the shell, or also is able to 
connect similar elements or parts of the helmet.

In the description below, for simpler and clearer illustration, reference will be made 
in particular to the use of a connection device in which said device is intended to 
provide the connection between the visor (forming said first element) and the helmet 
shell (therefore forming the second element).

In this connection, in a helmet, it is known to use a connection device including a 
base body associated with the helmet shell and an engaging lever inserted inside a 
corresponding seat in the base body. The lever has a lever end which engages with 
a corresponding portion of the visor.

By operating the lever it is possible to release the connection between the lever end 
and the visor and therefore remove the visor from the helmet shell.

This operating procedure, although advantageous in many respects, nevertheless 
has a number of drawbacks which have not yet been resolved.

One drawback of the known connection device consists in the complexity of 
assembling and disassembling the lever on/from the base body and the difficulty of 
operating the lever in order to disconnect the visor from the shell.

A further drawback consists in the fact that the connection device is large in size 
and heavy, which affects the whole helmet, with negative consequences for the 
person wearing the helmet.

One technical problem forming the basis of the present disclosure consists in the 
provision of a connection device with a structure which is able to overcome the 
drawbacks of the prior art and/or achieve further advantages and also the provision 
of a helmet including this device.

This is achieved by providing a connection device for a helmet as defined in the 
independent claim 1 and by a helmet as defined in claim 23.

Secondary features of the abovementioned connection device are defined in the
corresponding dependent claims.
In connection with the present disclosure the expression "connection device" is understood as meaning that the device allows connection of a first element to a second element of the helmet and at the same allows, if necessary, disconnection of the first element from the second element; it therefore consists of a removable or reversible connecting system.

With the connection device according to the present disclosure significant advantages may be achieved.

A first advantage consists in the possibility of easy operation of the slider in order to disconnect the first element from the second element of the helmet.

Another advantage consists in the possibility of limiting the weight and the size of the device and avoiding the use of heavy metal springs or large-size levers.

A further advantage is also achieved both in terms of production, owing to the limited time needed for assembly of the slider with the base body, and subsequently in the event of exchange or replacement.

A further advantage consists in the possibility of adjusting as required the elastic deformability of the slider (for example by means of modification of the slider structure or the material used) in order to achieve varied operation (different engaging force, different force which must be applied for disengagement). Basically, by providing a cursor which is elastically deformable (at least partly), during production it is possible to modify rapidly the degree of the engaging force to be applied to the first element of the helmet by simply modifying the material or the structure of the slider. In fact the deformability may be adjusted both by modifying the structure of the slider and by modifying the material of the slider.

By providing an elastically deformable slider it is also possible to reduce the time needed to define the force to be applied to the slider for disengagement of the engagement means from the first element of the helmet.

Preferably the slider is formed as a single body. With such an embodiment it is possible to reduce further the number of components in the connection device.

In one embodiment the slider comprises, incorporated in said single body, a spring element, i.e. a part of the slider or an element intended to be deformed in relation to the rest of the slider.

Even more preferably, the device comprises, incorporated in said single body, a grip element arranged between the engagement means and the spring element, so that by operating said grip element a user causes a movement of said engagement means away from the first element of the helmet and a consequent deformation of
the spring element. This grip element helps to ensure easy manual operation of the slider by the user of the helmet in order to release the engagement of said engagement means with the first element of the helmet.

Preferably the slider is symmetrical in relation to a longitudinal axis and, even more preferably, the slider comprises, along said longitudinal axis, said engagement means, two lateral extensions extending parallel to, and on opposite sides of, the longitudinal axis, said grip element extending between the two lateral extensions and transversely in relation to the longitudinal axis, and the spring element. This embodiment has the advantage of controlling displacement of the slider in its corresponding seat and at the same time deformation of the spring element.

Further advantages, characteristic features and modes of use of the connection device and the helmet according to the present disclosure will become clear from the following detailed description of preferred embodiments, provided by way of a non-limiting example.

It is evident, however, that each embodiment of the device according to the present disclosure may have one or more of the abovementioned advantages; in any case it is not necessary that each embodiment should have simultaneously all the advantages listed.

Reference will be made to the figures in the accompanying drawings in which:

- Figure 1 shows a side view of a connection device according to the present disclosure, applied to a helmet with visor, in which the visor is partly sectioned;
- Figure 1a illustrates schematically a front exploded view of a step for assembly of the connection device according to Figure 1 on a helmet shell;
- Figure 2 shows a side view of a first part or base body of the connection device according to Figure 1, forming the seat for housing a second part of the connection device;
- Figure 3 shows a view, on a larger scale, of a second part or slider of the connection device according to Figure 1, suitable for association with the first part according to Figure 2;
- Figure 4 shows a side view of a visor part;
- Figure 5 shows a view sectioned along the line V-V of Figure 4;
- Figure 6 shows a view of the connection device according to Figure 1, in a first operating condition suitable for connection of the visor;
- Figure 7 shows a view of the connection device according to Figure 1, in a second operating condition suitable for removal of the visor;
- Figure 8 shows a view sectioned along the line VIII-VIII of Figure 6;
- Figure 9 shows a view sectioned along the line IX-IX of Figure 6;
- Figure 10 shows a view of the connection device according to Figure 1 connected to the visor, wherein the visor is in a first position;
- Figure 11 shows a view of the connection device according to Figure 1 connected to the visor, where the visor is in a second position;
- Figure 12 shows a view of the connection device according to Figure 1, with a part separated;
- Figure 13 shows a view of the separated part of the connection device according to Figure 12;
- Figure 14 shows a view of the separated part of the connection device shown in Figure 12 according to another variation of embodiment;
- Figure 15 shows a view of the separated part of the connection device shown in Figure 12, according to another variation of embodiment.

With reference to the accompanying figures, the reference number 10 denotes a connection device according to the present disclosure.

In particular, in the example shown in the figures, the connection device 10 is applied to a helmet 12 including a shell 14 for protecting a user's head and a visor 16 and is intended to connect removably, i.e. reversibly, the visor in relation to the shell 14 of the helmet 12. In the example shown, the visor 16 is mounted rotatably in relation to the shell 14 about an axis X and in particular is rotatable between a first position in which said visor 16 is situated in the zone of the user's face, so as to perform a protective function (as shown in Figure 1 in continuous lines, and in Figure 10), and a second position in which it is raised in the zone of the user's forehead (as shown in Figure 1 in broken lines, and in Figure 11), passing through a series of intermediate positions.

More particularly, two connection devices 10, only one of which is visible in Figure 1, are associated with the helmet 12, said connection devices 10 being arranged on the outer side of the shell 14 on opposite sides in the so-called temple regions of the user's head, namely along the sides of the helmet 12 which protect the temple zones of the user's head. The axis X extends between one temple region and the other one and is the same for both the connection devices 10.

In the present description below, for the sake of simpler illustration, only one connection device 10 is described, i.e. that device which is located in the right-hand temple region of the user, as can be seen in schematic and exploded form in Figure 1a.

In the example, the connection device 10 comprises a base body 20 (Figure 1a,
Figure 2), or support plinth or base, forming a first part of the connection device 10 and fixed on the outside of the shell 14 to the aforementioned right-hand temple region, inside a respective seat 15 formed on the outer surface of the shell 14, and a slider 22 (Figure 3) forming a second part of the connection device 10.

The base body 20 is firmly fixed to the shell 14 by means of screws 21 (Figure 1) or similar fixing elements, and the slider 22 is housed inside a seat, which is generally denoted by the number 26 and is formed in the base body 20. Basically the base body 20 is a partially hollow structure which acts as a housing for the slider 22. The base body 20, in addition to acting as seat for housing the slider 22, also acts as a guide for displacement of the slider 22, as will be explained more fully below.

In the example, the base body 20 and the slider 22 are made of acetal resin, polycarbonate, ABS or a similar material with a suitable mechanical strength.

In the example, the base body 20 includes, in addition to the seat 26 for the slider 22, also a seat for rotation 28 for the visor 16. In particular, in the example, the seat for rotation 28 is substantially formed by two curved recesses, 28a and 28b, in the form of a circle segment. Each of the two curved recesses 28a, 28b is intended to receive a corresponding pin member 24 of the visor 16, in the example is intended to receive corresponding curved projections 24a, 24b in the form of a circle segment. In the example the pin member 24 is made of acetal resin, polycarbonate or ABS. Essentially the base body 20 is shaped so as to house, not only the slider 22, but also the pin member 24 of the visor 16 and allow rotation of the latter about the axis X.

According to the present disclosure, the slider 22 is elastically deformable, at least partially, so as to allow the reversible operations of connecting and removing/separating the visor 16 from the shell 14 and vice versa.

In this connection, the slider 22 includes a single body which is symmetrical in relation to a longitudinal axis S, namely an axis which coincides with a direction of longitudinal extension. In particular, the slider 22 comprises, along said axis S, an engagement element 23 intended to retain the pin member 24 inside the seat for rotation 28, two lateral extensions 34, 35 which extend parallel to, and on opposite sides of, the axis S, a grip element 33 which extends transversely in relation to the axis S (namely in the manner of a bridge) between the two lateral extensions 34, 35, and a spring element 30.

The spring element 30 is intended to be deformed during operation of the slider 22, in relation to the rest of the slider 22 which is not deformed.

The grip element 33 is therefore arranged between the engagement element 23
and the spring element 30.
The spring element 30 in the example is a compression spring and comprises two arms 32a, 32b each forming an appendage of a respective lateral extension 34, 35 and converging towards the longitudinal axis S on the opposite side to the engagement element 23.

As can be seen in Figure 3, the grip element 33, the two lateral extensions 34, 35, and the engagement element 23 form a ring inside which a cavity 37 is defined. This cavity 37 is intended to receive a user's finger, for example the index finger, which is inserted inside the cavity 37 so as to exert a force on the grip element 33 in the direction of the longitudinal axis S on the opposite side to the engagement element 23.

In other words, a grip element 33 and a spring element 30 are incorporated in the same body of the slider 22.

The slider 22 includes, formed in each lateral extension 34, 35, near the grip element 33, two shoulders 34a, 35a or abutting surfaces. In particular, the two shoulders 34a, 35a are arranged inclined and converging towards the longitudinal axis S on the side of, or with an inclination towards, the engagement element 23.

It can also be seen, from Figure 8, that the engagement element 23 has an L-shaped section including an end appendage 123 which constitutes a wing of the L and defines a shoulder 123a.

The end appendage 123 has a curved or concave profile, in the example a circle segment, and is intended to retain stably by means of pressing contact the pin member 24 of the shell 16. In particular, as will be illustrated in detail below, the curved shape of the end appendage 123 allows a rotational movement of the shell 14 about the axis X without hindering rotation.

As mentioned above, the slider 22 is intended to be inserted inside the seat 26 of the base body 20.

Even more particularly, with reference to Figures 2 and 3, the slider 22 is able to be inserted inside the seat 26, underneath the plane of the sheet, before fixing the entire connection device 10 to the shell 14.

The seat 26 of the base body 20 intended to house the slider 22 is symmetrical along an axis S', which is a longitudinal axis of the base body 20. The seat 26 includes a first zone 26a, including a first bottom side 126a and a bottom projection 126b arranged in an L-shape (Figure 8) and intended to cooperate in abutment with the ends 132a, 132b of the spring element 30.

The seat 26 also includes a second side 226a and a third side 226b which are
parallel to each other and to the axis S' and against which the two lateral extensions 34, 35, respectively, of the slider 22 are intended to be arranged resting. In particular, as can be seen in Figure 9, the two lateral extensions 34, 35 are positioned resting on a respective inner face 326a, 326b of the second side 226a and the third side 226b, namely, with reference to Figure 2, a face directed underneath the plane of the sheet, which, during operation, when the device 10 is mounted on the helmet 12, is directed towards the shell 14.

The second side 226a and the third side 226b define at the respective ends, on the part facing the first bottom side 126a, two respective inclined surfaces 226c, 226d, against which the two shoulders 34a, 35a of the slider 22 are intended to be placed in abutment.

Basically, the slider 22 when it is housed inside the seat 26 has the two lateral extensions 34, 35 arranged below (in relation to the plane of the sheet in Figure 2) the respective second side 226a and third side 226b, and the ends 132a, 132b of the spring element 30 arranged above the bottom projection 126b. In other words, when the device 10 is mounted on the helmet 12, the lateral extensions 34, 35 are arranged between the shell 14 and the respective second side 226a and third side 226b, while the bottom projection 126b is arranged between the shell 14 and the ends 132a, 132b.

The seat 26 includes a second zone 26b intended to receive the engagement element 23 of the slider 22.

In the zone 26b, the base body 20 includes a bridge element 27 which connects two opposite sides 20a, 20b of the base body 20 and separates in fact the seat 26 for the slider 22 from the seat for rotation 28.

When the slider 22 is inserted into the seat 26, the end appendage 123 rests on the bridge element 27, on top of the latter. Basically, in relation to the plane of the sheet according to Figure 2, the end appendage 123 rests on a top surface 127 of the bridge element 27. Moreover, said shoulder 123a, i.e. an inner portion of the engagement element 23, is placed in abutment against the bridge element 27, on the opposite side to the seat for rotation 28.

Basically, when the slider 22 is housed inside the seat 26, the ends 132a, 132b of the spring element 30 are arranged on top of the bottom projection 126b and the two lateral extensions 34, 35 are arranged underneath the respective second side 226a and third side 226b, while the engagement element 23 is positioned on top of the bridge element 27. This arrangement of the slider 22 ensures a stable connection between the slider 22 and the base body 20 and a stable guided
displacement of the slider in relation to the base body 20 parallel to the axes S, S'.
This consists of the so-called engagement position.
As regards the seat for rotation 28, this includes, as mentioned, two curved recesses 28a, 28b, each extending over a circle segment which subtends an angle of about 115°.
Between the two curved recesses 28a, 28b, along the axis of rotation X, the base body 20 includes a central element 29, which is substantially disc-shaped, and an outer circular rim 30, partially coinciding with the abovementioned bridge element 27, and connected on opposite sides to the central element 29 by means of connecting appendages 31a, 31b.
It can also be seen that, along the axis S', each recess 28a, 28b is widened within the outer circular rim 30 by means of a respective curved niche 128a, 128b. The two niches 128a, 128b are substantially aligned along said longitudinal axis S', and are symmetrical in relation to the latter.
Each niche 128a, 128b defines in the base body 20 two retaining walls 40, 41 which are respectively arranged on diametrically opposite sides of the central element 29 and therefore the axis of rotation X.
As regards the pin member 24, in the example it is formed as one piece with the visor 16, for example by means of moulding.
The pin member 24 has an oblong and tapered form including a first portion 45 which is ring-shaped, of greater width or diameter, provided with said projections 24a, 24b, and a second portion 46 of smaller width. The projections 24a, 24b each have an L shape and extend on opposite sides of the axis of rotation X of the first ring-shaped portion 45. Each projection 24a, 24b is intended to cooperate with a respective niche 128a, 128b and with a corresponding retaining wall 40, 41 of the base body 20.
The pin member 24 is completed by a cylindrical stud 50 or cylinder piece, projecting from the sheet with reference to Figure 4. In particular, in Figure 4, the visor portion 16 is viewed from the inside, namely from the side intended to face the shell 14.
In particular, the stud 50 extends at right angles from the surface of the pin member 24, in particular of the second portion 46, on the side directed towards the base body 20, along an axis Y parallel to the axis of rotation X.
In the example the stud 50 is formed as one piece with the pin member 24, but it is also possible for it to be formed as a structurally independent part.
The stud 50 forms the interaction element designed to cooperate with an interaction
counter-element 55 associated with the base body 20 (as shown in Figures 10 and 11) and removable if required.

The interaction counter-element 55 is a small plate which is structurally independent of the base body 20 and connected to it, along the outer circular rim 30, by means of connection (Figure 12).

In order to perform the connection, in the example shown, the base body 20 includes a slit 56 (Figure 6 and Figure 12) which has an arc-like shape extending along a circle arc and intended to receive a lug 57 which has a shape matching that of the slit 56, projecting at right angles from the side of the interaction counter-element 55. The lug 57 is intended to be inserted by means of elastic deformation inside the slit 56, passing underneath the base body 20 between the latter and the protective shell 14.

More particularly, the interaction counter-element 55 (shown in detail in Figures 12, 13, 14 and 15) is made of plastic which has a predefined flexibility and elasticity (in the example PC or ABS), so as to undergo suitable elastic deformation following pressing contact of the stud 50.

Essentially, the interaction counter-element 55 is retained between the base body 20 and the stud 50. Even more particularly, with reference to Figure 12, the interaction counter-element 55 is a crescent-shaped insert and has a profile 59 intended to be placed in contact with a cylindrical side surface of the stud 50. The profile 59 extends substantially along an arc of a circle which, when the counter-element 55 is mounted on the base body 20, has its centre coinciding with the axis of rotation X of the pin member 24.

It should also be pointed out that the profile 59 making contact with the stud 50 has two recesses or niches 60, 61, in the form of a circle arc, formed at the ends of the profile 59. The two recesses 60, 61 are intended to receive the stud 50 and respectively define a start-of-travel position of the pin member 24, in a first operating position of the visor 16, when the latter is situated opposite the user’s face, and an end-of-travel position of the pin member 24, in a second or fully raised position of the visor 16, when the latter is situated opposite the user’s forehead.

The pin member 24 and the base body 20 have dimensions such that, when the projections 24a, 24b are inserted into the corresponding recesses 128a, 128b of the seat for rotation 28 and along the retaining walls 40, 41, the stud 50 is positioned in pressing contact against the profile 59 of the interaction counter-element 55, such that the interaction counter-element 55 is subject, as mentioned, to a slight elastic deformation by the stud 50.
The stud 5 and the interaction counter-element 55 are therefore parts which are able to generate friction, during rotation of the visor 16 and the movement of the pin member 24; namely, the stud 5 and the profile 59 rub against each other and generate a friction force which slightly resists the movement, with a suitable force, so as to be able to position the visor 16 also in an intermediate position between the two abovementioned positions.

With reference to Figures 6 to 11, a mode of application of the connection device 10 according to the present disclosure is now described.

The slider 22, which is initially separated from the base body 20, is inserted underneath the base body 20, in the arrangement described above and visible in Figures 6 and Figures 8 and 9. As mentioned above, this arrangement allows both stable seating and guided sliding (Figure 7) of the slider 22 inside the seat 26 of the base body.

The device 10 is then joined to the shell 14, for example is positioned inside the special housing 15 formed on the outer surface of the shell 14 and is fixed there by means of screws 21.

In order to allow insertion of the pin member 24 of the visor 16, in particular the curved projections 24a, 24b of the pin member 24, inside the seat for rotation 28, the slider 22 is retracted towards the first bottom side 126a of the seat 26, so that the spring member 30 is compressed and deformed against the first side 126a of the seat 26, causing flexing of the two arms 32a, 32b (Figure 7). Retraction of the slider 22 is performed manually by operating the grip element 33. In this condition a so-called disengagement position of the slider 22 is obtained.

In this condition, the engagement element 23 frees part of the recess 28b and allows insertion of the pin member 24.

In particular, the pin member 24 is inserted so that the L-shaped wings of the two curved projections 24a, 24b fit inside the niches 128a, 128b of the recesses 28a, 28b.

Then the slider 22 is released from the retracted position or condition, so that the spring element 30 returns elastically into the initial condition (i.e. the undeformed or less deformed condition) and pushes the slider 22 towards the seat for rotation 28, until the shoulders 34a, 35a of the slider come into abutment against the respective inclined surfaces 226c, 226d. Therefore, the engagement element 23 surmounts with the end appendage 123 the curved projection 24b which is located inside the recess 28b, in particular inside the niche 128b; in other words, the end appendage 123 is arranged between the curved projection 24b and the plane of the pin member
24. In this way, extraction of the pin member 24 from the seat for rotation 28 is prevented and connection between the pin member 24 (fixed to the visor 16) and the base body 20 (fixed to the shell 14) is ensured.

By rotating then the visor 16 in relation to the shell 14, the L-shaped wings of the curved projections 24a, 24b pass underneath the respective retaining walls 40, 41.

At the same time the stud 50 exerts a pressing contact against the profile 59 until it reaches one or other of the two recesses 60, 61. In order to favour elastic deformation the interaction counter-element 55 includes a central hole or opening 63, which also has a weight-reducing function (Figures 12 to 15).

It should be noted that, in order to be seated inside either one of the two recesses 60, 61, the stud 50 passes over a small hump 65, 66, respectively, which, once passed by, produces, as a result of a slight vibration caused by elastic deformation, a click sound. This sound allows the user to "sense", i.e. hear, when the end-of-travel or start-of-travel positions of the pin member 24 and therefore the two positions of the visor 16 have been reached.

It should also be noted that, since the interaction counter-element 55 is removably associated with the base body 20, there is the possibility of replacing this interaction counter-element 55 with another interaction counter-element which is made of a different material or has a different thickness or geometry. The material, thickness and geometry are among the most important variables, the combination of which results in a wide variation of the characteristics of the interaction counter-element 55.

Basically, the interaction counter-element 55 according to Figure 13 may be replaced if necessary by another interaction counter-element 155, 255, such as that shown in Figure 14 or Figure 15, respectively.

For example, the embodiments according to Figures 14 and 15 show interaction counter-elements 155, 255 which include, along the profile 159, 259, a plurality of humps 170, 270 and depressions 171, 271, which are arranged between the two recesses 60, 61. For these variations of embodiment according to Figures 14 and 15, the parts and the components of the interaction counter-element 155, 255 which have the same function and structure in the interaction counter-element 55 described above retain the same reference number and therefore are not described again in detail.

In particular, the embodiment according to Figure 14 shows an interaction counter-element 155, the humps 170 and depressions 171 of which are lightly formed, while in the embodiment according to Figure 15 the humps 270 and the depressions 271
are more well-defined and form a kind of toothed segment along the respective profile 259.
The passing movement of the stud 50 over each hump 170, 270 and depression 171, 271 produces a corresponding vibration and therefore a noise or click.

Essentially, the material, the thickness and the number of humps 170, 270 and depressions 171, 271 on the interaction counter-element 155, 255 are suitably chosen so as to obtain a given movement (which is harder or easier, with greater or lesser resistance) of the pin member 24 relative to the base body 20, if necessary also with the abovementioned given sound. Basically, by using an interaction counter-element 155 and even more so an interaction counter-element 255, the user has to exert a greater force in order to move the visor 16 and also hears a click sound which is well defined and louder than that of the first embodiment 55, in the start-of-travel and end-of-travel positions, and for each hump 170, 270 which the stud 50 passes over.

Moreover, by replacing the interaction counter-element 55 described above with another interaction counter-element (not shown in the drawings) having the same geometry and made of the same material, but with a greater thickness, it is possible to obtain a greater area of contact/friction with the stud 50, and therefore a greater resistance to movement. This modification may be useful in the case where a user wishes to feel or hear more clearly a greater force required to operate the visor 16 between the two start-of-travel and end-of-travel positions and if it is desired to obtain stable positioning of the visor 16 also in an intermediate position between start and end of the travel movement.

A connection device 10 is therefore obtained where the movement of the visor 16 is accompanied in a regular and rhythmic manner by a well-defined sound and/or by a greater force required on the part of the user.

It must also be pointed out, as mentioned above, that the connection is removable and therefore the visor may be easily removed from the helmet 12, for example for maintenance or replacement.

For this purpose, the visor 16 is rotated until the curved projections 24a, 24b are disengaged from the respective retaining walls 40, 41 and are situated inside the niches 128a, 128b of the recesses 28a, 28b. The user, by operating the grip element 33, causes retraction of the slider 22 towards the first bottom side 126a of the seat 26 so that the spring element 30 is compressed and deformed against the first side 126a of the seat 26, while the engagement element 23 frees the recess 28b. At this point, the curved projections 24a, 24b may be extracted from the seat.
for rotation 28 and the visor 18 is then removed from the shell 14. The connection device according to the present disclosure has been described hitherto with reference to its preferred embodiments. It is understood that there may exist other embodiments which relate to the same inventive concept, all of these falling within the scope of protection of the claims provided below.
CLAIMS

1. A connection device (10) for a helmet (12) for connecting a first element (16) of
the helmet (12) to a second element (14) of the helmet (12), said connection device
(10) including a base body (20) apt to be associated with the second element (14)
of the helmet (12), and a slider (22) apt to be inserted into a corresponding seat
(26) of the base body (20), wherein said slider (22) includes engagement means
(23, 123) able to engage with a portion of said first element (16), and wherein said
slider (22) is, at least partially, elastically deformable.

2. The connection device (10) according to claim 1, wherein the slider (22) is
slidably inserted into said seat (26).

3. The connection device (10) according to claim 1 or 2, wherein the slider (22) is
formed as a single body.

4. The connection device (10) according to any one of the preceding claims,
wherein the slider (22) is displaceable inside said seat from an engaged position
into a disengaged position, and wherein said slider (22) comprises an elastically
deformable portion which is apt to undergo elastic deformation, when said slider
(22) is displaced from said engaged position into said disengaged position.

5. The connection device (10) according to claim 4, wherein said elastically
deformable portion is a spring element (30).

6. The connection device (10) according to claim 5, wherein said spring element
(30) is apt to be deformed elastically in relation to a remaining part (23, 33, 34, 35)
of the slider (22).

7. The connection device (10) according to claim 5 or 6, comprising a grip element
(33) arranged between the engagement means (23) and the spring element (30).

8. The connection device (10) according to claim 7, wherein the slider (22)
comprises, along a longitudinal axis (S), said engagement means (23), two lateral
extensions (34, 35) extending parallel to, and on opposite sides of, the longitudinal
axis (S), said grip element (33) extending between the two lateral extensions (34, 35)
transversally in relation to the longitudinal axis (S), and said spring element
(30).

9. The connection device (10) according to claim 8, wherein the slider (22) includes,
formed on each lateral extension (34, 35), near the grip element (33), two shoulders
(34a, 35a), and wherein the two shoulders (34a, 35a) are arranged inclined and
converging towards the longitudinal axis (S) on the side of, or with an inclination
towards, said engagement means (23).

10. The connection device (10) according to any one of claims 5 to 9, wherein the spring element (30) is a compression spring.

11. The connection device (10) according to claim 10, wherein the spring element (30) comprises two arms (32a, 32b).

12. The connection device (10) according to claim 11 and claim 8 or 9, wherein said two arms (32a, 32b) each constitute an appendage of a respective lateral extension (34, 35) and converge towards the longitudinal axis (S) on the side opposite to the engagement means (23).

13. The connection device (10) according to any one of the preceding claims, wherein said engagement means include an engagement element (23) having an L-shaped section including an end appendage (123) which constitutes a wing of the L and defines a shoulder (123a).

14. The connection device (10) according to any one of the preceding claims, wherein said seat (26) includes a first zone (26a), including a first bottom side (126a) and a bottom projection (126b) arranged in an L-like shape and intended to cooperate in abutment with a portion (30, 132a, 132b) of the slider (22).

15. The connection device (10) according to claim 14 when dependent on any one of claims 5 to 12, wherein the first bottom side (126a) and the bottom projection (126b) of the first zone (26a) are intended to cooperate in abutment with the spring element (30).

16. The connection device (10) according to claim 14 or 15, when dependent on claim 8, wherein the seat (26) includes a second side (226a) and a third side (226b) parallel to each other, against which the respective two lateral extensions (34, 35) of the slider (22) are intended to be arranged resting, wherein the two lateral extensions (34, 35) are positioned resting on a respective face (326a, 326b) of the second side (226a) and of the third side (226b), and wherein the second side (226a) and the third side (226b) define at the respective ends, on the side facing the first bottom side (126a), two respective inclined surfaces (226c, 226d), against which the two shoulders (34a, 35a) of the slider (22) are intended to be placed in abutment.

17. The connection device (10) according to any one of the preceding claims 14 to 16, wherein said seat (26) includes a second zone (26b) intended to house said engagement means (23) of the slider (22).

18. The connection device (10) according to claim 17, wherein the base body (20)
includes, in the second zone (26b), a bridge element (27) which connects two opposite sides (20a, 20b) of the base body (20), and wherein said engagement means (23) are intended to surmount said bridge element (27).

19. The connection device (10) according to claim 18, when dependent on claim 13, wherein the end appendage (123) rests on the bridge element (27).

20. The connection device (10) according to any one of the preceding claims, wherein said base body (20) includes a second seat (28, 28a, 28b) intended to house a corresponding pin member (24) of the first element (16) of the helmet, wherein said engagement means (23) are movable between a first position in which they occupy partially said second seat (28, 28a, 28b) and a second position where they free said second seat (28, 28a, 28b), wherein during a movement between said first position and said second position said slider (22) undergoes at least partially an elastic deformation.

21. The connection device (10) according to claim 20, wherein said second seat (28, 28a, 28b) is a seat for rotation for a pin member (24) associated with the first element (16) of the helmet (12).

22. The removable connection device (10) according to any one of the preceding claims, including an interaction counter-element (55, 155, 255) removably associated with said base body (20), wherein said interaction counter-element (55, 155, 255) is intended to interact with an interaction element (50) fixedly associated with the first element (16) of the helmet (12).

23. A helmet (12) including a removable connection device (10) according to any one of the preceding claims.

24. The helmet (12) according to claim 23, wherein said first element (16) is a visor of the helmet (12) and said second element (14) is a shell portion of the helmet (12).
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

INV. A42B3/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A42B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No</th>
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<tbody>
<tr>
<td>X</td>
<td>JP 4 100911 A (SHIYUEI KAKOU KK) 2 April 1992 (1992-04-02) figures 1,2</td>
<td>1-4, 13-15, 17-24, 5-12, 16</td>
</tr>
<tr>
<td>A</td>
<td>FR 2 541 874 A1 (GALLET FILS ETS JEAN [FR]) 7 September 1984 (1984-09-07) page 3, line 30 - page 4, line 27; figures 1, 2</td>
<td>1-4, 22-24</td>
</tr>
<tr>
<td>A</td>
<td>EP 1 057 419 A1 (OPTICOS S R L [IT]) 6 December 2000 (2000-12-06) the whole document</td>
<td>I</td>
</tr>
</tbody>
</table>

D Further documents are listed in the continuation of Box C

X See patent family annex

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"&" document member of the same patent family

Date of the actual completion of the international search 30 August 2010

Date of mailing of the international search report 20/09/2010

Name and mailing address of the ISA/Authorized officer

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<table>
<thead>
<tr>
<th>Patent document cited in search report</th>
<th>Publication date</th>
<th>Patent family member(s)</th>
<th>Publication date</th>
</tr>
</thead>
<tbody>
<tr>
<td>JP 4100911 A</td>
<td>02-04-1992</td>
<td>JP 2012776 C</td>
<td>02-02-1996</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JP 7035601 B</td>
<td>19-04-1995</td>
</tr>
<tr>
<td>FR 2541874 A1</td>
<td>07-09-1984</td>
<td>NONE</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>DE 69909975 D1</td>
<td>04-09-2003</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DE 69909975 T2</td>
<td>06-05-2004</td>
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<td></td>
<td>ES 2204095 T3</td>
<td>16-04-2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US 6253386 B1</td>
<td>03-07-2001</td>
</tr>
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