



(11) **EP 3 925 473 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**22.12.2021 Bulletin 2021/51**

(51) Int Cl.:  
**A42B 3/08 (2006.01)** **A44B 11/06 (2006.01)**  
**A44B 11/14 (2006.01)**

(21) Application number: **21178382.4**

(22) Date of filing: **08.06.2021**

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**  
Designated Extension States:  
**BA ME**  
Designated Validation States:  
**KH MA MD TN**

(71) Applicant: **Dainese S.p.A.**  
**36064 Colceresa (Vicenza) (IT)**

(72) Inventor: **BERTOLO, Luca**  
**36064 Colceresa (Vicenza) (IT)**

(74) Representative: **Manfrin, Marta et al**  
**Società Italiana Brevetti S.p.A.**  
**Stradone San Fermo 21 sc. B**  
**37121 Verona (VR) (IT)**

(30) Priority: **19.06.2020 IT 202000014779**

(54) **CLOSURE BUCKLE FOR A STRAP OF A PROTECTIVE HELMET AND CLOSING METHOD FOR A STRAP OF A PROTECTIVE HELMET**

(57) The present disclosure relates to a closure buckle (10) for a protective helmet strap and a method for opening a strap of a protective helmet. The buckle (100) comprises a main body (10) configured to be connected to a free end of said protective helmet strap and to house slidably along a sliding direction (D) a ratchet element (6) configured to be connected to another free end of said protective helmet strap. Moreover, the buckle (100) comprises a locking element (20) for preventing sliding of the ratchet element (60) with respect to the main body (10). The locking element (20) is rotatably associated by means of a first pin element (21) with said main body (10) and is configured to assume at least one first position, or locking position, in which sliding of said ratchet element (20) with respect to said main body (10) is prevented, and a second position, or sliding position, in which sliding of said ratchet element (60) with respect to said main body (10) is allowed. The buckle (100) further comprises an activation element (30) rotatably associated with said locking element (20) by means of a second pin element (31) and configured to move said locking element (2) from said first position, or locking position, into said second position, or sliding position, and vice versa.

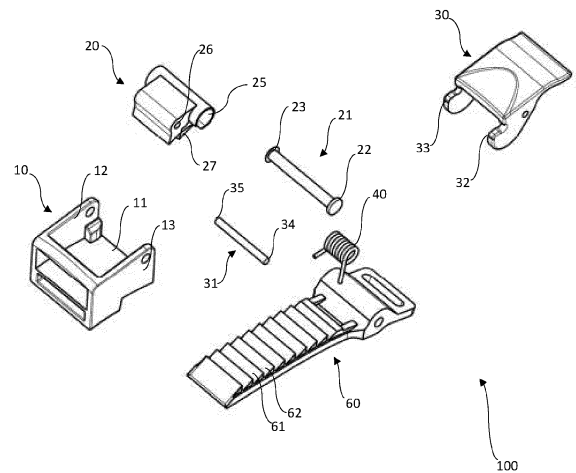


Fig. 1

**EP 3 925 473 A1**

## Description

**[0001]** The present disclosure relates in general to a fastening device for protective helmets. More specifically, the present disclosure relates to a closing device, in particular a buckle, for a strap of a protective helmet, and to a method for opening a strap of a protective helmet.

**[0002]** In many activities the use of protective helmets designed to increase the protection of a user's head is required or recommended. In particular, as is known, protective helmets, for example motorcycling helmets, are generally composed of an outer shell made of high-strength composite material, able to withstand impacts and abrasions and a layer of soft and deformable material, configured to absorb the mechanical stresses, in particular impacts, directed towards the user's head. The known helmets further comprise at least one fixing element configured to prevent the helmet from accidentally coming off the user's head.

**[0003]** This fixing element generally comprises a strap which comprises in turn a first and a second closing strap portion, each having a first end fixed to the outer shell and a second free end so that, during use, these free ends may be fastened together underneath the user's chin by means of a fastening device or buckle. The latter, in particular, must be configured so as to stably fix together the portions of the strap and at the same time allow simple release of the two said strap portions.

**[0004]** Among the known buckles, those which are most widely used generally comprise a ratchet - or rake or plate-like - element which is generally metallic and comprises a plurality of grooves. The ratchet element is associated with a strap portion. This ratchet element is configured to be inserted slidably inside a generally box-shaped element, or main body of the buckle, associated with a further strap portion and provided with a locking element configured to interact with at least one of the grooves in the ratchet element in order to prevent sliding of the said ratchet element.

**[0005]** In particular, in some types of known buckles the locking elements are elements which are configured to rotate relative to the box-shaped element, so that a rotation of these locking elements causes the opening or closing of the said buckle and the consequent possibility for the ratchet element to slide with respect to the box-shaped element.

**[0006]** Furthermore, these types of known buckles comprise prestressed elastic means, for example helical springs or torsion springs, which cooperate with the locking element in order to keep the latter in the buckle closing position, so as to ensure stable closing of the said buckle.

**[0007]** Such a known buckle, although advantageous in many respects, poses the problem that only a slight movement of the locking element is necessary in order to unlock the relative sliding movement of the ratchet and the main body of the buckle. In other words, only a small rotation of the locking element is required to open the buckle.

**[0008]** Consequently, there is the possibility that an accidental movement of the locking element may cause unintentional opening of the buckle, thus allowing sliding of the ratchet element which may result in slackening or complete opening of the helmet strap.

**[0009]** The present disclosure proposes providing a buckle and a method for opening a buckle, able to overcome the drawbacks mentioned above with reference to the prior art and/or achieve further advantages.

**[0010]** This is achieved by means of a buckle and a method for opening a buckle as defined in the respective independent claims.

**[0011]** Secondary characteristics and particular embodiments of the subject of the present invention are defined in the corresponding dependent claims.

**[0012]** The present disclosure is based on the recognition by the author of the present disclosure that it is required to modify or amplify the buckle opening mechanism of known helmet buckles in order to increase the safety for the user.

**[0013]** The present disclosure relates to a closure buckle for a strap of a protective helmet. Such a buckle comprises a main body connected to one free end of the strap of the helmet and a ratchet element connected to further free end of the helmet strap. The main body is furthermore configured to house slidably along a sliding direction the ratchet element. In particular, the ratchet element is configured to slide with respect to the main body along said sliding direction in a first sense, or locking direction, in order to close the strap of a helmet, and a second sense, or unlocking direction, opposite to said first direction, in order to open the helmet strap. Basically, the helmet strap comprises a first strap portion connected, on one side, to the cap of the said helmet and, on the other side, to the main body of the buckle, and a second strap portion connected, on one side, to the cap of the helmet and, on the other side, to the ratchet element. The buckle is configured to engage the first strap portion with the second strap portion, preferably, during use, in a zone underneath the user's chin.

**[0014]** In order to do so, namely in order to fasten the strap, the buckle comprises a locking element for preventing the sliding of the ratchet element with respect to the main body. In particular, the locking element is rotatably associated with the main body by means of a first pin element and is configured to assume at least one first position, or locking position, in which sliding of the ratchet element with respect to the main body is prevented, and a second position, or sliding position, in which sliding of ratchet element with respect to the main body is allowed. Basically, the position of the locking element with respect to the main body of the buckle results in the possibility or not of sliding of the ratchet element with respect to the main body.

**[0015]** Moreover, the buckle comprises an activation element which is rotatably associated with the locking element by means of a second pin element. The activation element is configured to move the locking element

from the first position into the second position and vice versa. In other words, the activation element is an element which can be operated by a user so as to displace the locking element. More specifically, a rotation of the activation element with respect to the locking element on which it is rotatably mounted causes a rotation also of the latter with respect to the main body and the switching from the locking position into the sliding position, or vice versa. The activation element is rotatably associated only with the locking element, without any other constraints, and the connection pin which connects the activation element and the locking element is a substantially floating pin or free pin. In other words, the only constraint for the activation element is a rotating pin constraint of the activation element on the locking element.

**[0016]** Advantageously, therefore, this double movement, or double rotation, increases the amplitude of the movement required in order to release, or open, the buckle and allow the sliding of the ratchet element. More specifically, according to a preferred aspect of the present disclosure, a rotation in a first rotation direction of the activation element with respect to the locking element causes a rotation of the latter with respect to the main body in a second rotation direction, opposite to the first rotation direction. Consequently, the risk of accidental opening of the strap is limited and at the same time it is possible to limit the overall dimensions of the buckle.

**[0017]** Moreover, preferably, the first rotation direction of the activation element in order to open the buckle is in the opposite direction to the second direction for sliding of the ratchet element, or unlocking direction. In particular, expressed in other words, the arrangement of the activation element with respect to the locking element rotatably associated with the main body by means of the first pin element and the fact that the second pin element is a floating or free pin element, arranged in the locking element and configured to rotatably associate the activation element with the said locking element, is such that the rotation of these two elements occurs in opposite directions of rotation. This characteristic feature, together with the fact that the pin configured to join together these two elements is a floating pin arranged in the locking element, mean that, in order to release the locking element from the ratchet element, a greater rotation of the activation element is required compared to the known buckles. In particular, differently from the buckles of the prior art in which the rotation of the activation element causes directly opening of the buckle, in the buckle according to the present disclosure a double movement involving rotation of the activation element first, and then of the locking element, is required in order to allow the sliding of the ratchet element with respect to the main body. Expressed yet differently again, in order to open the buckle and allow opening of the strap, a rotation of the activation element with respect to the main body is required; this rotation does not cause directly opening of the buckle, but more a subsequent rotation of the locking element on which it is pivotably mounted with respect to

said main body, which allows only subsequently the sliding of the ratchet element in the main body. The fact that rotation of the activation element and the locking element occurs in opposite directions of rotation owing to the arrangement of the first pin element and the second pin element means that opening of the buckle intended to allow sliding of the ratchet element requires a relatively broad rotation of the activation element. Expressed yet differently again, the double rotation of the activation element and locking element in the opposite rotation directions increases the amplitude of rotation of the activation element needed in order to open the buckle, therefore reducing the risk of accidental opening of the strap.

**[0018]** Advantageously, moreover, the opening of the buckle by a user may be performed with one hand only.

**[0019]** In fact, according to a preferred aspect of the present disclosure, the locking element comprises at least one engaging element, for example a tooth element, while the ratchet element comprises at least one counter-engaging element, for example a groove element. In the first position, or locking position, the engaging - for example tooth - element is engaged in the counter-engaging element, for example groove element, so as to prevent relative sliding of the ratchet element and the main body. The double rotation needed to unlock the sliding also allows the height of the counter-engaging element, for example the groove element, and the engaging element, for example the tooth element, to be reduced. Advantageously, therefore, it is possible to obtain a buckle with more compact dimensions.

**[0020]** According to a preferred aspect of the present disclosure, the buckle comprises an energizing element associated with the main body and the locking body. Preferably, this energizing element is configured to oppose rotation of the locking element from the first position, or locking position, into the second position, or sliding position. In other words, during use, the energizing element keeps the locking element in the first position and opposes any rotation of the locking element towards the second position. In this way, the safety of the buckle is further increased. Preferably, according to one aspect of the present disclosure, the energizing element is a torsion spring.

**[0021]** In this way, the operation for removal of the locking action and the displacement of the ratchet element in order to open the buckle may also be performed using the same hand. In particular, the overall configuration of the closure buckle according to the present disclosure is such that a displacement of the activation element from the first position, or locking position, into the second position, or sliding position, occurs in an opposite direction to the unlocking direction, or in a sliding direction of the ratchet element with respect to the main body. In this way, opening of buckle is substantially facilitated.

**[0022]** According to a further preferred aspect of the present disclosure, the main body comprises a base element and a pair of side walls associated with the base element so as to define a sliding path for the ratchet el-

element along the sliding direction. Moreover, according to a preferred aspect, the first pin element comprises a first end portion and a second end portion, wherein each end portion is associated with a side wall of the main body. Moreover, the locking element is received within said main body, in particular between the side walls of the main body. This allows the compactness of the buckle to be increased still further.

**[0023]** According to a further preferred aspect of the present disclosure, the activation element is also at least partially received within the side walls of the main body. Moreover, preferably, the activation element comprises at least one cam portion configured to interact with the main body so that the activation element cooperates rotatably with the said main body. In other words, the activation element comprises a cam-shaped protuberance, or extension, which abuts against the main element and allows a rotational movement of the activation element with respect to the main body. More specifically, during a movement from the first position, or locking position, into said second position, or sliding position, of the locking element, the cam portion is configured to abut against the base element of the main body so as to cause rotation of the activation element with respect to the main body and oppose the action of the energizing element.

**[0024]** Advantageously, therefore, owing to the configuration of the cam portion and the fact that it abuts against the base element, a movement of the activation element causes a rotation thereof with respect to the main body. This rotation of the activation element moves the second pin element away from the base element and brings the locking element into said second position, or sliding position.

**[0025]** According to a preferred aspect of the present disclosure, the activation element comprises a first cam portion and a second cam portion, each associated with a side wall of the main body. According to this aspect, moreover, the locking element is at least partially received within said cam portions, therefore allowing the dimensions of the buckle to be reduced. The second pin element furthermore comprises a first and a second end portion, each associated with a cam portion of the activation element.

**[0026]** According to a further aspect of the present disclosure, the locking element comprises a first through-hole configured to receive the first pin element and rotatably associate the said locking element with the main body. The locking element further comprises a second through-hole configured to receive the second pin element and rotatably associate the activation element with the said locking element.

**[0027]** The present disclosure also relates to a protective helmet comprising a cap, a strap associated with said cap and a closure buckle.

**[0028]** Moreover, the present disclosure also relates to a method for opening a strap of a protective helmet. Such a strap comprises a free end connected to a main body of a closure buckle and a further free end connected

to a ratchet element of the closure buckle. Moreover, the ratchet element is slidably received inside the main body and a locking element rotatably associated with the main body blocks the sliding of said ratchet element with respect to the main body. The opening method involves a step of rotating in a first rotation direction an activation element rotatably associated with the locking element. This rotation causes a rotation of the locking element in a second rotation direction with respect to the main body, wherein the second rotation direction is opposite to the first rotation direction. The rotation of the locking element in the second rotation direction causes unlocking of the relative sliding of the ratchet element and the main body.

**[0029]** According to a preferred aspect, the method comprises a further step of removing the ratchet element from the main body by sliding the ratchet element with respect to the main body along a sliding direction. Preferably, the direction of rotation of the rotation element is opposite to the sliding direction of the ratchet element and, in this way, the activation element and the ratchet element may be operated using the same hand.

**[0030]** Further advantages, characteristic features and modes of use forming the subject of the present disclosure will become clear from the following detailed description of embodiments thereof, provided by way of a non-limiting example.

**[0031]** It is in any case evident that each embodiment of the subject of the present disclosure may have one or more of the advantages listed above; in any case it is not required that each embodiment should have simultaneously all the advantages listed.

**[0032]** Reference will be made to the figures of the attached drawings in which:-

Figure 1 shows an exploded view of a closure buckle for a helmet strap according to one aspect of the present disclosure;

- Figures 2a-2c show a cross-sectional view of an opening sequence of a closure buckle according to one aspect of the present disclosure;

- Figures 3a-3c show a perspective view of an opening sequence of a closure buckle according to one aspect of the present disclosure;

- Figure 4 shows a perspective view of a helmet comprising a closure buckle according to one aspect of the present disclosure;

- Figure 5 shows a further perspective view of a helmet comprising a closure buckle according to one aspect of the present disclosure.

**[0033]** With reference to the attached figures, a closure buckle for a strap of a protective helmet is generally indicated by 100.

**[0034]** In particular, the buckle 100 according to the present disclosure comprises a main body 10 and a rake or plate-like ratchet element 60. More specifically, the main body 10 is a substantially box-shaped element configured to be connected to a free end of the protective

helmet strap. Similarly, the ratchet element 60 is connected to a further free end of the protective helmet strap.

**[0035]** In other words, such a protective helmet comprises a strap which includes a first strap portion having one end associated with a cap of the said helmet and a second free end, and a second strap portion having one end associated with the cap of the helmet and a second free end. The buckle 100 according to the present disclosure is configured to connect and fix together the free ends of the first and second strap portions by means of the main body 10 connected to said free end of said first strap portion and said ratchet element connected to said free end of said second strap portion.

**[0036]** In particular, the main body 10 is configured to house slidably along a sliding direction D the ratchet element 60.

**[0037]** Preferably, the main body 10 comprises a base element 11 and a pair of side walls 12, 13 associated with said base element 11 so as to define a sliding path for the ratchet element 60 along the sliding direction D. In other words, the ratchet element D may slide with respect to the main body 10, resting on the base element 11. Any lateral displacements of the ratchet element with respect to said sliding position are limited by said pair of side walls 12, 13.

**[0038]** The buckle 100 further comprises a locking element 20 configured to block the sliding movement of the ratchet element 60 with respect to the main body 10. In particular, the locking element 20 is movable with respect to the main body and is configured to assume at least one first position, or locking position, and at least one second position, or sliding position. In said locking position sliding of the ratchet element 20 with respect to the main body 10 is prevented, while in the sliding position this sliding is allowed.

**[0039]** More specifically, according to a preferred aspect of the present disclosure, said locking element 20 comprises at least one tooth element 27, 28, or protuberance, configured to interact with the ratchet element 60 in order to prevent sliding thereof. In particular, the ratchet element comprises at least one groove element 61, 62 configured to receive the at least one tooth element 27, 28 of the locking element. In other words, the at least one tooth element 27, 28 is configured to engage, in said first position, or position for locking the locking element 20, in the at least one groove element 61, 62 of the ratchet element 60 so as to prevent sliding of the latter with respect to the main body 10. According to a preferred aspect, in order to improve the stability of the buckle 100 in the first position, or locking position, of the locking element 20, the latter comprises two tooth elements, 27 and 28 respectively, while the ratchet element 60 comprises at least two groove elements, 61 and 62, respectively.

**[0040]** The locking element 20 of the buckle 100 according to the present disclosure is rotatably associated with the main body 10. In particular, the locking element 20 is rotatably associated with the main body 10 by

means of a first pin element 21. Preferably, the locking element 20 comprises a first through-hole 25 configured to receive this first pin element 21.

**[0041]** According to a preferred aspect of the present disclosure, the locking element 20 is in particular rotatably associated with the side walls 12, 13 of the main body 10. In particular, the first pin element 21 comprises a first end portion 22 and a second end portion 23, each associated with a side wall 12, 13 of the main body. In this way, the locking element 20 is received between the side walls 12, 13 of the main body 10, thus allowing the overall dimensions of the buckle 100 to be kept small.

**[0042]** The configuration of the buckle 100 is therefore such that the at least one tooth element 27, 28 of the locking element 20 is able to rotate with respect to said first pin element 20 so that it is able to assume a lowered position, close to the base element 11, in which the at least one tooth element 27, 28 is configured to engage with the at least one groove element 61, 62 of the ratchet element 60, and a raised position, or position spaced from the base element 11, in which the at least one tooth element 27, 28 does not engage with any groove element 61, 62 of the ratchet element 60. Said lowered and raised positions of the at least one tooth element 27, 28 correspond respectively to the first position, or locking position, and to the second position, or sliding position, of the locking element 20.

**[0043]** Preferably, according to one aspect of the present disclosure, the buckle 100 further comprises an energizing element 40 associated with the main body and the locking element 20. This locking element 50 is configured to oppose rotation of the locking element 20 from the first position, or locking position, into the second position, or sliding position.

**[0044]** In other words, the energizing element 40 tends to keep the locking element 20 in said first position, or locking position. In order to move the locking element 20 from the first position into the second position it is therefore necessary to impart to same locking element 20 a force which opposes that imparted by the energizing element 40.

**[0045]** According to a preferred embodiment, the energizing element 40 is configured to energize the locking element 20 in the clockwise direction.

**[0046]** Preferably said energizing element 40 is a torsion spring.

**[0047]** The buckle 100 further comprises an activation element 30. This activation element 30 is rotatably associated by means of a second pin element 33 with the locking element 20 and is configured to be operated by a user in order to move the locking element 20 from the first position, or locking position, into the second position, or sliding position, and vice versa. In other words, the activation element 30 may be a lever element for moving the locking element 20.

**[0048]** According to one aspect of the present disclosure, the locking element 20 comprises a second through-hole 26, preferably parallel to the first through-

hole 25, configured to receive this second pin element 31 so as to associate rotatably the activation element 30 with the said locking element 20.

**[0049]** Preferably, according to one aspect of the present disclosure, the activation element 30 is at least partially received within the side walls 12, 13 of the main body 10. Moreover, preferably, the activation element 30 comprises at least one cam portion 32, 33 configured to interact with the main body 10 so that the activation element 30 cooperates rotatably with the main body 10. In other words, the activation element 30 comprises a cam-shaped protruding or projecting element which allows the rotation of the activation element 30 with respect to the main body. Consequently, therefore, the activation element 30 is configured to rotate both with respect to the locking element 20 and with respect to the main body 10. Expressed yet differently again, the cam element 32, 33 is an eccentric element. In particular, the at least one cam portion 32, 33 is configured, during use, to abut against the main body 10, in particular against the base element 11 of the main body 10, so as to produce a rotational movement of the activation element 30 with respect to the main body 10.

**[0050]** According to a preferred aspect of the present disclosure, the activation element comprises a first cam portion 32 and a second cam portion 33, each associated with a side wall 12, 13 of the main body. Moreover, preferably, the locking element 20 is received inside the cam portions 32, 33 of the activation element. In other words, the locking element 20 is at least partially arranged inside the space between the first cam portion 32 and the second cam portion 33. Preferably, moreover, the second pin element 31 comprises a first end portion 34 and a second end portion 35, wherein each of said first and second end portions is associated with cam portion 32, 33 of the activation element 30.

**[0051]** Preferably, according to one aspect of the present disclosure, the at least one cam portion 32, 33 abuts, during use, against the main body 10, in particular the base element 11 so that the activation element 30 is able to rotate with respect to said main body 10. Therefore, the activation element 30 is rotatably associated by means of the second pin element 31 with the locking element 20 and abuts or rests or cooperates with the main element by means of said at least one cam element 32, 33. In other words, given the form of the at least one cam portion 32, 33 and the fact that the latter abuts, during use, against the base element 11 of the main body 10, activation of the activation element 30 by a user causes a rotation of the said activation element 30 with respect to the main body 10.

**[0052]** More particularly, the at least one cam portion 32, 33 of the activation element 30 abuts against the base element 11 of the main body 10 during the movement from the first position, or locking position, into the second position, or sliding position. During this movement, this abutting action and the configuration of the at least one cam portion 32, 33 cause the rotation of the activation

element 30 and oppose the action of the energizing element 40. The effect of this opposing action and this rotation is a displacement from the lowered position of the at least one tooth element 27, 28 into the raised position thereof and the consequent unlocking of the ratchet element 60. In fact, the form of the at least one cam portion 32, 33 and the fact that the locking element 20 is rotatably associated with the activation element 30 by means of the second pin element 21 result in a movement of the latter away from the base element 11 of the main body 10 and a consequent movement of the at least one tooth element 27, 28 from the lowered position into the raised position thereof. In other words, the cam portion is configured so that activation of the activation element 30 by a user, namely, given the cam portion, a rotation of said activation element 30 from the first position, or locking position, into the second position, or sliding position, against the action of the energizing element 40, causes a consequent rotation of the locking element 20 with respect to the main body 10 about said first pin element 21. Following this rotation unlocking of the ratchet element 60 occurs.

**[0053]** In other words, as can be seen from Figures 2a-2c and from Figures 3a-3c, from the first position, or locking position, of the locking element 20 (Figures 2a and 3a) in which the at least one tooth element 27, 28 is inserted inside the at least one groove element 61, 62 of the ratchet element 60, the activation element 30 is activated, in particular made to rotate, so as to move the locking element into the second position, or sliding position (Figures 2c and 3c).

**[0054]** During this movement, the activation of the activation element 30 causes the at least one cam portion 32, 33 to abut against the base element 11 of the main body, as can be seen in Figures 2b and 3b. This abutting action, owing to the configuration of the at least one cam element 32, 33, causes a rotation of the activation element 30 with respect to the main body 10. This rotation causes a movement of the second pin element 31 away from the main body 10, more specifically with respect to the base element 11 which in turn causes the at least one tooth element 27, 28 to pass into the raised position and the unlocking of the sliding movement of the ratchet element 20 with respect to the main body 10. In other words, the cam element 32, 33 allows the rotation of the activation element 30 with respect to the main body 10 of the buckle 100 and at the same time, depending on this rotation, spaces the locking element 20 from the base element 11 of the main body.

**[0055]** In particular, according to a preferred aspect of the present disclosure, a rotation in a first rotation direction of the activation element 30 with respect to the main body 10 causes a rotation, in a second rotation direction, of the locking element 20 with respect to the main body. Moreover, the second rotation direction is opposite to the first rotation direction. The first rotation direction is anticlockwise and the second rotation direction is clockwise.

**[0056]** A single initial activation therefore activates a

kinematic mechanism. The rotation of the activation element 30 in the first rotation direction starts from the same side where removal of the ratchet element occurs and therefore may all be performed using the same hand. Therefore activation, unlocking and removal may be performed in a single action and at the same time the rotation necessary for performing unlocking is amplified.

**[0057]** With reference to Figures 4 and 5, the present disclosure also relates to a protective helmet 200 comprising a cap 250, which is preferably substantially spherical and configured to withstand impacts and abrasions.

**[0058]** The helmet 200 furthermore comprises an opening configured, during use, to receive the head of a user. The helmet 200 further comprises a strap 220 associated with the cap 250. This strap 220 is configured, during use, to be arranged underneath the chin of a user.

**[0059]** The helmet 200 further comprises a buckle 100 for closing the strap 220 as described above. More specifically, the strap 220 may comprise a first strap portion 221 and a second strap portion 222. Each of said first and second strap portions 221, 222 comprises one end associated with the cap 250 of the helmet 200 and a further free end. During use, the free ends of the first strap portion 221 and the second strap portion 222 are configured to be connected together underneath the chin of a user by means of the closure buckle 100. For this purpose, the main body 10 of the buckle 100 is connected to the free end of the first strap portion 221, while the ratchet element 60 is connected to the free end of the second strap portion 222.

**[0060]** The present disclosure also relates to a method for opening a strap of a protective helmet.

**[0061]** In the description of this method, the parts of the buckle 100 involved in the method and having the same function and the same structure as the parts described above retain the same reference number and are not described again in detail.

**[0062]** In particular, the method for opening the strap according to the present disclosure comprises a step of rotating in a first rotation direction the activation element 30 with respect to the locking element 20. This rotation in the first rotation direction causes a rotation of the locking element 20 with respect to the main body 10 in a second rotation direction, opposite to the first rotation direction. This rotation of the locking element 20 causes unlocking of the relative sliding movement of the ratchet element 60 and the main body 10.

**[0063]** According to a preferred aspect of the present disclosure, the strap opening method comprises a further step of removing the ratchet element 60 from the main body 10 by sliding the ratchet element 60 with respect to the main body along the sliding direction D. It can be seen that, owing to the arrangement of the aforementioned parts, removal of the ratchet element 60 is performed on the same side on which rotation of the activation element 30 occurs. Expressed in other words, a sliding direction of the ratchet element 60 is directed towards a free end zone of the activation element 30 so that the

two actions may be performed using the same hand.

**[0064]** The subject-matter of the present disclosure has been described hitherto with reference to embodiments thereof. It is to be understood that other embodiments relating to the same inventive idea may exist, all of these falling within the scope of protection of the claims which are attached below.

## 10 Claims

1. Closure buckle (100) for a strap of a protective helmet, said buckle (100) comprising a main body (10) configured to be connected to a free end of said protective helmet strap and to house slidably along a sliding direction (D) a ratchet element (60) configured to be connected to another free end of said protective helmet strap, said buckle (100) further comprising a locking element (20) configured to block sliding of said ratchet element (60) with respect to the main body (10), wherein said locking element (20) is rotatably associated with said main body (10) by means of a first pin element (21) and is configured to assume at least one first position, or locking position, in which sliding of said ratchet element (60) with respect to said main body (10) is prevented, and a second position, or sliding position, in which sliding of said ratchet element (60) relative to said main body (10) is allowed, the buckle (100) further comprising an activation element (30) rotatably associated with said locking element (20) by means of a second pin element (31), configured to cause a rotation of said locking element (20) from said first position, or locking position, into said second position, or sliding position, and vice versa, wherein, the locking position of the locking element corresponds to a first position of the activation element (30), and the second position or sliding position of the ratchet element (60) corresponds to a second position of the activation element angularly displaced with respect to the first position of the activation element (30), wherein the activation element (30) is configured for a rotation in a rotation direction opposite to a rotation direction of the locking element (20).
2. Buckle according to claim 1, wherein a sliding direction of the ratchet element (60) is directed towards a free end zone of the activation element (30).
3. Buckle (100) according to any one of the preceding claims, comprising an energizing element (40), preferably a torsion spring, associated with said main body (10) and with said locking element (20) and configured to oppose a rotation of the locking element (20) from said first position, or locking position, into said second position, or sliding position.
4. Buckle (100) according to any one of the preceding

- claims, wherein said main body (10) comprises a base element (11) and a pair of side walls (12, 13) associated with said base element (11), the base element (11) and the pair of side walls (12, 13) defining a sliding path for said ratchet element (60) along said sliding direction (D).
- 5 **5.** Buckle (100) according to the preceding claim, wherein the first pin element (21) comprises a first end portion (22) and a second end portion (23), wherein each end portion (22, 23) is associated with a side wall (12, 13) of the main body (10). 10
  - 6.** Buckle (100) according to claim 4 or 5, wherein said locking element (20) is received between said side walls (12, 13) of the main body (10). 15
  - 7.** Buckle (100) according to claim 4, 5 or 6, wherein said activation element (30) is at least partially received within said side walls (12, 13) and comprises a cam portion (32, 33) configured to interact with the main body (10) so that said activation element (30) rotatably cooperates with said main body (10). 20
  - 8.** Buckle (100) according to the preceding claim in combination with the features of any one of claims 2 to 4, wherein in a condition from said first position, or locking position, to said second position, or sliding position, of the locking element (20), said cam portion (32, 33) of the activation element (30) is configured to abut against the base element (11) of the main body (10) so as to rotate the activation element (30) with respect to the main body (10) and oppose an action of said energizing element (40). 25
  - 9.** Buckle (100) according to claim 7 or 8, wherein the activation element (30) comprises a first cam portion (32) and a second cam portion (33) each associated with one of said side walls (12, 13) of the main body (10), wherein the locking element (10) is received within said first cam portion (32) and second cam portion (33) and wherein said second pin element (31) comprises a first end portion (34) and a second end portion (35), wherein each of said first and second end portions (34, 35) is associated with one of said first cam portion (32) and said second cam portion (33) of the activation element (30). 30
  - 10.** Buckle (100) according to any one of the preceding claims, wherein the locking element (20) comprises a first through-hole (25) configured to receive said first pin element (21) so as to rotatably associate said locking element (20) with said main body (10) and a second through-hole (26) configured to receive said second pin element (31) so as to rotatably associate said activation element (30) with said locking element (20). 35
  - 11.** Buckle (100) according to any one of the preceding claims, wherein said locking element (20) comprises at least one tooth element (27, 28) and wherein said ratchet element (60) comprises at least one groove element (61, 62), wherein in said first position, or locking position, said at least one tooth element (27, 28) of the locking element is engaged in said at least one groove element (61, 62) of the ratchet element (60) so as to block the relative sliding of the ratchet element (60) and the main body (10). 40
  - 12.** Buckle (100) according to any one of the preceding claims, wherein a rotation in a first rotation direction of said activation element (30) with respect to said main body (10) causes a rotation in a second rotation direction of said locking element (20) with respect to said main body (10), said second rotation direction being opposite to said first rotation direction. 45
  - 13.** Buckle (100) according to any one of the preceding claims, wherein the second pin element (31) is a floating pin, or free pin, or unconstrained pin. 50
  - 14.** Buckle (100) according to any one of the preceding claims, wherein the second pin element (31) connects only the activation element (30) with the locking element (20) and not with said main body (10). 55
  - 15.** Protective helmet comprising a cap, a strap associated with said cap and a buckle according to any one of the preceding claims.
  - 16.** Method for opening a strap of a protective helmet, wherein said strap comprises a free end connected to a main body (10) of a closure buckle (100) and a further free end connected to a ratchet element (60) of the closure buckle (100), wherein said ratchet element (60) is received slidably in said main body (10) and wherein a locking element (20) rotatably associated with the main body (10) blocks the sliding of said ratchet element (60) with respect to said main body (10), the opening method comprising a step of rotating in a first rotation direction an activation element (30) rotatably associated with said locking element (20), said rotation in said first rotation direction causing a rotation of said locking element (20) in a second rotation direction with respect to said main body (10), said second rotation direction being opposite to said first rotation direction, wherein the rotation of the locking element (10) in said second rotation direction with respect to the main body (10) causes unlocking of the relative sliding of the ratchet element (60) and the main body (10) .
  - 17.** Method according to the preceding claim, comprising a step of removing the ratchet element (60) from the main body (10) by sliding said ratchet element (60) with respect to said main body (10) along a slid-

ing direction (D).

- 18.** Method according to claims 16 or 17, wherein the ratchet element (60) slides on the same side on which the activation element is rotated (30). 5

10

15

20

25

30

35

40

45

50

55

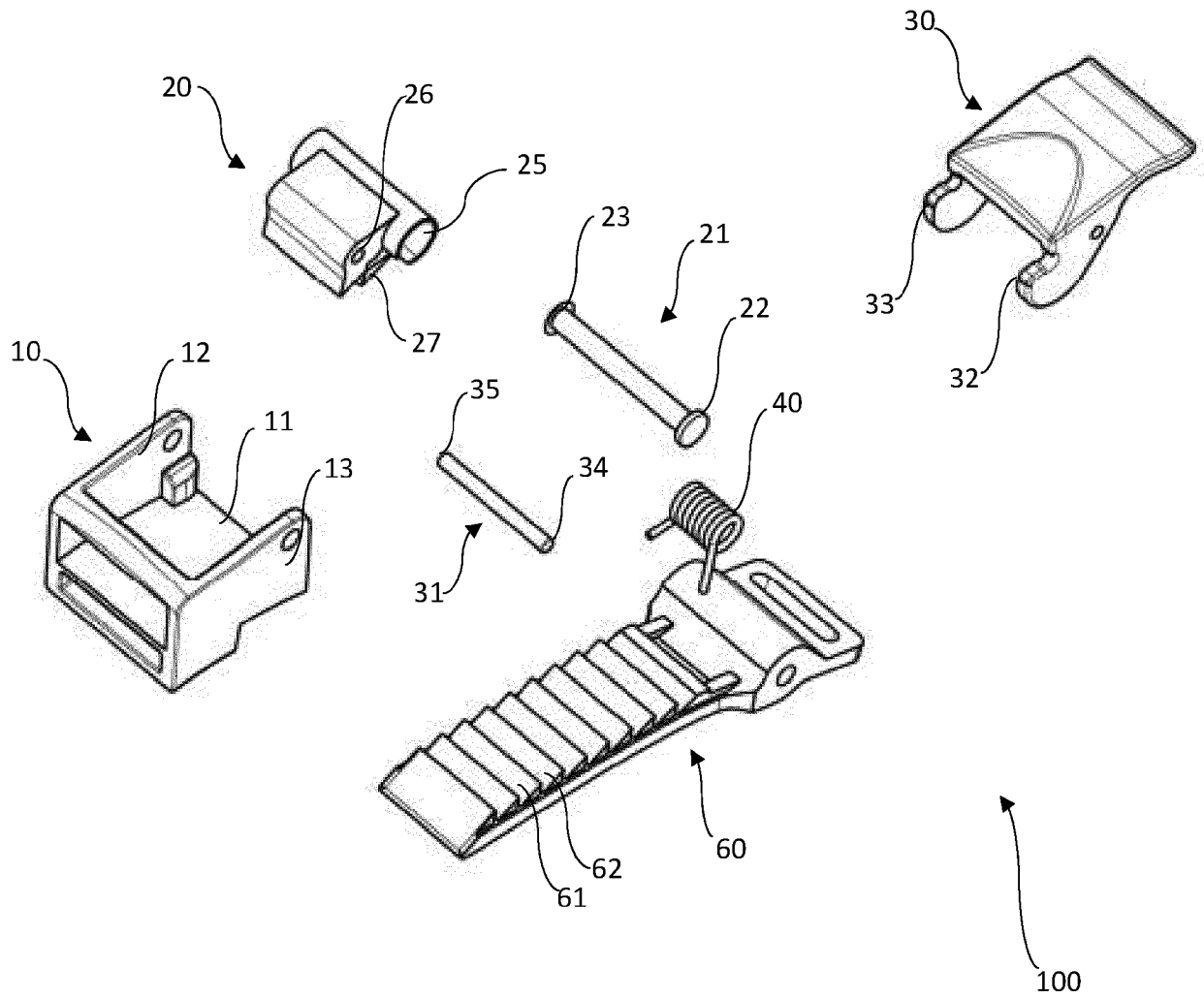


Fig. 1

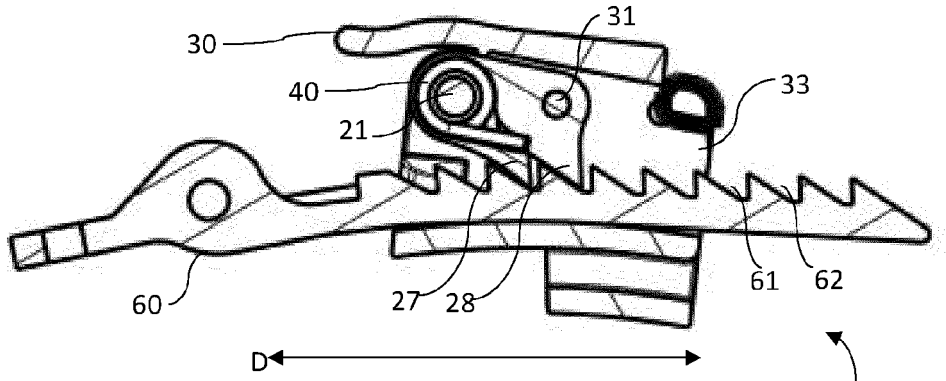


Fig. 2a

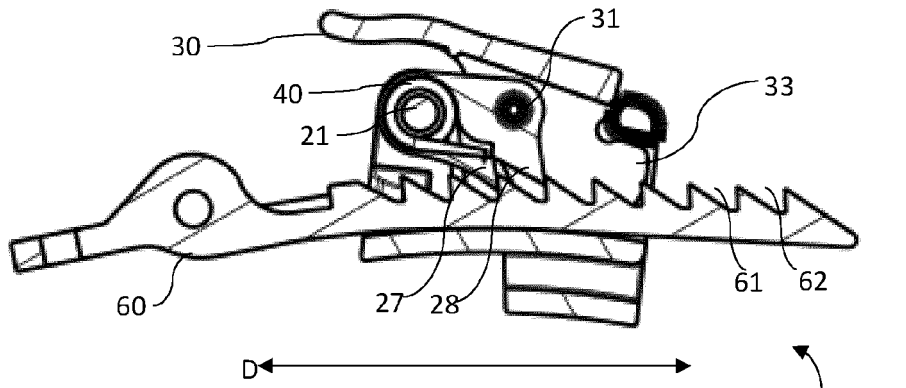


Fig. 2b

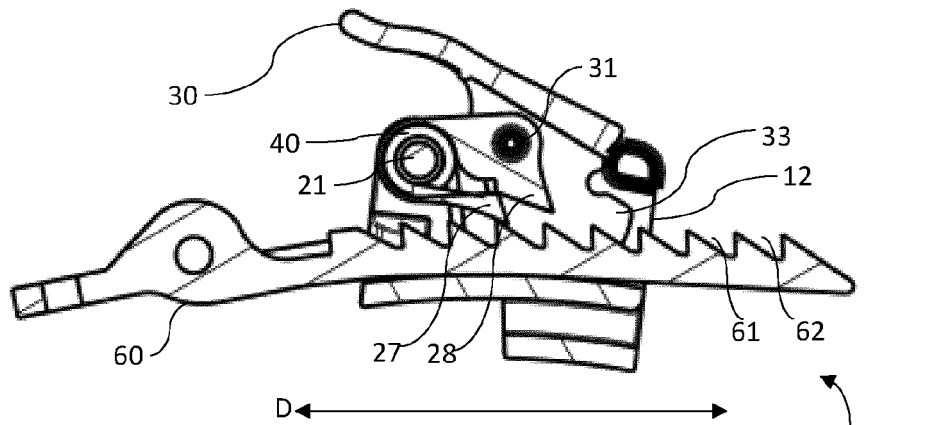


Fig. 2c

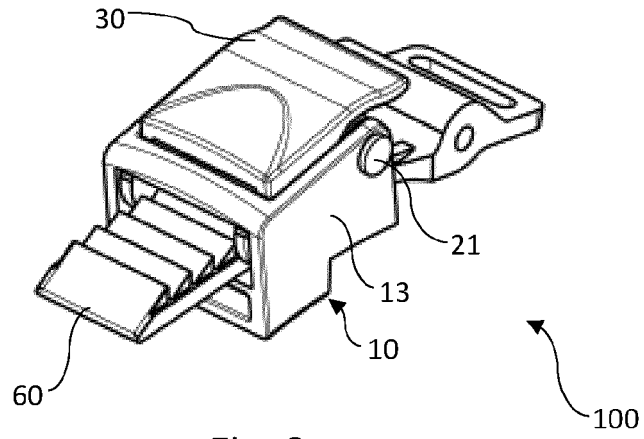


Fig. 3a

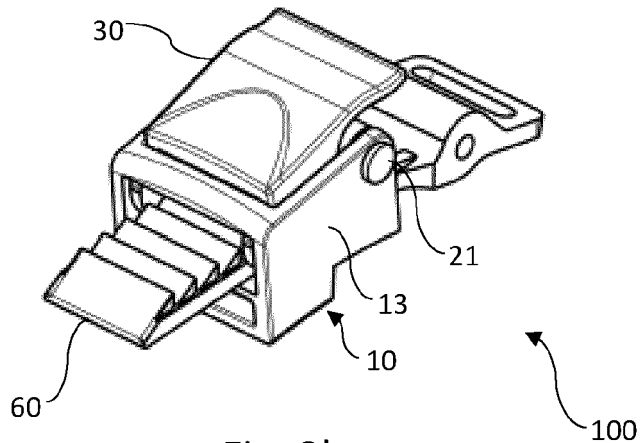


Fig. 3b

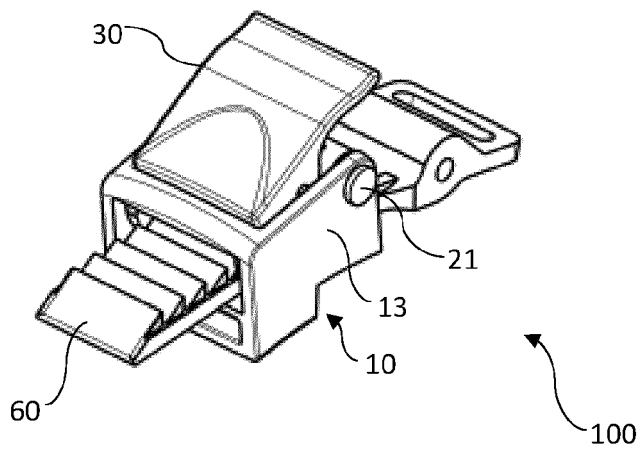


Fig. 3c

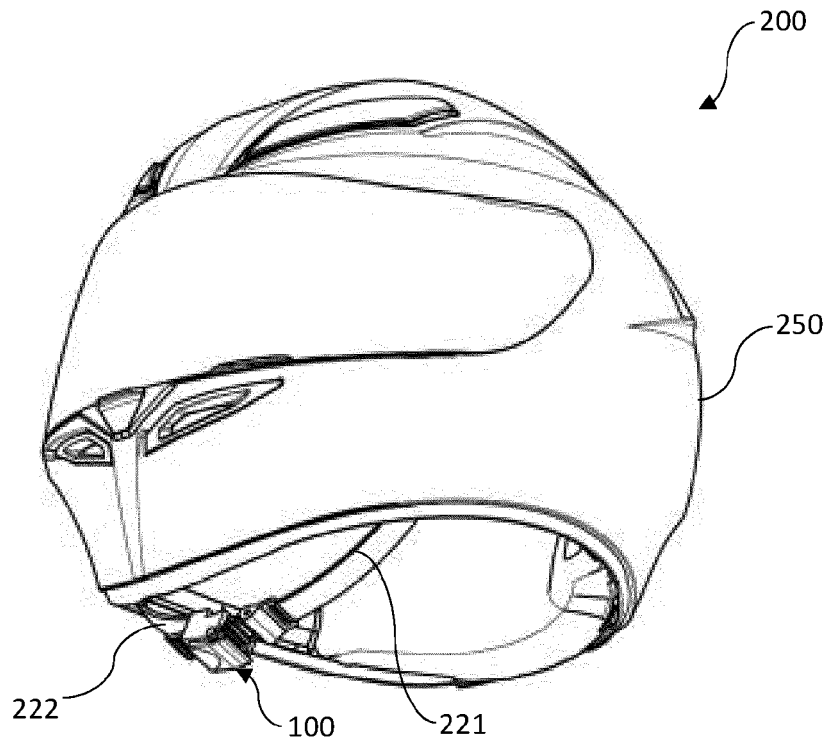


Fig. 4

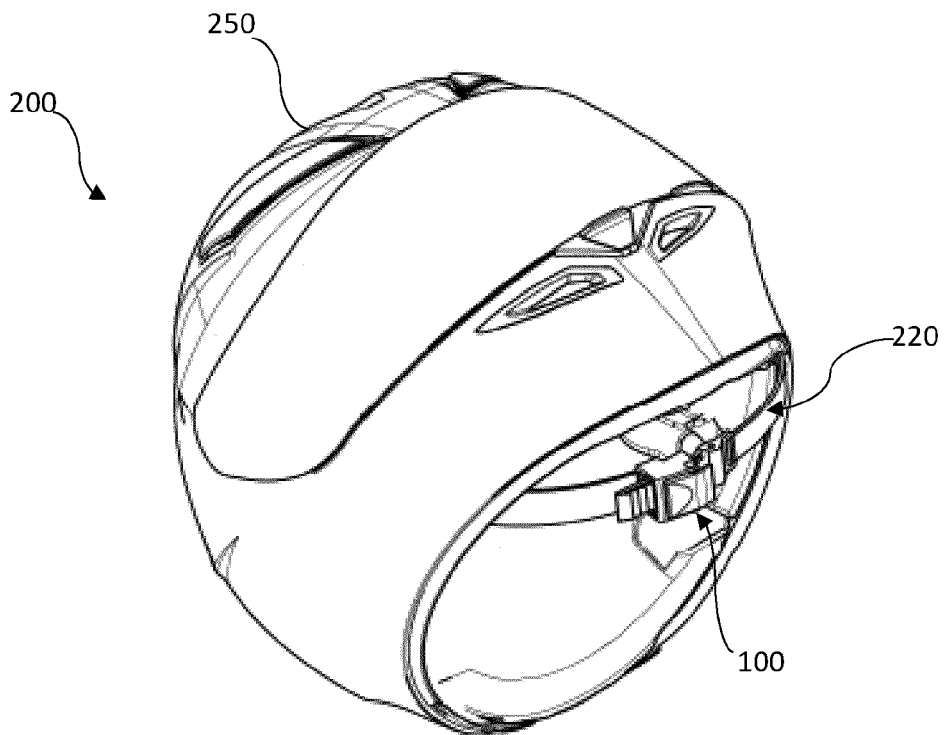


Fig. 5



EUROPEAN SEARCH REPORT

Application Number  
EP 21 17 8382

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 2 554 066 A1 (NOLAN GROUP SPA) 6 February 2013 (2013-02-06) * paragraphs [0070] - [0085]; figures 5,6 *	1-18	INV. A42B3/08 A44B11/06 A44B11/14
A	EP 0 772 983 A1 (E D C SARL [FR]) 14 May 1997 (1997-05-14) * claim 1; figure 2 *	1-18	
A	EP 3 017 714 A1 (JNT KOREA CO LTD [KR]) 11 May 2016 (2016-05-11) * claim 1; figure 3 *	1-18	
A	US 10 070 701 B1 (LIU KUAN HUNG [TW]) 11 September 2018 (2018-09-11) * claim 1; figures 1,4-6 *	1-18	
			TECHNICAL FIELDS SEARCHED (IPC)
			A42B A44B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 3 November 2021	Examiner D'Souza, Jennifer
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	

1  
EPO FORM 1503 03.02 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.

EP 21 17 8382

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

03-11-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2554066	A1	06-02-2013	AU 2012205155 A1 21-02-2013
			BR 102012001013 A2 30-07-2013
			EP 2554066 A1 06-02-2013
			ES 2467995 T3 13-06-2014
			JP 6112798 B2 12-04-2017
			JP 2013036159 A 21-02-2013
			KR 20130016071 A 14-02-2013
			US 2013031702 A1 07-02-2013
EP 0772983	A1	14-05-1997	DE 69517180 T2 22-02-2001
			EP 0772983 A1 14-05-1997
			ES 2145892 T3 16-07-2000
EP 3017714	A1	11-05-2016	EP 3017714 A1 11-05-2016
			KR 101430435 B1 14-08-2014
			WO 2015147476 A1 01-10-2015
US 10070701	B1	11-09-2018	NONE