(19) Europäisches Patentamt
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(11) **EP 3 583 863 A3**

(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
**26.02.2020 Bulletin 2020/09**

(43) Date of publication A2:
**25.12.2019 Bulletin 2019/52**

(21) Application number: **19179838.8**

(22) Date of filing: **12.06.2019**

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

(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**

(30) Priority: **18.06.2018 US 201862686425 P**
**15.04.2019 US 201962833935 P**
**23.05.2019 US 201916420652**

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# (54) CYCLING HELMET WITH ROTATIONAL IMPACT ATTENUATION

(57) A helmet having an outer liner and an inner liner is disclosed. The inner liner is positioned at least partially inside the outer liner. The helmet includes at least one chin strap anchored to the outer liner and passing through an opening in the inner liner. The helmet further includes a plurality of return springs, each having a first end coupled to the outer liner, and a second end distal to the first end and coupled to the inner liner. The return springs bias the inner liner to a first position with respect to the outer liner. The inner liner is slidably coupled to the outer liner through the plurality of return springs and slidably movable relative to the outer liner between the first position and a second position where the inner liner and outer liner are rotated away from the first position.

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# EUROPEAN SEARCH REPORT

Application Number
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## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
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The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
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| The Hague | 17 January 2020 | 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

EPO FORM 1503 03.82 (P04C01)

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## CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

## LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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## LACK OF UNITY OF INVENTION
## SHEET B

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-13

A helmet, comprising:an outer liner comprising an inward-facing surface;an inner liner positioned at least partially inside the outer liner, the inner liner comprising an outward-facing surface facing the inward-facing surface of the outer liner;a plurality of return springs comprising an elastomeric material, each return spring having a first end coupled to the inward-facing surface of the outer liner, a second end distal to the first end and coupled to the outward-facing surface of the inner liner, and a body connecting the first end and the second end, the plurality of return springs biasing the inner liner to a first position with respect to the outer liner; andat least one chin strap anchored to the outer liner and passing through an opening in the inner liner;wherein the inner liner is slidably coupled to the inward-facing surface of the outer liner through the plurality of return springs and slidably movable relative to the outer liner between the first position and a second position where the inner liner and outer liner are rotated with respect to each other away from the first position; andwherein the body of each return spring of the plurality of return springs is substantially tangential to at least one of the inward-facing surface of the outer liner and the outward-facing surface of the inner liner.

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2. claims: 14, 15

A method of assembling a helmet comprising an inner liner and an outer liner, the method comprising:providing the outer liner of the helmet, the outer liner having an inward-facing surface;coupling a plurality of return springs to the outer liner by affixing a first end of each return spring to the outer liner, each return spring comprising an elastomeric material and further comprising a second end distal to the first end and having a different one of a plurality of fasteners;coupling at least one chin strap to the outer liner;providing the inner liner of the helmet, the inner liner having an outward-facing surface;positioning the inner liner at least partially inside the outer liner, the inward-facing surface of the outer liner facing the outward-facing surface of the inner liner;threading the at least one chin strap through an opening in the inner liner; andcoupling the inner liner to the outer liner by pressing the inner liner into the outer liner until the plurality of fasteners are passing through the outward-facing surface of the inner liner, thereby coupling the outward-facing surface to the inward-facing surface through the plurality of return springs, optionally further comprising annealing at least a

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## LACK OF UNITY OF INVENTION
## SHEET B

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

portion of at least one of the outward-facing surface of the inner liner and the inward-facing surface of the outer liner.

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## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 17 9838

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