(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 195 753 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
26.07.2017 Bulletin 2017/30

(51) Int Cl.:
A43C 11/14 *(2006.01)* ***A43B 5/04*** *(2006.01)*

(21) Application number: **17152026.5**

(22) Date of filing: **18.01.2017**

(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:
MA MD

(30) Priority: **20.01.2016 IT UB20160338**

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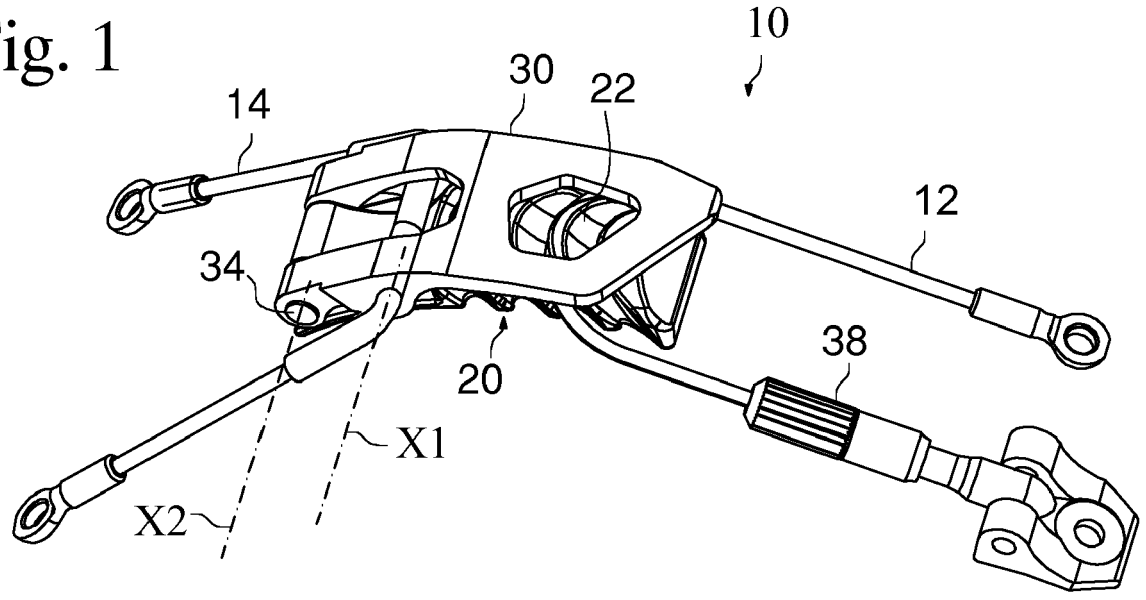
(54) LEVER CLOSING DEVICE FOR SPORT FOOTWEAR

(57) A closing device (10) is described for a first and second flap (L1; L2), adjacent to each other, of a footwear shell, comprising a first element (14) for fastening to the first flap; a closing lever (30); a rack (20) provided with teeth (22); and a second element (12) for fastening to the second flap, wherein

The rack is constrained only to the lever at a point of mutual articulation (X2), and the lever, at a different point (X1), is articulated to the first element, and the second element is selectively attachable on a tooth of the rack to adjust the relative position of the first and second flap when the lever is brought closer to the rack.

There is obtained a connection simple-to-build and with the quality of always maintaining the rack in the same position when the lever is closed.

Fig. 1



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Description

[0001] The present invention concerns a lever-and-rack closing device for footwear, e.g. sports footwear here chosen as example.

[0002] The lever-and-rack closing devices for clamping an upper of sport footwear are of many types. A particular family comprises a rack fixed to a flap of the upper, a tie-rod connected to the opposite flap, and a lever articulated to the tie-rod made for selectively engaging one of rack's teeth. Such an example is described in US 41 04 766 or FR 2 701 361. Another classic example is found in FR 2,755,833.

[0003] With recent developments of sport equipment, the size of the closing devices is a problem to solve. A decisive factor for the choices of sportsmen is that the size and/or the projections of the closing devices be basically reduced as much as possible, to minimize the probability of impacts during the skiing activity.

[0004] The models described in the documents cited above are instead very bulky, and when closed span on too wide an area of the outer shell. Furthermore, since the position of each rack changes according to its degree of closure (because the tooth that the user engages with the lever may change), an unpredictable misalignment of the closing devices on the shell descends, or in any case a very wide variance in their misalignment. Both effects imply a final sub-optimal placement of the closing devices on the shell, which increases the risk of accidental collision thereof and lowers the dynamic performances of the ski boot.

[0005] Main object of the invention is to improve this state of the art.

[0006] Another object is to provide a lever-and-rack closing device which solves at least one of the above problems.

[0007] Another object is to provide a more compact lever-and-rack closing device.

[0008] Another object is to provide a lever-and-rack closing device that is less cumbersome when mounted and closed on the shell.

[0009] At least one object is attained with a lever-and-rack closing device for footwear, preferably sports footwear, as defined in claim 1, and in the dependent ones for advantageous variants.

[0010] An aspect of the invention relates to a closure device for a first and second flap, adjacent to each other, of a footwear shell, comprising

a first element for fastening to the first flap;

a closing lever;

a rack (20) provided with teeth;

a second element for fastening to the second flap, wherein

the rack is constrained only to the lever at a point of mutual articulation, and the lever, at a different point, is articulated to the first element, and

the second element is selectively attachable on a tooth of the rack to adjust the relative position of the first and second flap when the lever is brought closer to the rack.

[0011] The first fastening element and/or the second fastening element may be

a flexible element; and/or

an extensible, e.g. elastic, element or an inextensible element.

[0012] Preferably, at the articulation point one end of the lever is articulated to the rack, so that such articulation point becomes a fulcrum on the toothed rack for the first fastening element with more favorable leverage.

[0013] Preferably, at the articulation point the lever is hinged to the rack, to facilitate the closing of the device through rotation of the lever about an axis that intersects the rack.

[0014] Preferably, the lever is permanently hinged or articulated to the rack at the articulation point, for greater stability of the device and to maintain the relative distances between the components of the device constant.

[0015] Preferably, on the rack the articulation point is located at one end of the rack, that end which is closer to the second element. Thus the closing stroke of the rack towards the second element is greater.

[0016] Preferably, said different point is located approximately at the center of the lever, as a good compromise between the effort required during closing and the approach gap of the two fastening elements (and thus of the flaps).

[0017] Preferably, the first and/or second fastening element comprise/s an adjustment element for adjusting its/their own length, so as to adjust the distance between an anchorage point of the fastening element to the shell and an articulation point of the first element on the lever or on the tooth of the rack engaged by the second fastening element.

[0018] Preferably, the device comprises, preferably at the articulation point of the first element on the lever, an elastic element mounted for biasing the first element and/or the lever towards a resting position.

[0019] Preferably, the first and/or second element comprise/s or is/are constituted by a cable or by a filiform element. The advantage is that filiform elements well adapt to the curved shape of the shell, they are thin and compact, and distribute well the traction force on the shell surface. In this variant the lever preferably comprises a seat or an eyelet or a loop or a tunnel into which the cable or the filiform element is insertable for articulating the latter with respect to the lever. The advantage is to provide a coupling which functions as a hinge between the lever and the first fastening element without a third piece of mutual connection.

[0020] Preferably, the rack comprises an eyelet or a bushing or a seat or an eyelet for housing an articulation axis with the lever.

[0021] Preferably, the articulation axis is an axis of rotation and hinging.

[0022] Preferably, the lever comprises an eyelet or a bushing or a seat or an eyelet for housing an articulation axis with the first fastening element.

[0023] Preferably, the articulation axis is an axis of rotation and hinging.

[0024] Preferably, the lever comprises at one end a fork which is hinged about a first axis at one end of the rack. Preferably to the fork there is also hinged, about a second axis parallel to said first axis, one end of the first element. This solution enables the easy use e.g. of pins for the hinging and is easy to assemble. Or the fork may be comprised at one end of the first element, which fork is hinged about an axis at one end of the rack.

[0025] The hinging between rack and lever preferably envisages a portion, or e.g. an eyelet or a hole, in the rack to house and/or support the hinging axis. Such portion may e.g. comprise a pass-through tunnel present in the rack body or a fork at whose ends the lever is coupled.

[0026] The hinging between rack and lever preferably comprises a portion in the lever, for example a slot or a hole, for housing and/or supporting the hinging axis. Such portion may e.g. comprise a pass-through tunnel present in the lever body or a fork at whose ends the rack is coupled.

[0027] Preferably said hinging or articulation axes are accomplished by a pin or a prismatic pair.

[0028] Another aspect of the invention relates to a disposition on a (e.g. sport) shoe shell of two or more devices as defined above, wherein
two devices are mounted on the shell side by side,
in each device the first fastening element and the second fastening element are constituted by a cable or a filiform element, and
at least one fastening element of one device intersects at least one fastening element of the other device.

[0029] The present invention is hereinafter further described in some of its preferred embodiments of a device with reference to the accompanying drawing, in which:

Figure 1 shows a perspective view from above of a first device, closed,
Figure 2 shows a side view of the device of Fig. 1,
Figure 3 shows a perspective view of the device of Fig. 1, open;
Figure 4 shows a side view of the device of Fig. 3;
Figure 5 shows a perspective view from above of a second device, opened;
Figure 6 shows a side view of the device of Fig. 5.

[0030] In the figures equal numbers indicate similar or identical parts.

[0031] In order not to crowd the drawing, identical elements are not always referenced.

[0032] A closing device 10 for adjacent flap L1 and flap L2 is shown in figures 1-4.

[0033] The flaps L1, L2 belong to a sport-shoe shell (not shown).

[0034] The device 10 comprises a first fastening element to the flap L1 in the form of a cable 12 and a second fastening element to the flap L2 in the form of another cable 14. The cables 12, 14 are U-bent and their ends are anchored to the flaps L1, L2 in a known manner.

[0035] The central part of the cable 14 (that is, of the U) is inserted inside an eyelet or bushing 36 of a closing lever 30, so as to be indeed hinged to the lever 30 about an axis X1. In turn, through a pin 34, the lever 30 is hinged, about an axis X2 parallel to axis X1, to an eyelet 24 present at the end of a rack 20 provided with teeth 22.

[0036] As can be seen, the ends of the lever 30 are articulated to the rack 20, creating a fulcrum and leaving the lever 30 free to rotate about the X2 axis; while the cable 14 is articulated to the lever 30 at a point near the center of the lever 30.

[0037] The cable 12 is free and its central part (curve of the U) can be constrained selectively on any tooth 22 of the rack 20.

[0038] On one of the cables 12, 14, e.g. the cable 12 as in the figure, is preferably present a tensioner 38, to adjust the length of cable 12.

[0039] To tighten the flaps L1, L2 one just brings the device 10 from the opening position (fig. 3 and 4) to the closing position (fig. 1 and 2).

[0040] To this aim, the lever 30 is rotated (arrow F) towards the rack 20 turning the X1 axis toward the cable 12. In this way the cable 14 is pulled, and so is the flap L2, toward the other flap L1. In other words, by lowering the lever 30 until it is above the rack 20, the cable 14 is pulled and the rack 20 moves back towards the cable 14 by about twice the distance between the axes X1, X2.

[0041] The fastening degree is established by selecting which tooth 22 is engaged by the cable 12 and/or by acting on the tensioner 38.

[0042] Note that the particular mechanism of the invention, regardless of the tooth 22 engaged by the cable 12, allows in the closed device 10 (Fig. 2) to maintain the distance, indicated by D in Fig. 2, between the axis X1 and the anchoring point of cable 14, constant. As a result, with the device 10 closed the rack 20, which is constrained only to the shell by only the lever 30, always has the same position on the shell independently of the tooth engaged by the cable 12. Therefore, a device 10 can be designed to make it stay on the shell always in a same position, little subject to accidental knocks.

[0043] To balance the strains and improve the movement of the lever 30, it is preferable that the lever 30 comprises a terminal fork with two spaced apart, parallel end arms 42. These arms are hinged with the pin 38 to the sides of the eyelet 36.

[0044] It is also possible that it is the rack 20 which comprises a fork, while the lever 30 has a central portion adapted to mate inside such fork. In this case the advantage is to have a rack with more surface area to obtain increased stability.

[0045] Figures 5 and 6 show a variant of device 60, which illustrates some different technical solutions, usable alone or in combination with the others, e.g. by implementing them in the device 10. For brevity's sake we will describe only such technical solutions, the rest of the device and its operation being equal to the previous one.

Option 1: The device 60 comprises a rack 70 terminating with a fork 72 having two separate, parallel arms 76 at whose ends, by pins 74, a lever 80 is hinged. Thus, the lever 80 can rotate on the pins 74 with respect to the rack 70 about an axis X3. The advantage is greater stability in the closing phase, because the lever 80 is guided better.
Option 2: the lever 80 comprises two eyelets or bushings 82 to house a pass-through pin 84 to which there is hinged, about an axis X4 parallel to the axis X3, the end of an arm 90 adjustable in length, in turn connected to an anchor 92 to the shell. The advantage of the lever 80 is to be able to easily adjust the closing clamping level.

Claims

1. Closing device (10) for a first and second flap (L1; L2), adjacent to each other, of a footwear shell, comprising:

   a first element (14) for fastening to the first flap;
   a closing lever (30);
   a rack (20) provided with teeth (22);
   a second element (12) for fastening to the second flap, wherein
   the rack is constrained only to the lever at a point of mutual articulation (X2), and the lever, at a different point (X1), is articulated to the first element, and the second element is selectively attachable on a tooth of the rack to adjust the relative position of the first and second flap when the lever is brought closer to the rack.

2. Device according to claim 1, wherein the first fastening element and/or the second fastening element is/are a flexible element.

3. Device according to claim 1 or 2, wherein the first fastening element and/or the fastening second element is/are an inextensible element.

4. Device according to claim 1 or 2 or 3, wherein at the articulation point one end of the lever is articulated to the rack.

5. Device according to any one of the preceding claims, wherein at the articulation point the lever is hinged, preferably permanently, to the rack.

6. Device according to any one of the preceding claims, wherein the point of articulation is located at one end of the rack, that end which is closer to the second element.

7. Device according to any one of the preceding claims, wherein said different point is located approximately at the center of the lever.

8. Device according to any one of the preceding claims, wherein the first and/or second fastening element comprise/s an adjustment element for adjusting its/their own length.

9. Device according to any one of the preceding claims, comprising, preferably at the articulation point of the first element on the lever, an elastic element mounted for biasing the first element and/or the lever toward a resting position.

10. Device according to any one of the preceding claims, wherein the first and/or second element comprise/s or is/are constituted by a cable or by a filiform element.

11. Device according to claim 10, wherein the lever comprises a tunnel into which the cable or the filiform element is insertable for articulating the latter with respect to the lever.

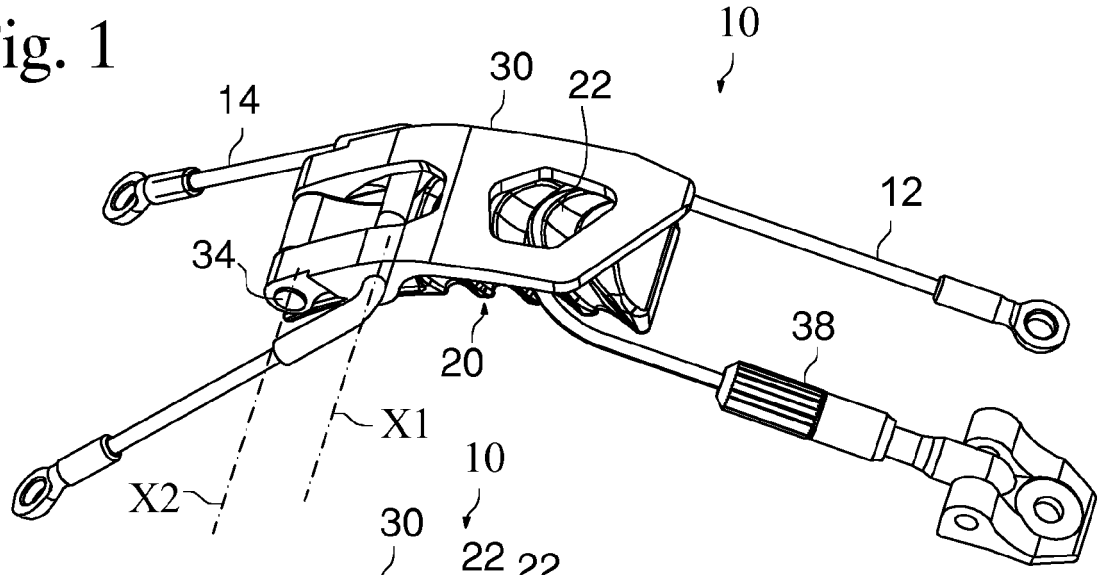
12. Device according to any one of the preceding claims, comprising, for the hinging between the rack and the lever, a seat in the lever or in the rack which is adapted to support a pin for mutual pivoting.

13. Device according to any one of the preceding claims, wherein the lever comprises at one end a fork which is hinged about a first axis at one end of the rack.

14. Device according to claim 13, wherein to the fork there is hinged, about a second axis parallel to said first axis, one end of the first element.

15. Disposition on a sport-shoe shell of two or more devices as defined according to one of the preceding claims, wherein
    two devices are mounted on the shell side by side,
    in each device the first fastening element and the second fastening element are constituted by a cable or a filiform element, and
    at least one fastening element of one device intersects at least one fastening element of the other device.

Fig. 1



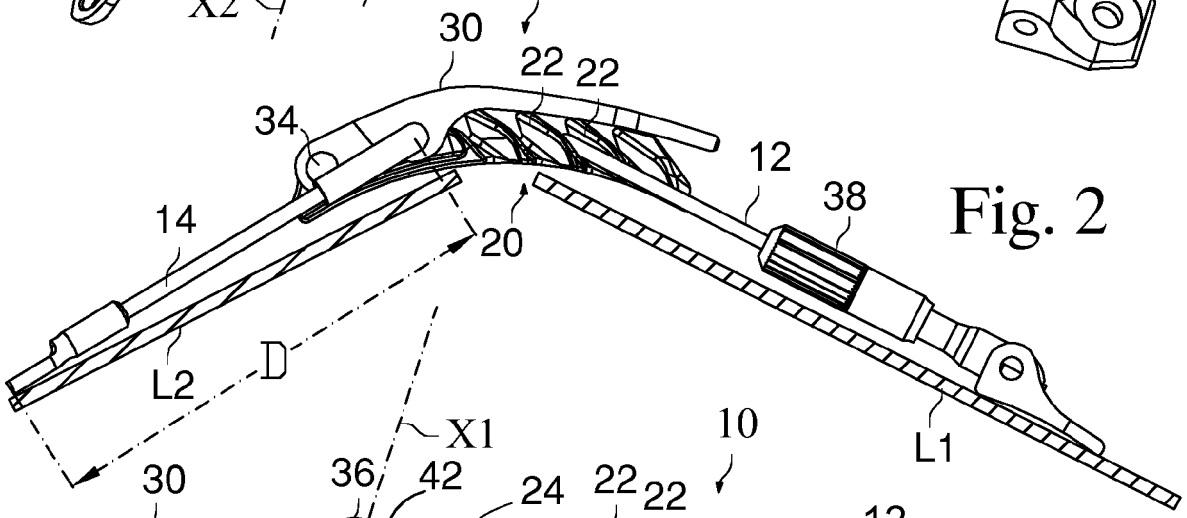


Fig. 2

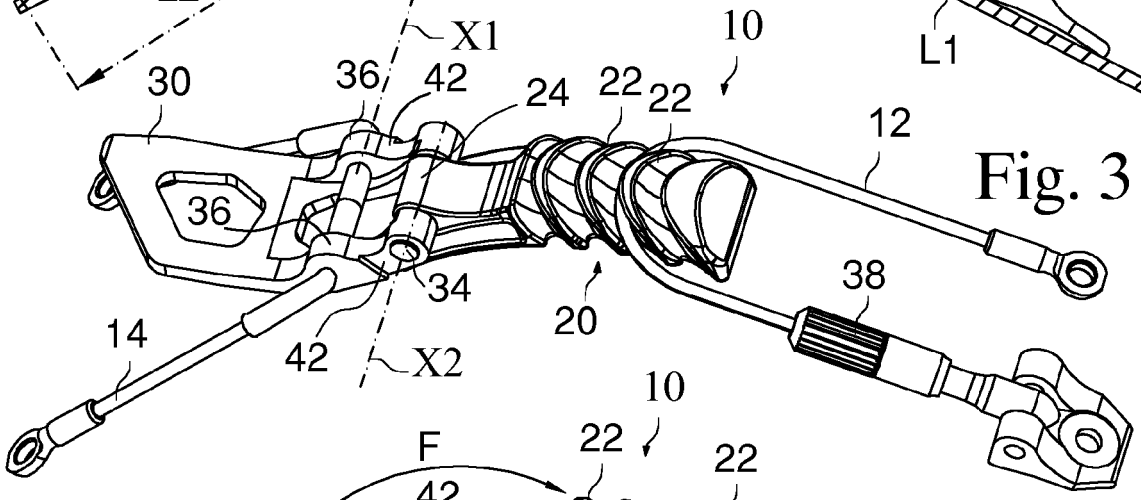


Fig. 3

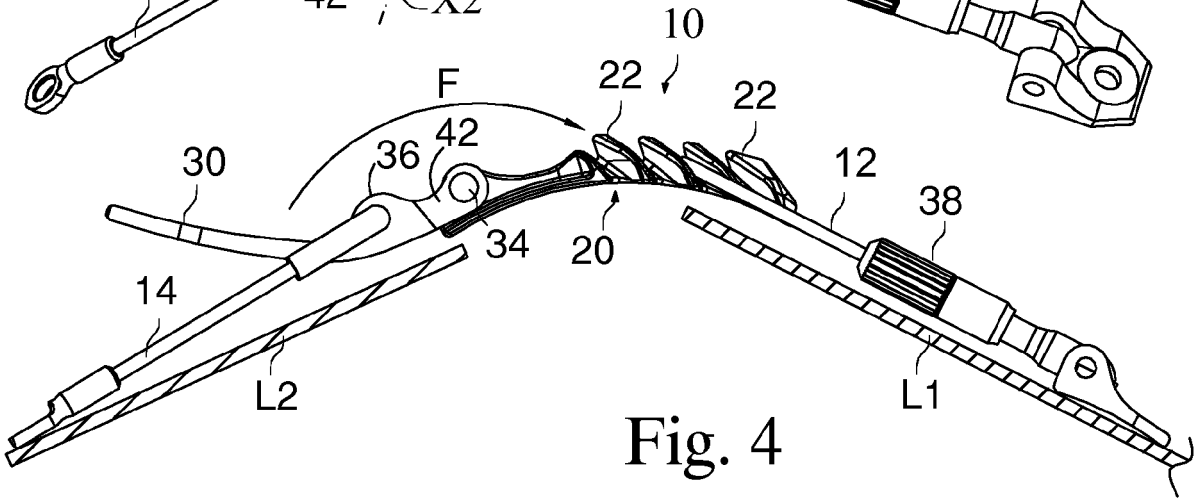
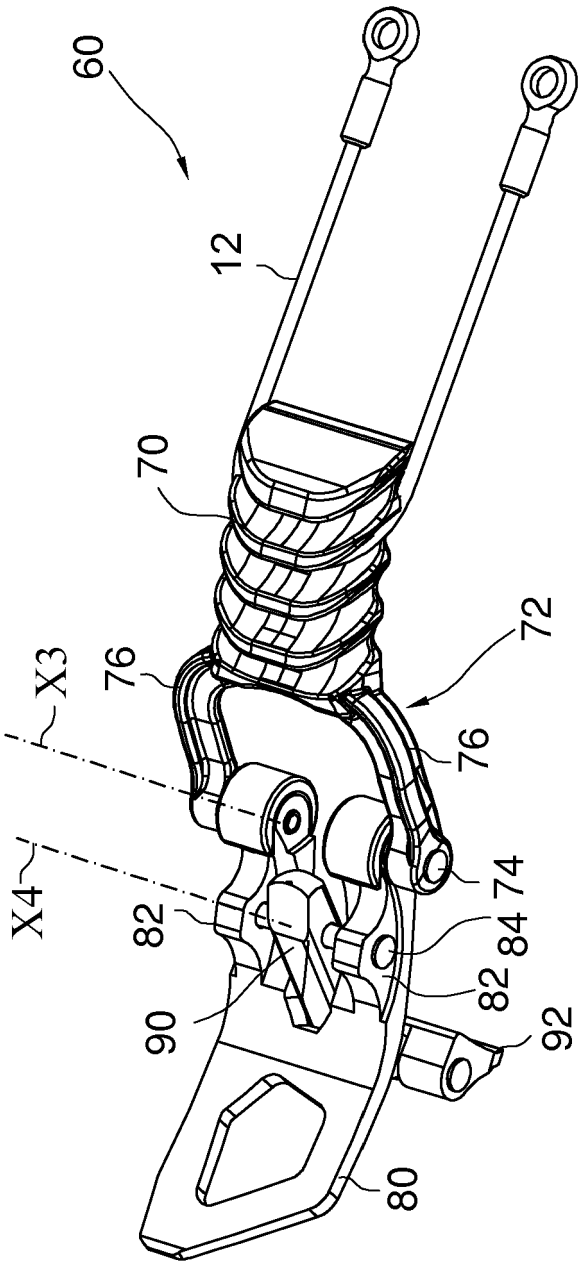


Fig. 4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X3
X4
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Fig. 5

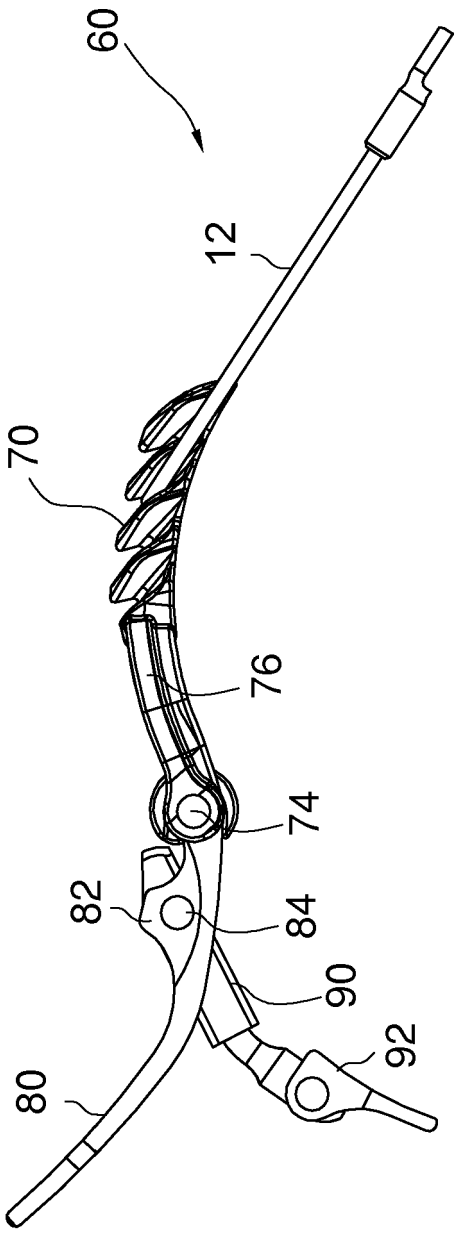
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Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 17 15 2026

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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
The Hague	7 June 2017	Chirvase, Lucian

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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REFERENCES CITED IN THE DESCRIPTION

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