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

(11) **EP 4 537 913 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
16.04.2025 Bulletin 2025/16

(21) Application number: **24205808.9**

(22) Date of filing: **10.10.2024**

(51) International Patent Classification (IPC):
A63C 9/08 *(2012.01)* ***A63C 9/086*** *(2012.01)*
A63C 9/085 *(2012.01)*

(52) Cooperative Patent Classification (CPC):
A63C 9/0807; A63C 9/08528; A63C 9/08571; A63C 9/08578; A63C 9/086; A63C 9/0805

(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 ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
GE KH MA MD TN

(30) Priority: **12.10.2023 IT 202300021312**

(71) Applicant: **ATK SPORTS S.R.L.**
41042 Fiorano Modenese (MO) (IT)

(72) Inventors:
- **INDULTI, GIOVANNI**
  41042 FIORANO MODENESE (MO) (IT)
- **SOLARINO, MARCO**
  42122 REGGIO EMILIA (IT)

(74) Representative: **Dall'Olio, Christian et al**
INVENTION S.r.l.
Via delle Armi, 1
40137 Bologna (IT)

(54) TOE-PIECE OF A SKI BINDING FOR SKI MOUNTAINEERING

(57) A toe-piece of a ski binding (1) for ski mountaineering is disclosed, comprising: a base (2); a first jaw (11) rotatably coupled with the base (2); a second jaw (12) rotatably coupled with the base (2); a first pin (21) borne by the first jaw (11); a second pin (22) borne by the second jaw (12); an activating lever (3) rotatably coupled to the base (2) and connected to the first jaw (11) and the second jaw (12) so that, upon rotation of the activating lever (3) in a first rotation direction (A1), the first pin (21) and the second pin (22) move toward one another; a mobile member (4) borne by the base (2) and movable along the base (2); an abutment wall (5) solidly constrained to the mobile member (4); coupling means (13, 14), such as a gear or a cable, for coupling the activating lever (3) and the mobile member (4) to one another in such a way as to transform the rotary motion of the activating lever (3) into a translating motion of the mobile member (4) and vice versa; first elastic means (31) arranged to press against the abutment wall (5) to generate a torque on the activating lever (3) which tends to move the first pin (21) and the second pin (22) toward one another.

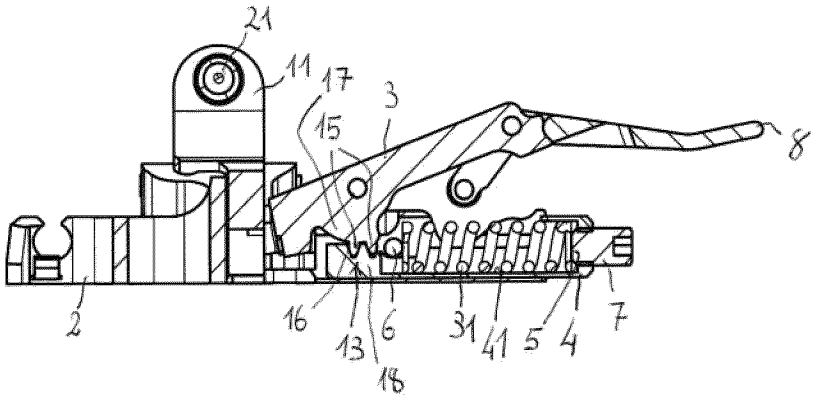

FIG5

EP 4 537 913 A1

Description

[0001] The present invention relates to the technical field of ski bindings for ski mountaineering, with particular reference to a toe-piece of a ski binding for ski mountaineering.

[0002] A toe-piece of a ski binding for ski mountaineering is known from EP 2347807, comprising: a base fixable to a ski; a first jaw rotatably coupled with the base; a second jaw rotatably coupled with the base; a first pin borne by the first jaw to insert into a first lateral hole formed in the tip of a ski boot; a second pin borne by the second jaw to insert into a second lateral hole formed in the tip of the ski boot; a joint; a first pair of springs interposed between the joint and the first jaw; a second pair of springs interposed between the joint and the second jaw; an activating lever rotatably coupled to the base and connected to the first jaw and the second jaw via the joint.

[0003] This toe-piece of a ski binding is designed to achieve at least two stable configurations, namely a configuration ready to receive the ski boot and a downhill skiing configuration.

[0004] In the configuration ready to receive the ski boot, the joint is positioned at a top dead center, and the first pin and the second pin are spaced apart to allow the tip of a ski boot to be inserted between the first pin and the second pin and press against the joint.

[0005] In the downhill skiing configuration, the joint is positioned at a bottom dead center, the first pin is inserted into the first lateral hole of the tip of the ski boot, and the second pin is inserted into the second lateral hole of the tip of the ski boot. In this configuration, the first pin and the second pin are close together.

[0006] To transition from the configuration ready to receive the ski boot to the downhill skiing configuration, the tip of the ski boot must be positioned between the first pin and the second pin and pressed against the joint to move the joint into the bottom dead center. During the lowering of the joint to reach the bottom dead center, the first pair of springs and the second pair of springs are initially compressed, thus exerting an opposing elastic force; this elastic force progressively increases until it reaches a maximum when the axes of the springs lie on a common (substantially horizontal) plane, after which it inverts (i.e., changes sign), thereby contributing to the movement of the joint towards the bottom dead center. During the lowering of the joint towards the bottom dead center, the activating lever rotates in a first direction of rotation.

[0007] To transition from the downhill skiing configuration to the configuration ready to receive the ski boot, the activating lever must be rotated in a second direction of rotation opposite to the first direction of rotation, exerting a predetermined torque, thus bringing the joint to the top dead center. During the lifting of the joint to reach the top dead center, the first pair of springs and the second pair of springs are initially compressed, thus exerting an opposing elastic force; this elastic force progressively increases until it reaches a maximum when the axes of the springs lie on a common (substantially horizontal) plane, after which it inverts (i.e., changes sign), contributing to the movement of the joint towards the top dead center.

[0008] The configuration ready to receive the ski boot can also be achieved during use, i.e., while skiing downhill, following an impact or fall. In this case, the accidental force generated by an impact or fall exceeds the maximum value of the aforementioned reactive elastic force, causing the toe-piece of the ski binding to disengage from the tip of the ski boot to safeguard the skier's safety.

[0009] A drawback of this type of known toe-piece of a ski binding is due to its large size and weight.

[0010] In light of the above, the purpose of the present invention is to overcome the mentioned drawback.

[0011] This objective has been achieved by means of a toe-piece of a ski binding for ski mountaineering in accordance with claim 1.

[0012] It has been found that with this arrangement of the elastic means, it is possible to generate a high rotation torque on the activating lever, which tends to bring the first pin and the second pin closer together. In other words, compared to the known ski binding toe-piece, it is possible to employ elastic means that have a smaller size and weight while generating the same amount of torque on the activating lever, thus making the ski binding toe-piece lighter and more compact.

[0013] Specific embodiments of the invention will be described hereinafter in accordance with the claims and with the aid of the attached drawing sheets, in which:

- Figures 1 and 2 show two different perspective views of a toe-piece of a ski binding for ski mountaineering in accordance with a first embodiment of the invention and in a downhill skiing configuration;
- Figures 3 and 4 show, respectively, a side view and a top view of the ski binding toe-piece of Figures 1 and 2; additionally, Figure 3 shows a ski;
- Figure 5 is a view of section V-V of Figure 4;
- Figures 6 and 7 show two different perspective views of a toe-piece of a ski binding for ski mountaineering in accordance with a second embodiment of the invention and in a downhill skiing configuration;
- Figures 8 and 9 show, respectively, a side view and a top view of the ski binding toe-piece of Figures 6 and 7;
- Figure 10 is a view of section X-X of Figure 9;
- Figures 11 and 12 are two different perspective views of the ski binding toe-piece of Figures 6 and 7, in which the base has been omitted to better visualize other parts;
- Figures 13 and 14 are two views of the same perspective as Figure 11, which differ from it in that additional elements of the ski binding toe-piece have been omitted;
- Figures 15 and 16 show two different perspective

views of a ski binding toe-piece for ski mountaineering in accordance with the second embodiment of the invention and in a configuration ready to receive the ski boot;

- Figures 17 and 18 show, respectively, a side view and a top view of the ski binding toe-piece of Figures 15 and 16;
- Figure 19 is a view of section XIX-XIX of Figure 18;
- Figures 20 and 21 are two different perspective views of the ski binding toe-piece of Figures 15 and 16, in which the base has been omitted to better visualize other parts;
- Figures 22 and 23 are two views of the same perspective as Figure 20, which differ from it in that additional elements of the ski binding toe-piece have been omitted;
- Figures 24 and 25 show two different perspective views of a ski binding toe-piece for ski mountaineering in accordance with a third embodiment of the invention and in a downhill skiing configuration;
- Figures 26 and 27 show, respectively, a side view and a top view of the ski binding toe-piece of Figures 24 and 25;
- Figure 28 is a view of section XXVIII-XXVIII of Figure 27;
- Figure 28A is similar to Figure 28 but represents a variant of this third embodiment, in which the coupling means comprise a first tooth borne by the activating lever and a second tooth borne by the mobile member;
- Figures 29 and 30 are two different perspective views of the ski binding toe-piece of Figures 24 and 25, in which the base has been omitted to better visualize other parts;
- Figure 31 is a view of the same perspective as Figure 29, which differs from it in that additional elements of the ski binding toe-piece have been omitted;
- Figure 32 is a perspective view that differs from the view of Figure 31 in that it was taken from a different perspective and that additional elements of the ski binding toe-piece have been omitted;
- Figures 33 and 34 show two different perspective views of a ski binding toe-piece for ski mountaineering in accordance with a fourth embodiment of the invention and in a downhill skiing configuration;
- Figures 35 and 36 show, respectively, a side view and a top view of the ski binding toe-piece of Figures 33 and 34;
- Figure 37 is a view of section XXXVII-XXXVII of Figure 36;
- Figures 38 and 39 are two different perspective views of the ski binding toe-piece of Figures 33 and 34, in which the base has been omitted to better visualize other parts;
- Figure 40 is a view of the same perspective as Figure 38, which differs from it in that additional elements of the ski binding toe-piece have been omitted;
- Figure 41 differs from Figure 40 only in that it is taken from a different perspective;
- Figures 42 and 43 show two different perspective views of a ski binding toe-piece for ski mountaineering in accordance with a fifth embodiment of the invention and in a downhill skiing configuration;
- Figures 44 and 45 show, respectively, a side view and a top view of the ski binding toe-piece of Figures 42 and 43;
- Figure 46 is a view of section XXXXVI-XXXXVI of Figure 45;
- Figures 47 and 48 are two different perspective views of the ski binding toe-piece of Figures 42 and 43, in which the base has been omitted to better visualize other parts;
- Figure 49 is a view of the same perspective as Figure 47, which differs from it in that additional elements of the ski binding toe-piece have been omitted;
- Figure 50 differs from Figure 49 only in that it is taken from a different perspective.

[0014] With reference to the attached drawing sheets, the object of the present invention has been generically indicated with (1), a toe-piece of a ski binding for ski mountaineering, comprising:

a base (2) fixable to a ski (10);

a first jaw (11) rotatably coupled with the base (2);

a second jaw (12) rotatably coupled with the base (2);

a first pin (21) borne by the first jaw (11) to insert into a first lateral hole formed in the tip of a ski boot (is not illustrated);

a second pin (22) borne by the second jaw (12) to insert into a second lateral hole formed in the tip of the ski boot;

an activating lever (3) rotatably coupled to the base (2) and connected to the first jaw (11) and the second jaw (12) so that to a rotation of the activating lever (3) in a first direction of rotation (A1), the first pin (21) and the second pin (22) move towards each other;

a mobile member (4) borne by the base (2) and movable along the base (2);

an abutment wall (5) solidly constrained to the mobile member (4);

coupling means (13, 14) for coupling the activating lever (3) and the mobile member (4) to each other, so as to transform the rotary motion of the activating lever (3) into a translating motion of the mobile member (4) and vice versa;

first elastic means (31) arranged to press against the

abutment wall (5) to generate a rotation torque on the activating lever (3), which tends to bring the first pin (21) and the second pin (22) closer together.

[0015] The first jaw (11) may be rotatably coupled with the base (2) so as to have only one degree of freedom (Figures 1, 3).

[0016] The rotation axis of the first jaw (11) is preferably parallel to the axis of the ski (10) when the base (2) is fixed to the ski (10) (the ski is shown only in Figure 3).

[0017] The second jaw (12) may be rotatably coupled with the base (2) so as to have only one degree of freedom (Figures 1, 3).

[0018] The rotation axis of the second jaw (12) is preferably parallel to the axis of the ski (10) when the base (2) is fixed to the ski (10).

[0019] The first pin (21) is preferably fixed to the first jaw (11) (Figure 1).

[0020] The second pin (22) is preferably fixed to the second jaw (12) (Figure 4).

[0021] The activating lever (3) may be rotatably coupled with the base (2) so as to have only one degree of freedom (Figures 1, 2).

[0022] The rotation axis of the activating lever (3) may be transverse, preferably perpendicular, to the axis of the ski (10) when the base (2) is fixed to the ski (10).

[0023] There are many known ways to connect the activating lever (3) to the first jaw (11) and to the second jaw (12), as will be clarified later.

[0024] For example, observing Figure 10, the first direction of rotation (A1) may correspond to a counterclockwise direction of rotation around the rotation axis of the activating lever (3).

[0025] Figures 6-23 show one embodiment of the invention: more specifically, Figures 6-14 show a downhill skiing configuration, while Figures 15-23 show a configuration ready to receive the ski boot. In the downhill skiing configuration (and this applies to all the embodiments illustrated in the drawings), the ski boot attached to the first pin (21) and the second pin (22) has not been illustrated to avoid covering features of the invention. Again with reference to this embodiment, Figure 18 shows that the first pin (21) and the second pin (22) are spaced apart so that the ski boot can be inserted between the first pin (21) and the second pin (22); instead, Figure 9 shows that the first pin (21) and the second pin (22) are close together in a position where they have engaged the ski boot (which, as mentioned, is not illustrated).

[0026] The first elastic means (31) preferably include a spring.

[0027] The mobile member (4) may be identified as a carriage (4) (Figures 1-41).

[0028] The coupling means (13, 14) may include a first tooth (131) borne by the activating lever (3) and a second tooth (132) borne by the mobile member (4). The first tooth (131) and the second tooth (132) may be shaped to come into contact with each other, making it possible to transform the rotary motion of the activating lever (3) into a translating motion of the mobile member (4) and vice versa. See, for example, Figure 28A.

[0029] Preferably, the coupling means (13, 14) include a gear (13) defined between the activating lever (3) and the mobile member (4) (Figures 1-32).

[0030] The gear (13) may include at least one tooth (15) borne by the activating lever (3) and at least one recess (16) for receiving the at least one tooth (15) borne by the mobile member (4). In the first embodiment of Figures 1-5, the second embodiment of Figures 6-23, and the third embodiment of Figures 24-32, two teeth (15) borne by the activating lever (3) and two recesses (16) for receiving these two teeth (15) are illustrated. The at least one tooth (15) may be integral with the activating lever (3), as shown in the above-cited figures. The at least one recess (16) may be integral with the mobile member (4).

[0031] An alternative solution (not represented) may differ only in that the at least one tooth (15) may be borne by the mobile member (4), and the at least one recess (16) may be borne by the activating lever (3).

[0032] Preferably, the gear (13) comprises a cogwheel portion (17) borne by the activating lever (3) and a rack (18) borne by the mobile member (4).

[0033] The cogwheel portion (17) may be integral with the activating lever (3), as shown in Figures 1-32.

[0034] The rack (18) may be integral with the mobile member (4), as shown in Figures 1-32.

[0035] Alternatively, the coupling means (13, 14) include a cable (14), which is fixed to the activating lever (3) on one end and solidly constrained to the mobile member (4) on the other end (Figures 33-41 and Figures 42-50).

[0036] The cable may run internally to the first elastic means, preferably coaxial to the first elastic means.

[0037] The cable (14) may be fixed to the activating lever (3) at one end and solidly constrained to the mobile member (4) at the opposite end.

[0038] The ski binding toe-piece (1) may include a preload regulating element (7) for the first elastic means (31), such as a screw.

[0039] The cable (14) may be fixed directly to the mobile member (4) (Figures 42-50) or fixed to the preload regulating element (7) for the first elastic means (31), which in turn may be coupled to the mobile member (4), as will be specified below (Figures 33-41).

[0040] Preferably, the mobile member (4) is movable along a translation axis that is parallel to the axis of the ski (10) when the base (2) is fixed to the ski (10).

[0041] The mobile member (4) may be provided with a first seat (41) (Figures 5, 10, 19) for receiving the first elastic means (31) (first embodiment of Figures 1-5, second embodiment of Figures 6-23, and fourth embodiment of Figures 33-41).

[0042] The first elastic means (31) may be interposed between the abutment wall (5) and the base (2): see the first embodiment of Figures 1-5, the second embodiment of Figures 6-23, the fourth embodiment of Figures 33-41, and the fifth embodiment of Figures 42-50, where the first elastic means (31) contact a pin (6) forming part of the

base (2).

[0043] The preload regulating element (7) for the first elastic means (31) may be borne by the mobile member (4); in this case, the abutment wall (5) is part of the mobile member (4) (fourth embodiment of Figures 33-41) or is part of the preload regulating element (7) for the first elastic means (31) (first embodiment of Figures 1-5 and second embodiment of Figures 6-23).

[0044] In particular, the preload regulating element (7) for the first elastic means (31) may be coupled to a threaded portion (not illustrated) formed in the mobile member (4) (first embodiment of Figures 1-5, second embodiment of Figures 6-23, and fourth embodiment of Figures 33-41).

[0045] Alternatively, the preload regulating element (7) for the first elastic means (31) may be borne directly by the base (2); in this case, the abutment wall (5) is part of the mobile member (4), and the first elastic means (31) are interposed between the abutment wall (5) and the preload regulating element (7) for the first elastic means (31) (see the third embodiment of Figures 24-32 and the related variant of Figure 28A).

[0046] In particular, the preload regulating element (7) for the first elastic means (31) may be coupled to a threaded portion (not illustrated) formed in the base (2) (third embodiment of Figures 24-32).

[0047] The base (2) may be provided with a second seat (42) (Figure 28) for receiving the first elastic means (31) (third embodiment of Figures 24-32 and the related variant of Figure 28A).

[0048] Preferably, the activating lever (3) is coupled to the first jaw (11) via a first spherical coupling (51), and the activating lever (3) is coupled to the second jaw (12) via a second spherical coupling (52), so that to a rotation of the activating lever (3), there corresponds a rotation of the first jaw (11) and the second jaw (12), and vice versa.

[0049] The first jaw (11) may be provided with a third seat (43), which forms a first partially spherical cavity; the second jaw (12) may be provided with a fourth seat (44), which forms a second partially spherical cavity; the activating lever (3) may bear a first spherical portion (61) and a second spherical portion (62) to engage respectively in the first partially spherical cavity and the second partially spherical cavity.

[0050] The first spherical portion (61) may include a first protruding element (71), for example, cylindrical, which protrudes from a first end (91) of the activating lever (3), and a first covering (81) having the shape of a spherical portion that covers the first protruding element (71).

[0051] The second spherical portion (62) may include a second protruding element (72), for example, cylindrical, which protrudes from the first end (91) of the activating lever (3), and a second covering (82) having the shape of a spherical portion that covers the second protruding element (72).

[0052] The spherical coupling between the activating lever (3) and the first jaw (11) and the second jaw (12) optimizes the motion transfer from the activating lever (3) to the first jaw (11) and the second jaw (12), and vice versa.

[0053] Alternatively, the first spherical portion (61) may be borne by the first jaw (11), the second spherical portion (62) may be borne by the second jaw (12), while the first partially spherical cavity and the second partially spherical cavity may be formed in the activating lever (3) (solution not represented).

[0054] Other types of coupling between the activating lever (3) and the first jaw (11) and the second jaw (12) are also possible: for example, a joint (not represented), similar to that disclosed in EP2347807, cited in the introduction, may be interposed between the activating lever (3) on one side and the first jaw (11) and the second jaw (12) on the other side.

[0055] Preferably, the ski binding toe-piece (1) comprises: a support (9) borne by the first jaw (11) and by the second jaw (12); an interference lever (19) rotatably borne by the support (9); second elastic means (32) interposed between the support (9) and the interference lever (19) to move the interference lever (19) away from the support (9). Additionally, the base (2) comprises a lever abutment (20) (Figures 10, 19) and a housing (23) (Figures 10, 19) for receiving the interference lever (19). The support (9), the interference lever (19), the second elastic means (32), and the base (2) are configured such that when the activating lever (3) is rotated in a second rotation direction, which is opposite to the first rotation direction (A1), to move the first pin (21) and the second pin (22) apart from each other, the interference lever (19) exits the housing (23), moves away from the support (9) due to the effect of the second elastic means (32), and rests on the lever abutment (20), thereby stabilizing the position of the activating lever (3) and preventing it from rotating in the first rotation direction (A1) due to the action of the first elastic means (31).

[0056] The ski binding toe-piece (1) may comprise, as known, a locking lever (8) rotatably borne by the activating lever (3), allowing the activating lever (3) to be locked in the downhill skiing configuration, thus enabling uphill walking.

[0057] The support (9) may be coupled by interlocking or interference with the first jaw (11) and the second jaw (12).

[0058] The support (9) may comprise a third protruding element and a fourth protruding element (both not visible in the figures); the first jaw (11) may comprise a fifth seat (45) (visible in Figures 14, 23), while the second jaw (12) may comprise a sixth seat (not visible). The third protruding element may interlock or engage by interference with the fifth seat (45), while the fourth protruding element may interlock or engage by interference with the sixth seat.

[0059] In the following, specific reference will be made to the embodiments illustrated in the drawings: the first embodiment is illustrated in Figures 1-5 and shows the ski binding toe-piece (1) in a downhill skiing configuration; the second embodiment is illustrated in Figures 6-23

and shows both the ski binding toe-piece (1) in a downhill skiing configuration (Figures 6-14) and the ski binding toe-piece (1) in a configuration ready to receive the ski boot (Figures 15-23); the third embodiment is illustrated in Figures 24-32 and shows the ski binding toe-piece (1) in a downhill skiing configuration; the variant of the third embodiment is illustrated in Figure 28A and shows the ski binding toe-piece (1) in a downhill skiing configuration; the fourth embodiment is illustrated in Figures 33-41 and shows the ski binding toe-piece (1) in a downhill skiing configuration; and finally, the fifth embodiment is illustrated in Figures 42-50 and shows the ski binding toe-piece (1) in a downhill skiing configuration.

[0060] In the first embodiment, the ski binding toe-piece (1) has only one stable configuration, which is the downhill skiing configuration. To attach the ski boot to the first pin (21) and the second pin (22), starting from the downhill skiing configuration illustrated in Figures 1-5, the activating lever (3) must be manually rotated in the second direction of rotation so that the first pin (21) and the second pin (22) move apart, and the tip of the ski boot must be inserted between the first pin (21) and the second pin (22). At this point, the activating lever (3) can be released, and it will tend to rotate in the first direction of rotation (A1) due to the action of the first elastic means (31), with the result that the first pin (21) is inserted into the first lateral hole formed in the tip of the ski boot, and the second pin (22) is inserted into the second lateral hole formed in the tip of the ski boot.

[0061] In this first embodiment: the coupling means (13) include the gear (13) defined between the activating lever (3) and the mobile member (4); the mobile member (4) receives the first elastic means (31) in the first seat (41); the preload regulating element (7) for the first elastic means (31) is borne by the mobile member (4); the abutment wall (5) is part of the preload regulating element (7) for the first elastic means (31); the first elastic means (31) are interposed between the base (2) (pin (6)) and the preload regulating element (7) for the first elastic means (31).

[0062] In the second embodiment, the ski binding toe-piece (1) has two stable configurations, namely the downhill skiing configuration and the configuration ready to receive the ski boot.

[0063] In this second embodiment: the coupling means (13) include the gear (13) defined between the activating lever (3) and the mobile member (4); the mobile member (4) receives the first elastic means (31) in the first seat (41); the preload regulating element (7) for the first elastic means (31) is borne by the mobile member (4); the abutment wall (5) is part of the preload regulating element (7) for the first elastic means (31); the first elastic means (31) are interposed between the base (2) and the preload regulating element (7) for the first elastic means (31).

[0064] In the third embodiment, the ski binding toe-piece (1) also has two stable configurations, namely the downhill skiing configuration and the configuration ready to receive the ski boot (not illustrated).

[0065] In this third embodiment: the coupling means (13, 14) include the gear (13) defined between the activating lever (3) and the mobile member (4); the base (2) receives the first elastic means (31) in the second seat (42); the preload regulating element (7) for the first elastic means (31) is borne by the base (2); the elastic means are interposed between the mobile member (4) and the preload regulating element (7) for the first elastic means (31); the abutment wall (5) is part of the mobile member (4); the first pin (21) and the second pin (22) are interposed between the second seat (42) of the base (2) and the activating lever (3).

[0066] The variant of the third embodiment illustrated in Figure 28A shows that the coupling means (13, 14) may alternatively include a first tooth (131) and a second tooth (132), which may interact with each other, still enabling the transformation of the rotary motion of the activating lever (3) into a translating motion of the mobile member (4) and vice versa. Although illustrated, the second elastic means (32) may not be present.

[0067] In the fourth embodiment, the ski binding toe-piece (1) also has two stable configurations, namely the downhill skiing configuration and the configuration ready to receive the ski boot (not illustrated).

[0068] In this fourth embodiment: the coupling means (14) include the cable (14); the mobile member (4) receives the first elastic means (31) in the first seat (41); the preload regulating element (7) for the first elastic means (31) is borne by the mobile member (4); the abutment wall (5) is part of the mobile member (4); the elastic means are interposed between the base (2) and the mobile member (4). Unlike the other embodiments, unscrewing the preload regulating element from the mobile member (4) causes the compression of the first elastic means (31).

[0069] Even in the fifth embodiment, the ski binding toe-piece (1) has two stable configurations, namely the downhill skiing configuration and the configuration ready to receive the ski boot (not illustrated).

[0070] In this fifth embodiment: the coupling means (14) include the cable (14); the elastic means are interposed between the base (2) and the mobile member (4); the abutment wall (5) is part of the mobile member (4); there is no preload regulating element (7) for the first elastic means (31).

[0071] It is understood that the above has been described by way of example and not limitation, so any constructive variants are understood to fall within the scope of protection of the present technical solution as claimed hereinafter.

Claims

1. A toe-piece of a ski binding (1) for ski mountaineering, comprising:

   a base (2) which is fixable to a ski (10);
   a first jaw (11) which rotatably couples with the

base (2);
a second jaw (12) which rotatably couples with the base (2);
a first pin (21) which is borne by the first jaw (11) for inserting in a first lateral hole fashioned in a tip of a ski boot;
a second pin (22) which is borne by the second jaw (12) for inserting in a second lateral hole fashioned in the tip of the ski boot;
an activating lever (3) which is rotatably coupled to the base (2) and which is connected to the first jaw (11) and to the second jaw (12), so that to a rotation of the activating lever (3) in a first rotation direction (A1) there corresponds a moving of the first pin (21) and the second pin (22) towards one another;
characterised in that it comprises:

a mobile member (4) which is borne by the base (2) and which is movable along the base (2);
an abutment wall (5) which is solidly constrained to the mobile member (4);
coupling means (13, 14) for coupling the activating lever (3) and the mobile member (4) to one another, in such a way as to transform the rotary motion of the activating lever (3) into a translating motion of the mobile member (4), and vice versa;
first elastic means (31) which are arranged so as to press against the abutment wall (5), to thus generate a rotation torque on the activating lever (3) which tends to move the first pin (21) and the second pin (22) towards one another.

2. The toe-piece of the ski binding (1) for ski mountaineering of the preceding claim, wherein the mobile member (4) is identified as a carriage (4).

3. The toe-piece of the ski binding (1) for ski mountaineering of claim 1 or 2, wherein the coupling means (13, 14) comprise a gearing (13) defined between the activating lever (3) and the mobile member (4).

4. The toe-piece of the ski binding (1) for ski mountaineering of the preceding claim, wherein the gearing (13) comprises a portion of cogwheel (17) borne by the activating lever (3) and a rack (18) borne by the mobile member (4).

5. The toe-piece of the ski binding (1) for ski mountaineering of claim 1 or 2, wherein the coupling means (13, 14) comprise a cable (14) which on one side is fixed to the activating lever (3) and which on another side is solidly constrained to the mobile member (4).

6. The toe-piece of the ski binding (1) for ski mountaineering of any one of the preceding claims, wherein the mobile member (4) is movable along a translation axis which is parallel to the axis of the ski (10) when the base (2) is fixed to the ski (10).

7. The toe-piece of the ski binding (1) for ski mountaineering of any one of the preceding claims, wherein the mobile member (4) is provided with a first seat (41) for receiving the first elastic means (31).

8. The toe-piece of the ski binding (1) for ski mountaineering of the preceding claim, wherein the first elastic means (31) are interposed between the abutment wall (5) and the base (2).

9. The toe-piece of the ski binding (1) for ski mountaineering of any one of the preceding claims, wherein: it comprises a preload regulating element (7) of the first elastic means (31) which is borne by the mobile member (4); the abutment wall (5) is a part of the mobile member (4) or is a part of the preload regulating element (7) of the first elastic means (31).

10. The toe-piece of the ski binding (1) for ski mountaineering of any one of claims from 1 to 6, wherein the base (2) is provided with a second seat (42) for receiving the first elastic means (31).

11. The toe-piece of the ski binding (1) for ski mountaineering of the preceding claim, wherein it comprises a preload regulating element (7) of the first elastic means (31) which is borne directly by the base (2); the abutment wall (5) is a part of the mobile member (4) and the first elastic means (31) are interposed between the abutment wall (5) and the preload regulating element (7) of the first elastic means (31).

12. The toe-piece of the ski binding (1) for ski mountaineering of any one of the preceding claims, wherein the activating lever (3) is coupled to the first jaw (11) by means of a first spherical coupling (51) and wherein the activating lever (3) is coupled to the second jaw (12) by means of a second spherical coupling (52), so that to a rotation of the activating lever (3) there corresponds a rotation of the first jaw (11) and the second jaw (12), and vice versa.

13. The toe-piece of the ski binding (1) for ski mountaineering of any one of the preceding claims, wherein:

it comprises a support (9) which is borne by the first jaw (11) and by the second jaw (12);
it comprises an interference lever (19) which is rotatably borne by the support (9);
it comprises second elastic means (32) which are interposed between the support (9) and the interference lever (19) for moving the interference lever (19) away from the support (9);

the base (2) comprises a lever abutment (20) and a housing (23) for receiving the interference lever (19);
the support (9), the interference lever (19), the second elastic means (32) and the base (2) are configured in such a way that when the activating lever (3) is rotated in a second rotation direction which is opposite the first rotation direction (A1), in order to move the first pin (21) and the second pin (22) away from one another, the interference lever (19) exits from the housing (23), moves away from the support (9) by effect of the second elastic means (32) and becomes arranged resting on the lever abutment (20), thus stabilising the position of the activating lever (3) and preventing the activating lever (3) from rotating in the first rotation direction (A1) by effect of the action of the first elastic means (31).

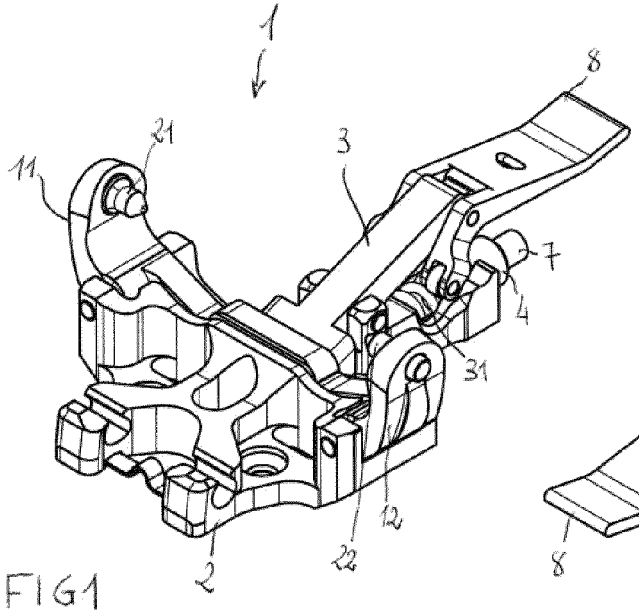

FIG1

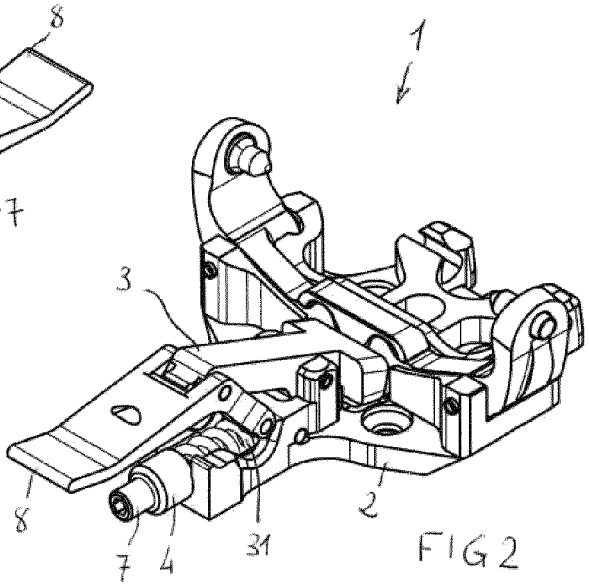

FIG2

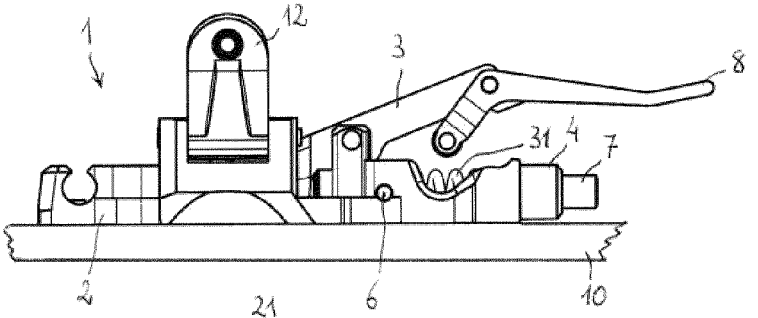

FIG3

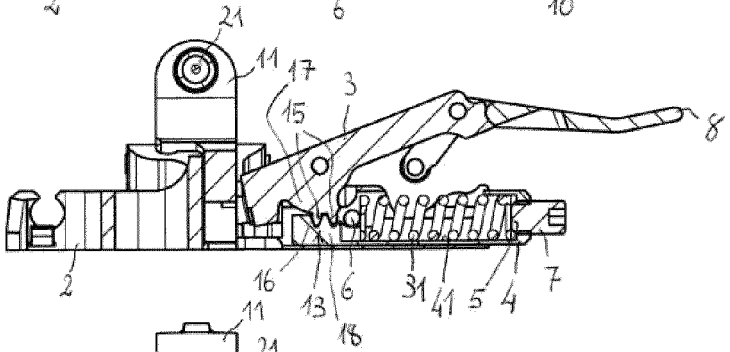

FIG5

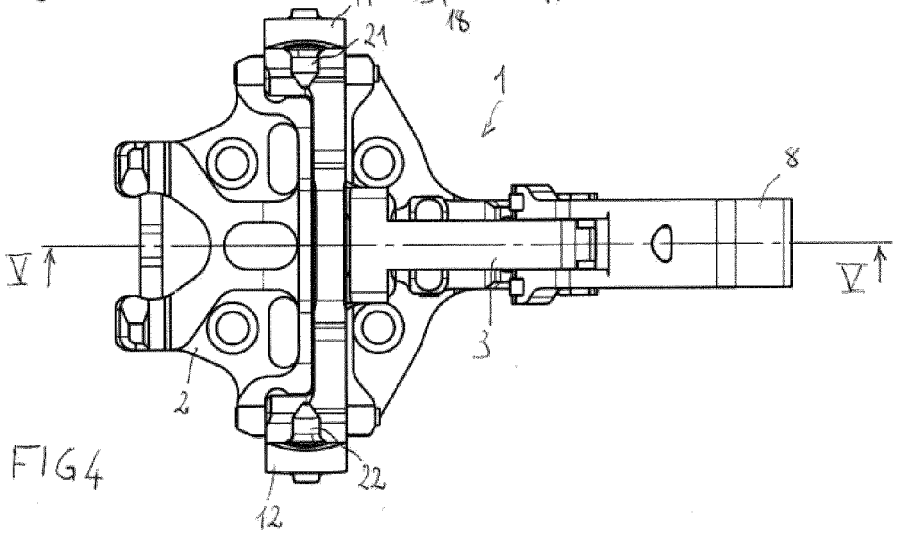

FIG4

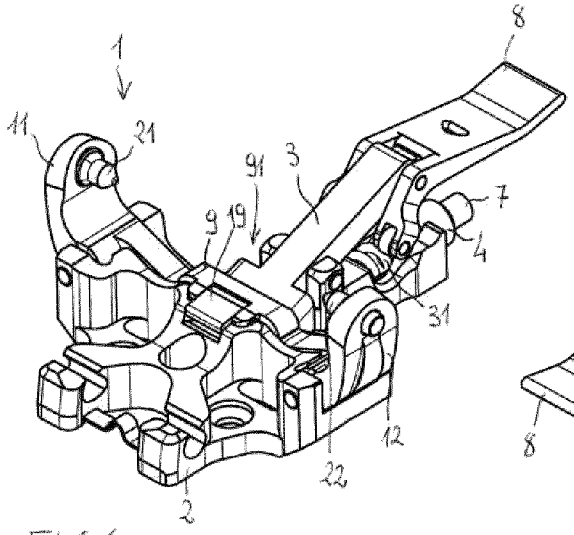

FIG6

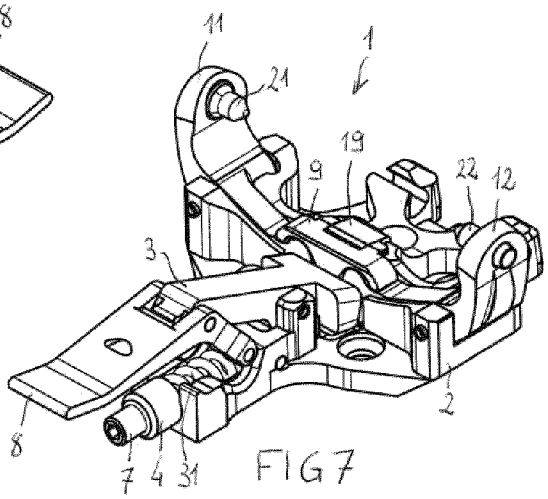

FIG7

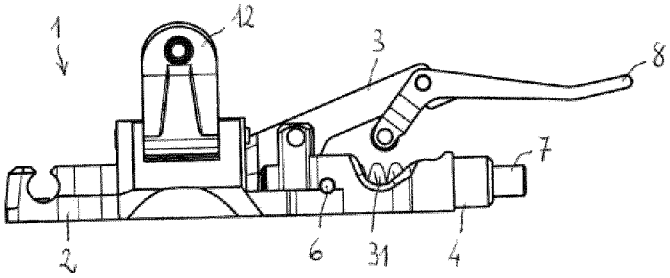

FIG8

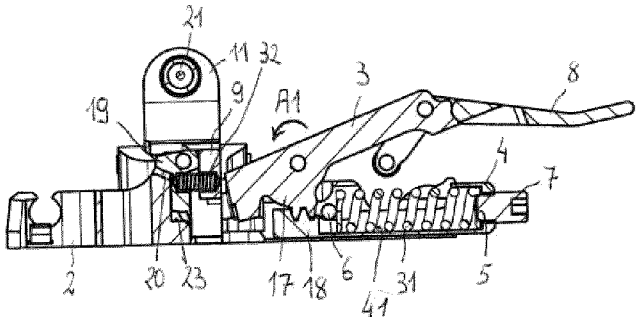

FIG10

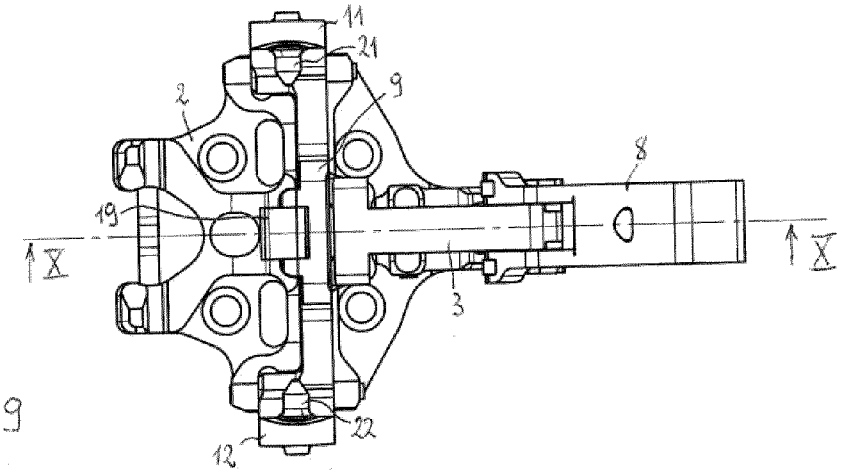

FIG9

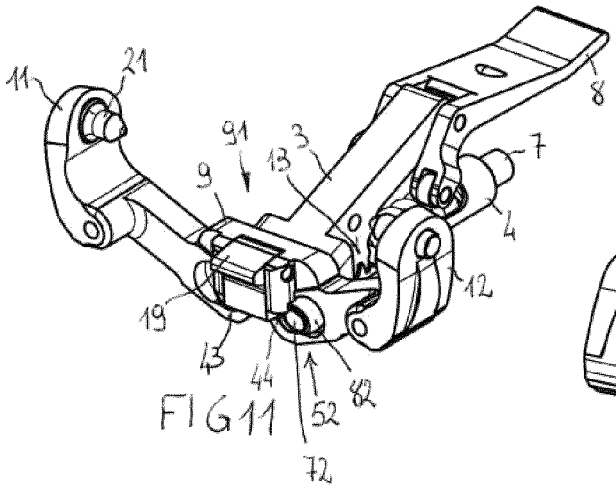

FIG11

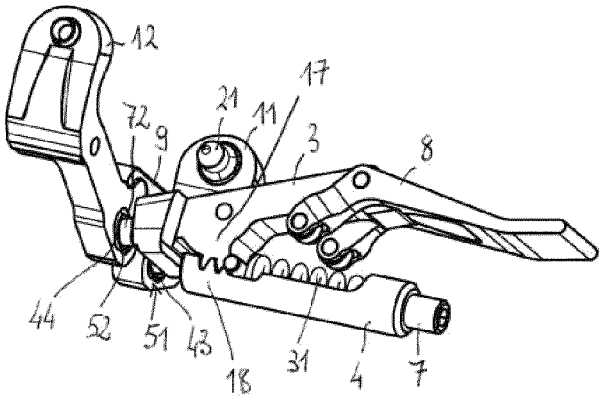

FIG12

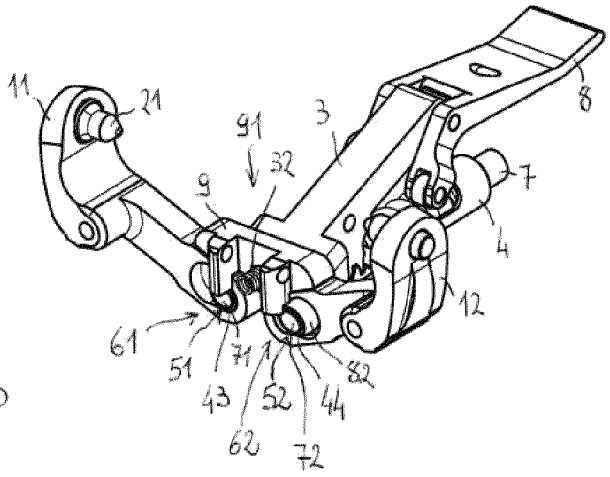

FIG13

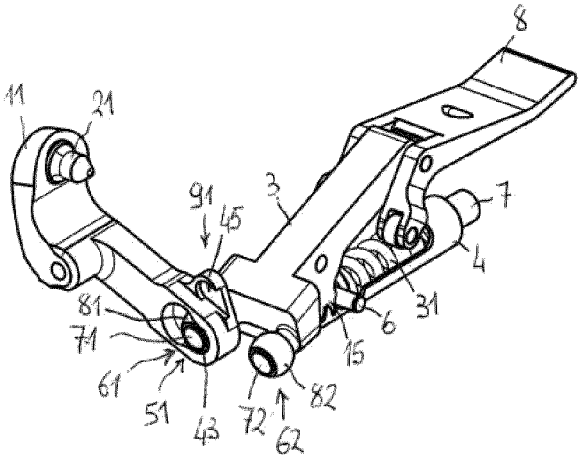

FIG14

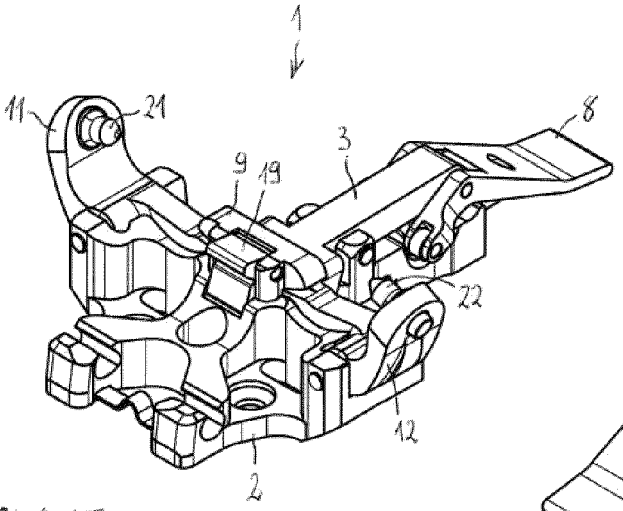

FIG 15

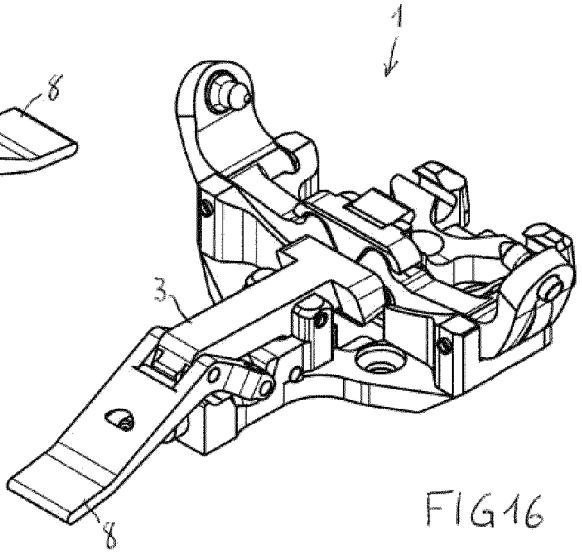

FIG 16

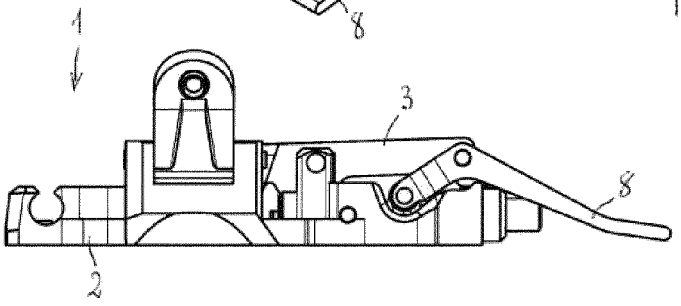

FIG 17

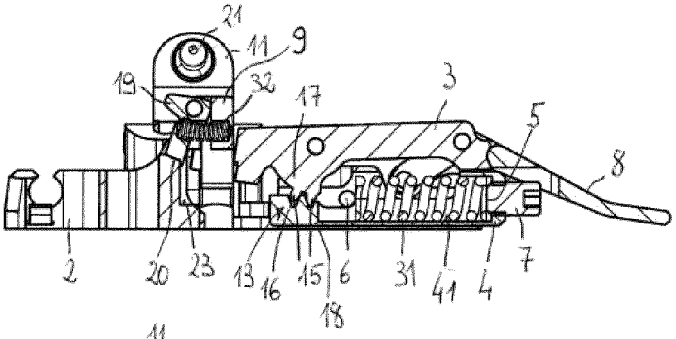

FIG 19

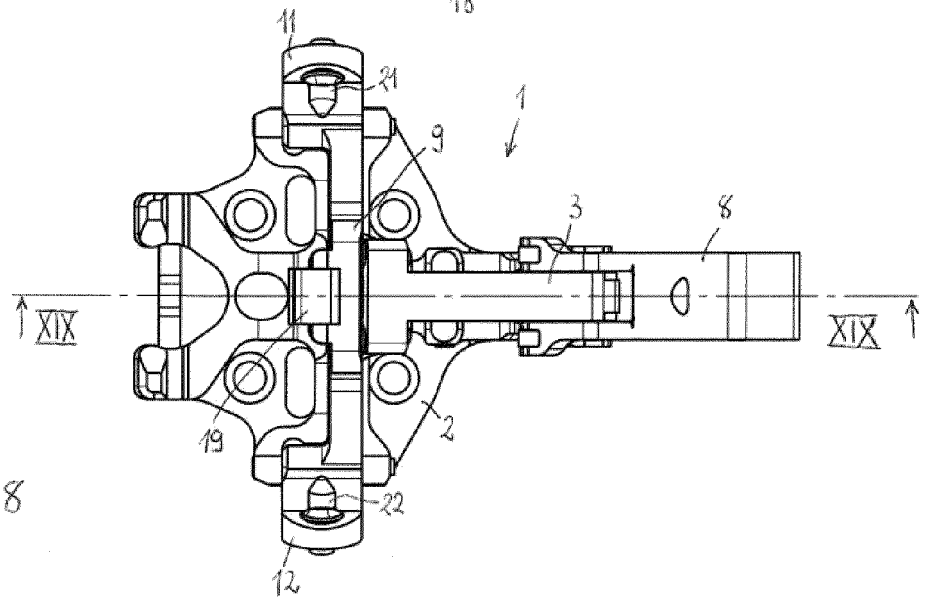

FIG 18

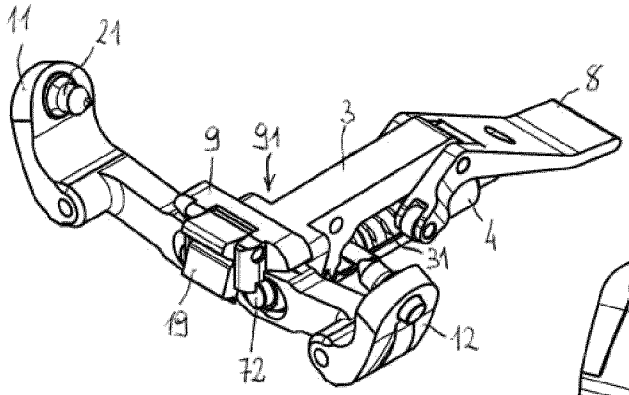

FIG20

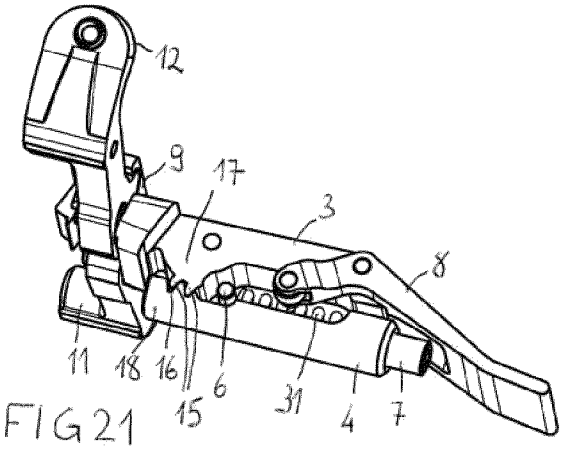

FIG21

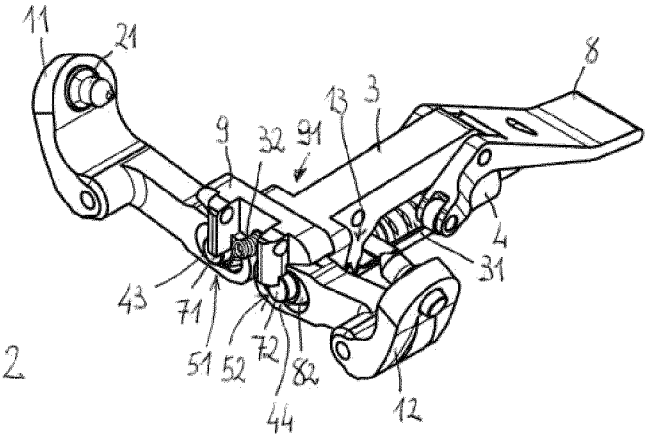

FIG22

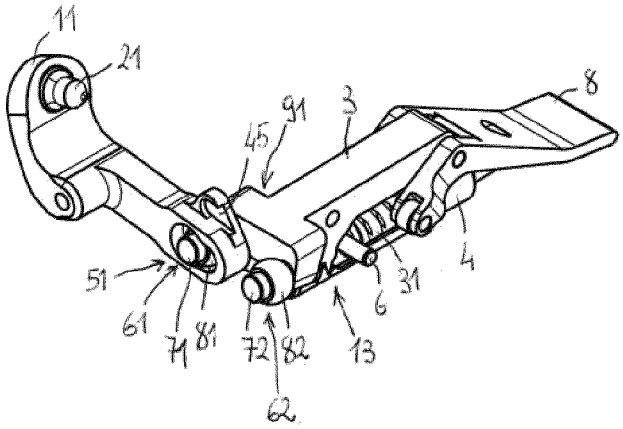

FIG23

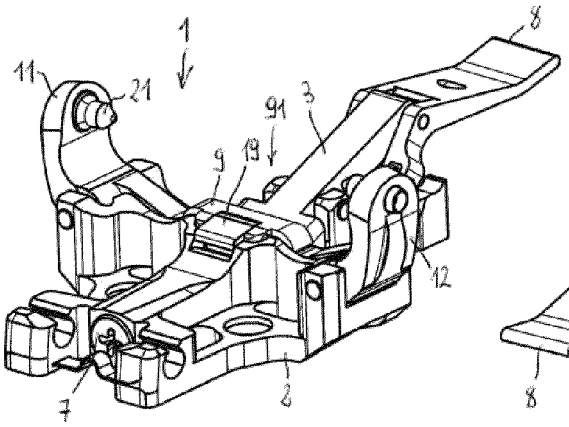

FIG24

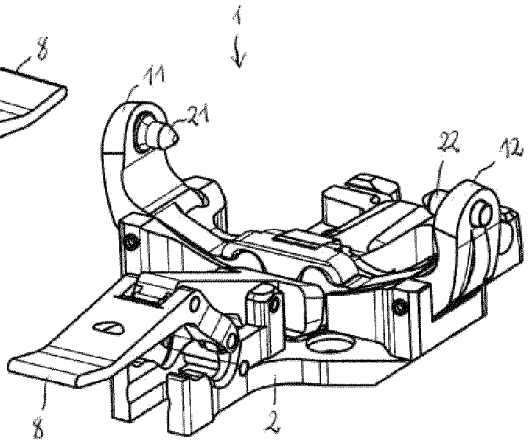

FIG25

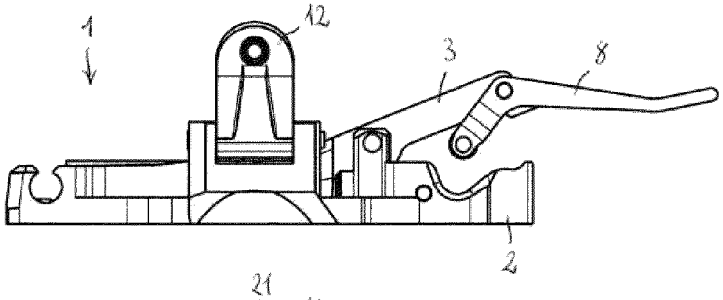

FIG26

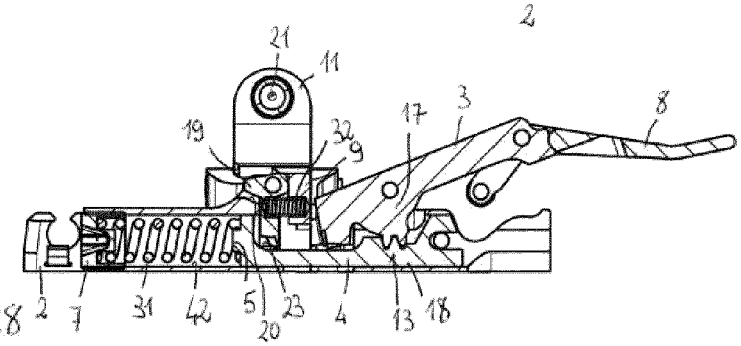

FIG28

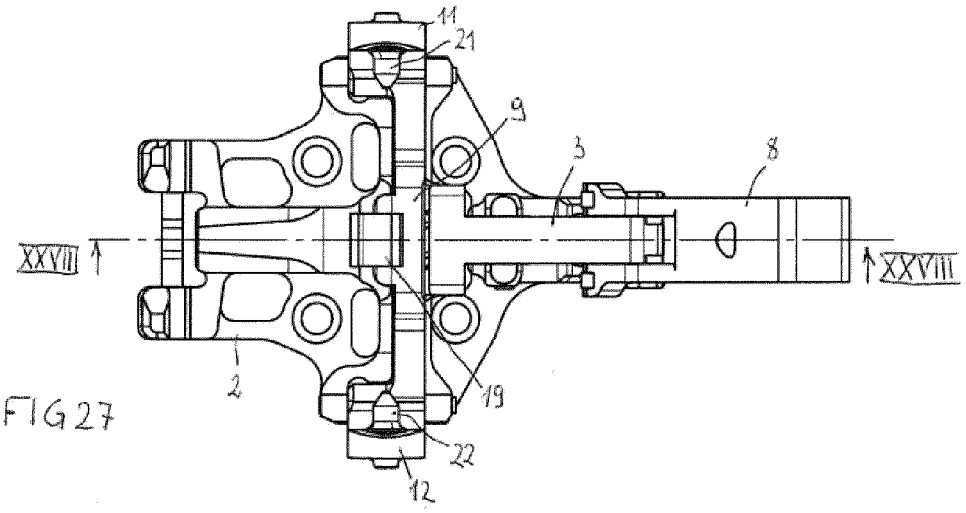

FIG27

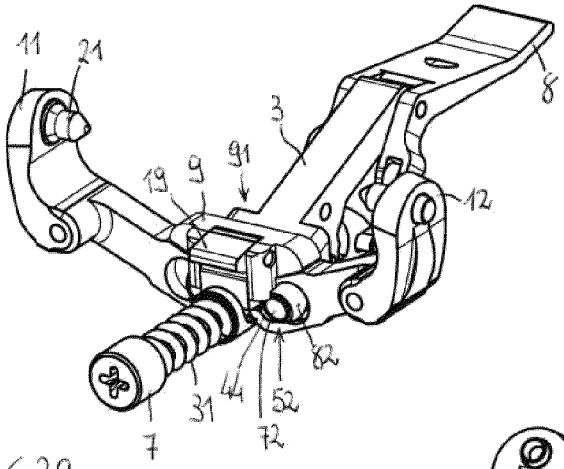

FIG29

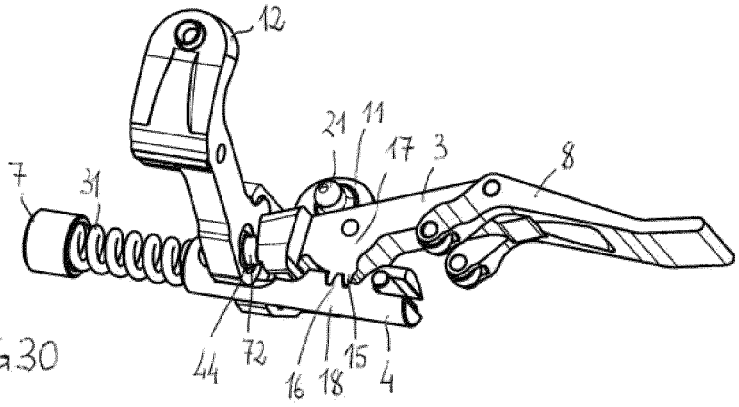

FIG30

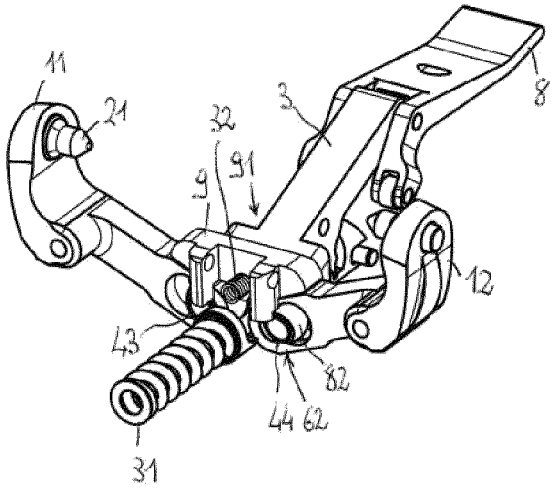

FIG31

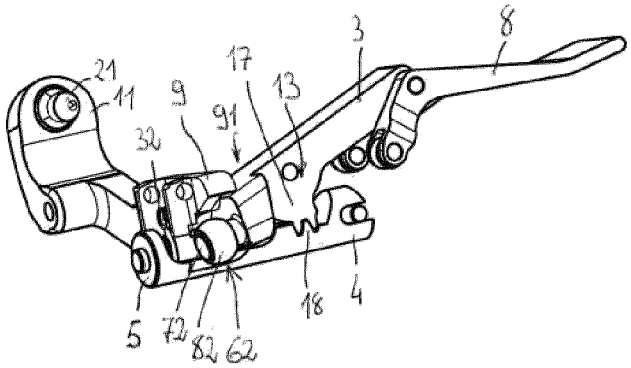

FIG32

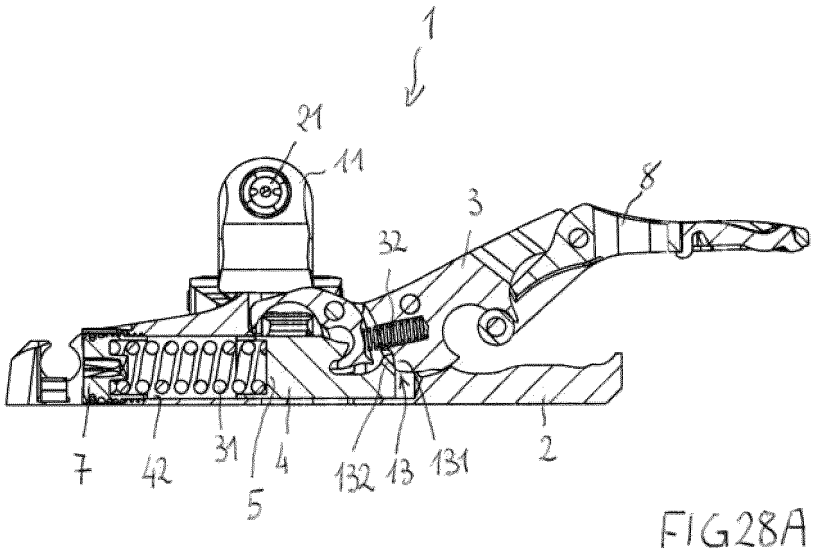

FIG28A

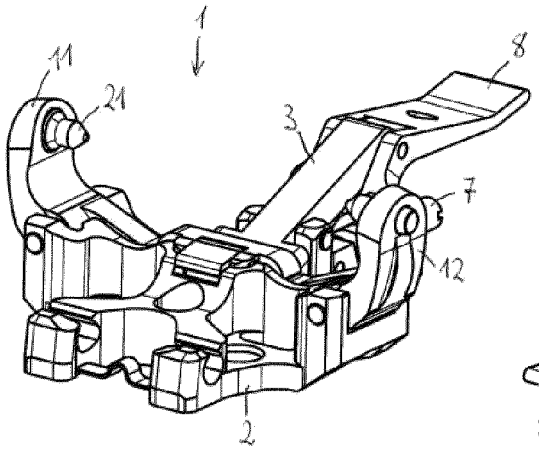

FIG33

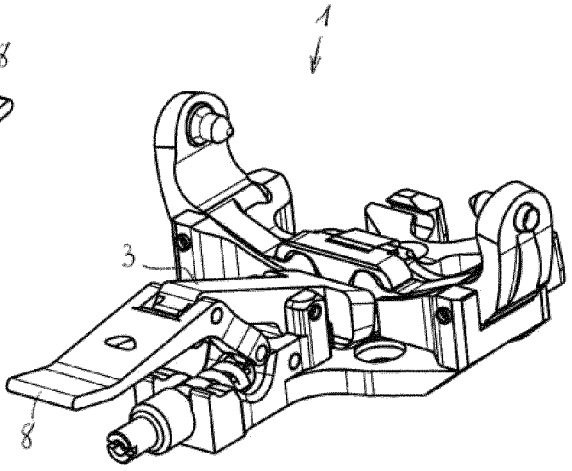

FIG34

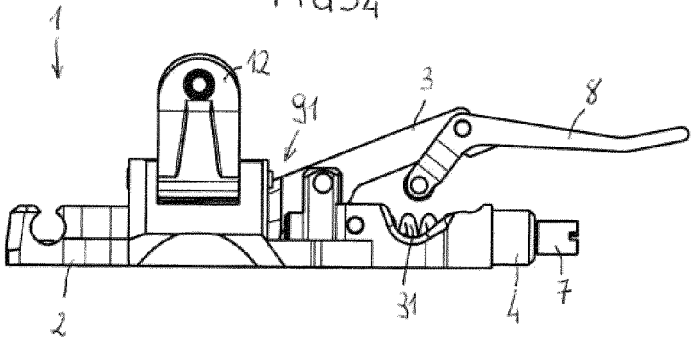

FIG35

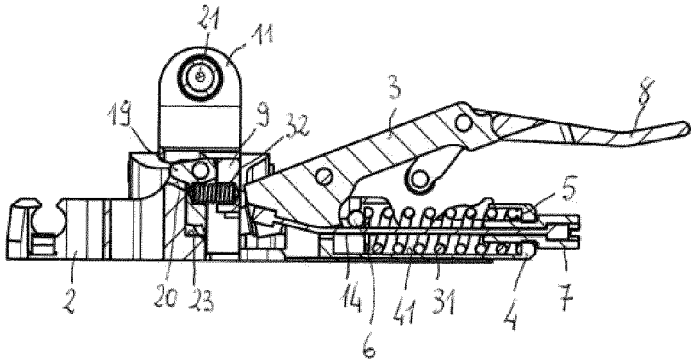

FIG37

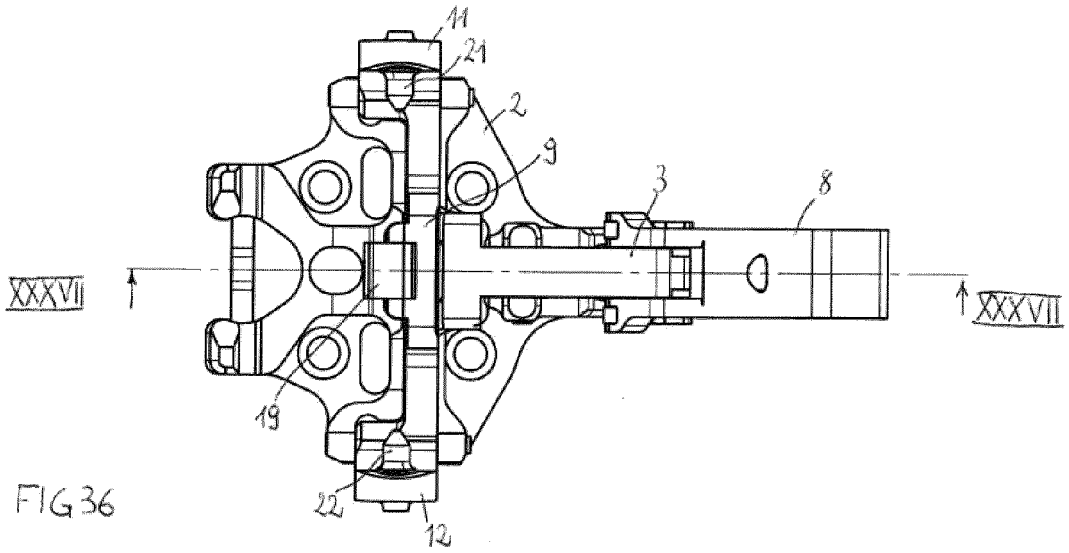

FIG36

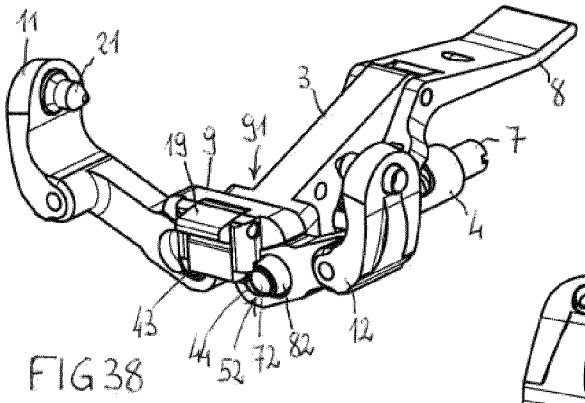

FIG 38

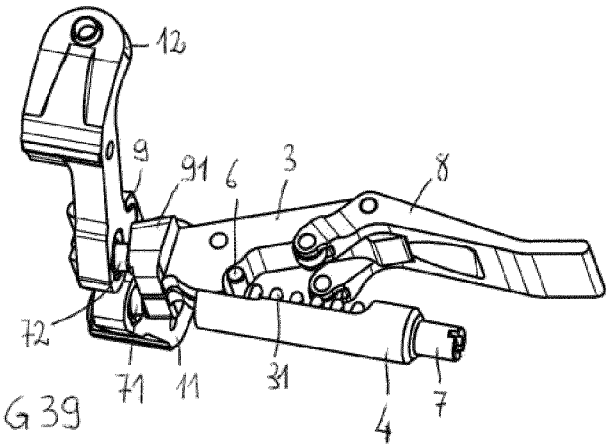

FIG 39

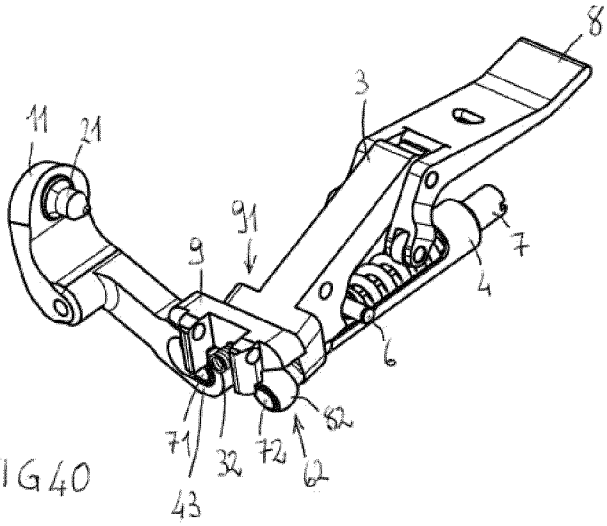

FIG 40

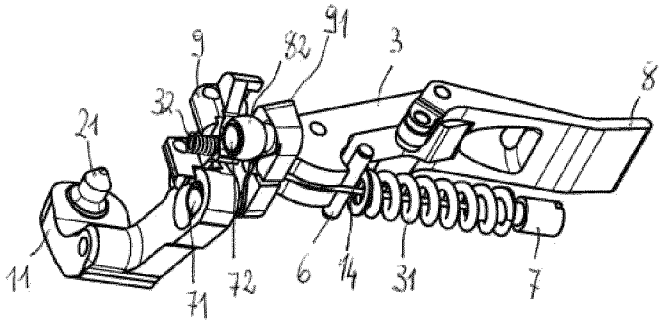

FIG 41

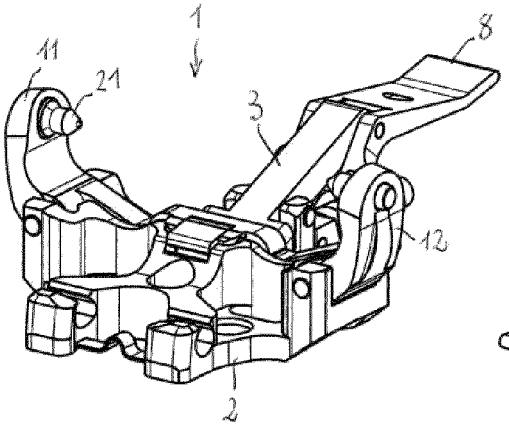

FIG42

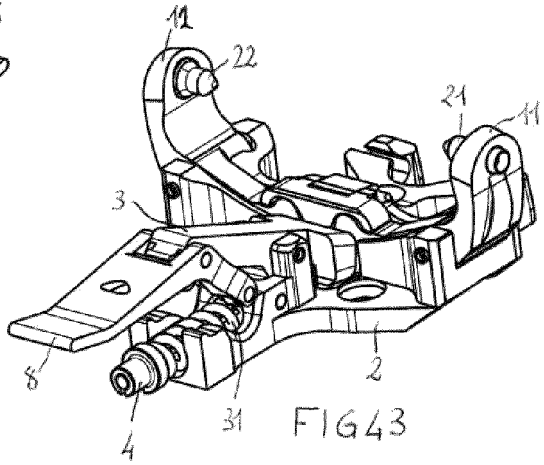

FIG43

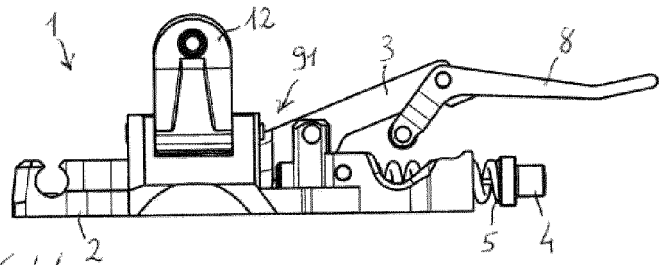

FIG44

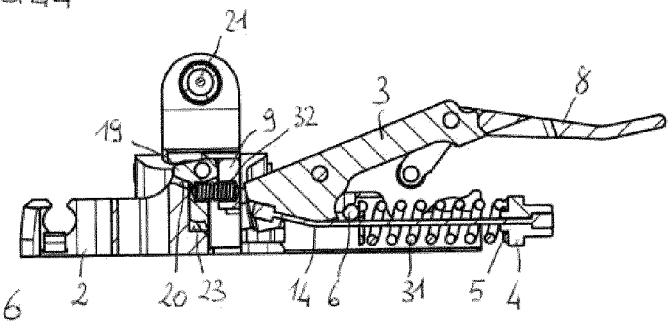

FIG46

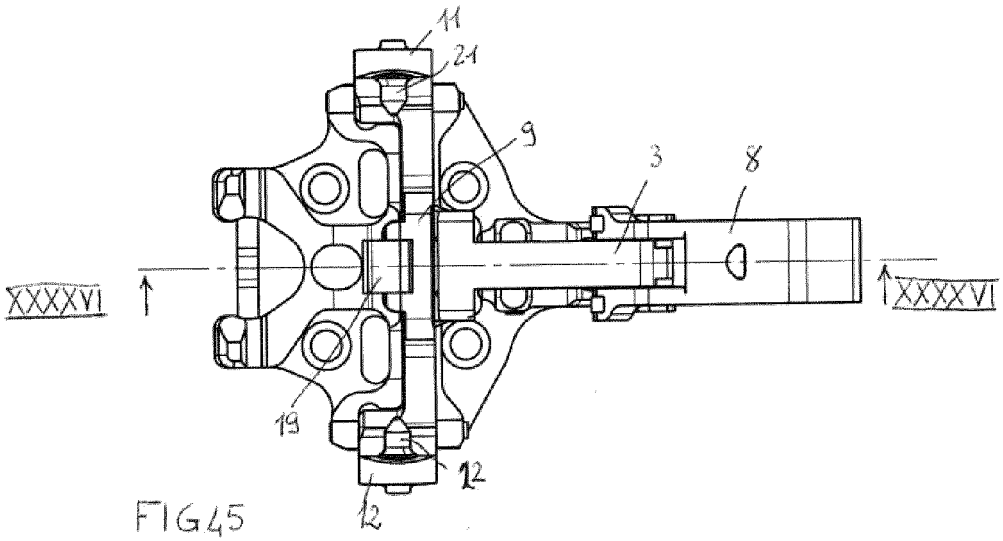

FIG45

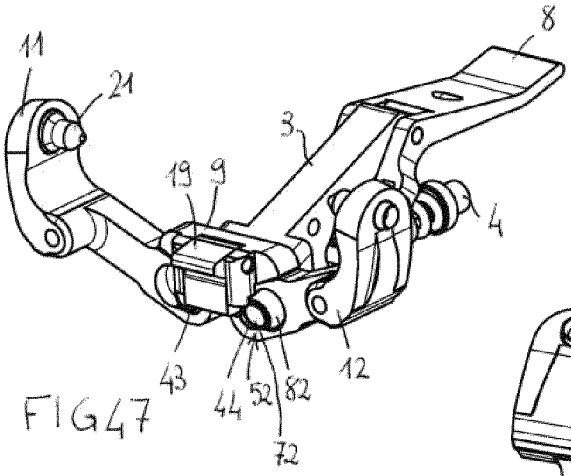

FIG47

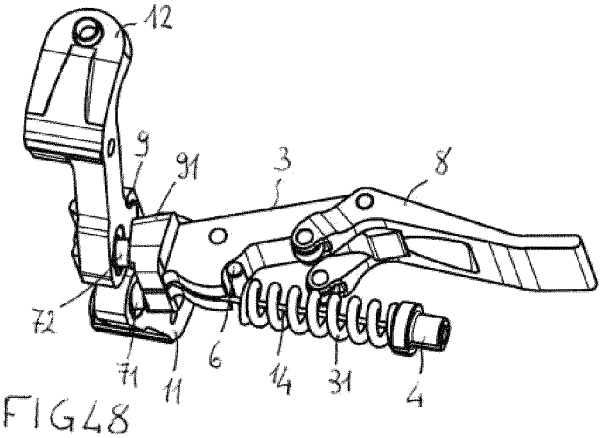

FIG48

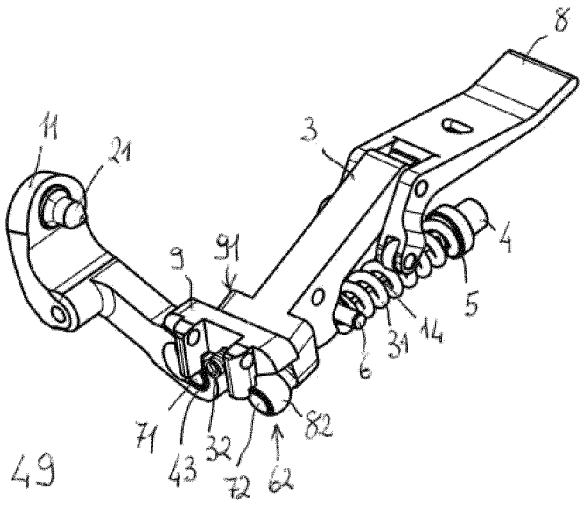

FIG49

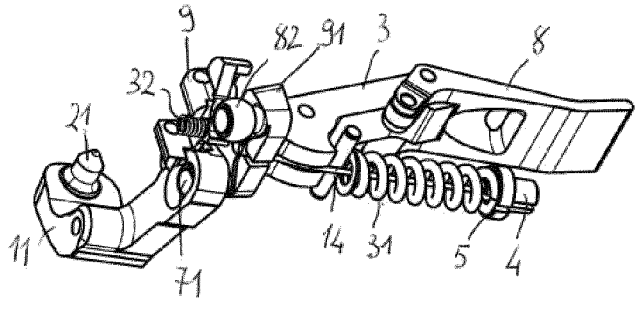

FIG50

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 24 20 5808

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 4 119 205 A1 (ATK SPORTS S R L [IT]) 18 January 2023 (2023-01-18) * paragraph [0008] - paragraph [0057]; figures *	1,2,6,7, 9-11	INV. A63C9/08 A63C9/086 A63C9/085
X	EP 3 266 504 A1 (FRITSCHI AG - SWISS BINDINGS [CH]) 10 January 2018 (2018-01-10) * paragraph [0085] - paragraph [0134]; figures 1,3a-5b *	1,2,6-10	
A	DE 10 2013 003839 A1 (ZOOR REINHOLD [DE]) 11 September 2014 (2014-09-11) * the whole document *	1-13	

TECHNICAL FIELDS SEARCHED (IPC)

A63C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	6 February 2025	Endrizzi, Silvio

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)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 24 20 5808

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.

06-02-2025

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 4119205 A1	18-01-2023	EP 4119205 A1	18-01-2023
		US 2023016853 A1	19-01-2023
EP 3266504 A1	10-01-2018	NONE	
DE 102013003839 A1	11-09-2014	AT 514044 A2	15-09-2014
		CH 707718 A2	15-09-2014
		DE 102013003839 A1	11-09-2014

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 2347807 A **[0002] [0054]**