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(54) **A jointed heel piece for an alpine ski binding**

Absatzstück für eine Abfahrtsskibindung

Pièce de talon pour fixation de ski alpin

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(73) Proprietor: **Atk Race S.R.L.**
**41042 Fiorano Modenese (MO) (IT)**

(72) Inventor: **Indulti, Giovanni**
**41042, FIORANO MODENESE (MODENA) (IT)**

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

(56) References cited:
**WO-A1-2009/105866** **AT-B- 402 020**

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## Description

**[0001]** The invention relates to the technical sector of bindings for Alpine skiing.

**[0002]** As is known, Alpine skiing is a sporting discipline in which the athlete re-ascends using the skis, from a point downhill up to a predetermined point from which he or she will newly descend with the skis, either on- or off-piste, using conventional skiing techniques.

**[0003]** WO 2009/105866 A1 discloses an alpine touring binding.

**[0004]** In order to enable re-ascent with skis attached, without sliding backwards, sealskins are applied to the underneath of the skis, while the attachments and ski-boots have to be specially conformed in order to assume two operating positions, respectively for ascending and descending.

**[0005]** In the ascending position, each boot is hinge-constrained, by the front part only, to the toe piece, while the heel piece of the attachment is predisposed such as not to hook with the rear part of the boot; the boot can therefore oscillate about an axis which is transversal to the ski, such as to enable rising of the heel from the ski platform during each step made by the athlete.

**[0006]** In the descending position, the heel pieces block the rear parts of the relative boots, which thus become solidly constrained to the ski, enabling the athlete to guide the skis.

**[0007]** Both the toe piece and the heel piece are provided, in a known way, with safety hooks in a case of the athlete's falling.

**[0008]** In the most commonly used system for hooking the rear part of the ski boot to the heel piece, two horizontal pins are present, substantially parallel, positioned at a predetermined height from the ski platform, facing towards the toe piece and subjected to elastic means which maintain them in a minimum interaxial position.

**[0009]** In the boot, at the rear vertical side of the heel, an undercut is realised in which a wedge-shaped metal plate is fixed, destined, following downwards pressure exerted on the boot, to insert between the pins and cause them to splay; after passing beyond the plate the pins snap-fit to the plate above it, thus blocking the boot to the ski.

**[0010]** To arrange the heel piece in the ascent position, in some models a tilting element is provided, hinged to the heel piece, which is rotated such as to be positioned above the pins and to cover them, such as to prevent them from hooking to the boot.

**[0011]** All the heel piece models are provided with a vertical-axis joint which enables a safety unhooking which enables rotation between the upper block, bearing the pins, and the base fixed to the ski; in the absence of the tilting element, in order to arrange the heel piece in the ascent position this joint is used for orientating the pins towards the rear part of the ski.

**[0012]** The joint is elastically stabilised in the position in which the pins are facing forwards, such as to resist rotation up to a predetermined load corresponding to the normal stresses impressed by the athlete during descent.

**[0013]** In the conformation of the joints of known type, the "female" part is associated to the upper block and the "male" part is associated to the base; the elastic organs, also housed internally of the female part, are inevitably small and consequently their preload value, on which the greater or lesser amount required for unhooking depends, is adjustable only with a poor degree of progression.

**[0014]** The above-cited conformation implies that the joint cannot be made smaller than to a certain degree, which has negative implications for the overall lightness of the attachment which, as is known, represents a characteristic of particular relevance, especially in models destined for competitive sporting use.

**[0015]** An aim of the present invention is therefore to provide a heel piece with a joint for an attachment for Alpine skiing which is conformed in such a way as to be very compact and light.

**[0016]** A further aim of the invention relates to the desire to have means for calibrating the resistance to rotation which are regulatable more gradually and precisely with respect to the prior art.

**[0017]** A still further aim of the invention consists in obtaining a reliable and sturdy heel piece which is also suitable for competitive sporting use.

**[0018]** The characteristics of the invention will more clearly emerge from the following description of a preferred embodiment of the heel piece of the invention, in accordance with what is set out in the claims and with the aid of the accompanying figures of the drawings, in which:

figure 1 is a perspective view of the heel piece of the invention, associated to a ski;

figures 2A, 2B illustrate partly-sectioned lateral views of the heel piece, respectively in a descent position and an ascent position;

figure 3 is a plan view from below of figure 2A;

figure 4 is a section view along plane IV-IV of figure 2A;

figure 5 is a section view along plane V-V of figure 2A;

figure 6 is an exploded view of the heel piece of figure 1.

**[0019]** With reference to the above-mentioned figures of the drawings, 1 denotes in its entirety the heel piece of the invention, in an overall view.

**[0020]** The heel piece 1 defines, together with a toe piece (not illustrated), an attachment for Alpine skiing.

**[0021]** The heel piece 1, similarly to the known heel pieces described in the preamble hereto, is constituted

by a base 2 fixed to the ski S, to which base is associated, with an interposing of a joint 3 having a vertical axis, an upper block 4 comprising attachment means enabling hooking with the rear part of the boot (not illustrated).

**[0022]** The attachment means are constituted, in the example of the figures, by a pair of pins 5, of known type, described herein above.

**[0023]** The rotation of the upper block 4 with respect to the joint 3 defines, for the heel 1, the two known configurations of use, respectively hooking K (figures 1, 2A, 3, 5) and non-hooking W (figure 2B), of the pins 5 to the relative ski boot.

**[0024]** In the invention, in the heel piece 1 the joint 3 is defined by a vertical-axis hub 40, made solid to the upper block 4, projecting downwards and destined to couple rotatably with a circular seatings 20 realised in the base 2.

**[0025]** The base 2 and the upper block 4 are maintained mutually assembled by joining means 10 conformed such as to enable the above-mentioned rotation of the block 4.

**[0026]** The joining means 10 are constituted, for example, by a disc 11, removably fixed to the lower end of the hub 40 and having a diameter which is appropriately larger than the hub 40, which disc 11 is destined to abut an abutment 21 realised in the lower part of the seating 20 (figures 2A, 2B, 3, 4, 6).

**[0027]** The joint 3 thus-conformed is associated to positioning organs 30, destined to define and elastically stabilise at least the above-mentioned hooking configuration K of the heel piece 1.

**[0028]** The positioning organs 30 comprise a piston 31, housed slidably in the base 2 and subjected to the action of elastic organs 32 destined to press the piston 31 radially against the hub 40, a first face 41 being realised in the lateral surface thereof, in the hooking configuration K (figures 5 and 6).

**[0029]** In the illustrated example a second face 42 is comprised, realised at 180° from the first face 41, in the above-mentioned non-hooking conformation W (see once more figures 5 and 6).

**[0030]** When one of the two faces 41, 42 is faced to the head 31A of the piston 31, the relative configuration K, W is defined and elastically stabilised (figure 5).

**[0031]** Two further faces 43, 44 are advantageously realised in the hub 40, offset by 90° with respect to the first two, destined to define and elastically stabilise, in cooperation with the mentioned piston 31, other corresponding non-hooked configurations (not illustrated) of the heel piece 1; the presence of the further faces 43, 44 facilitates manual rotation of the block 4 from the hooked configuration K to the non-hooked configuration W and vice versa, and further optimise the safety unhooking of the heel piece 1 in the case of a fall during descent (see once more figures 5 and 6).

**[0032]** In the embodiment of the accompanying figures, the faces 41, 42, 43, 44 exhibit the relative flat surface, like the head 31 A of the piston 31.

**[0033]** In variant embodiments, not illustrated, the surface of the faces 41, 42, 43, 44 can be concave or convex; the head 31A of the piston 31 assumes a complementary convex form in the first case and concave in the second case.

**[0034]** Calibration organs 50 are comprised in the base, associated to the positioning organs 30, destined to vary resistance to rotation offered by the block 4 during the descent, from a minimum to a maximum.

**[0035]** The calibration organs 50 are constituted, in the embodiment of the figures, by an externally-threaded cup 51 engaged in a corresponding threaded hole 52 fashioned in the base 2 and designed to modify the preload of the elastic organs 32 which act on the piston 31, according to the weight of the skier, his or her muscular power and the technical level thereof.

**[0036]** The preset value must be such that the block 4 remains in the hooked configuration K as long as the stresses on the ski boot are contained within a predetermined value, and until a spontaneous partial rotation of the block 4 occurs, exceeding the value, with a consequent unhooking of the ski boot.

**[0037]** In order to have a visual reference of the set preload, a window 53 is realised in the base 2 above the threaded hole 52, which window 53 makes the front head of the cup 51 visible (see figure 1); in order to make the adjustment more precise, a graduated scale (not illustrated) is advantageously provided by the side of the window 53.

**[0038]** From the above description the special characteristics of the heel piece of the invention emerge clearly; the heel piece is very compact thanks to the original conformation of the joint 3, in which the female part is associated to the base while the male part is associated to the upper block 4.

**[0039]** The above-described conformation enables both the positioning organs 30 and the calibration organs 50 to be located externally of the hinge joint; the positioning organs 30 and calibration organs 50 being advantageously housed in the base of the heel piece, i.e. in the fixed part thereof; this has enabled having, among other things, a spring of a certain length which is adjustable with a greater graduality and precision with respect to the known-type springs inserted in the heel pieces.

**[0040]** It follows that, with functional characteristics being equal, the proposed heel-piece is lighter, with respect to known heel pieces, without any sacrifice in terms of sturdiness and reliability, such as to be particularly suitable also for competitive sporting use.

**[0041]** The above, however, is provided by way of non-limiting example, and any modifications in detail which become necessary for technical and/or functional reasons, are considered henceforth to fall within the ambit of protection defined by the appended claims.

## Claims

1. A jointed heel piece for an Alpine ski bindings of a type in which a joint (3) has a vertical axis and is destined to enable rotation of an upper block (4) to which attachment means (5) of a ski boot are associated, with respect to a base (2) fixed to the ski (S), in order to define two use configurations of the heel piece (1), respectively a hooked configuration (K) and a non-hooked configuration (W) of the attachment means (5) to the ski boot, the heel piece (1) being **characterised in that** it comprises: a vertical-axis hub (40) solidly constrained to the block (4), extending downwards and destined to rotatably couple with a circular seating (20) realised in the base (2), such as to define the joint (3); joining means (10) able to keep the block (4) and the base (2) mutually assembled, enabling the rotation of the block (4); positioning organs (30), associated to the joint (3), destined to define and elastically stabilise at least the hooked configuration (K) of the heel piece (1).

2. The heel piece of claim 1, **characterised in that** it comprises calibration organs (50) associated to the positioning organs (30), which calibration organs (50) are able to vary from a minimum to a maximum a resistance to rotation offered by the block (4), in order to keep the block (4) in the hooked configuration (K) in presence of stress on the ski boot contained within a predefined range, and in order to enable a spontaneous partial rotation of the block (4) in presence of stress of amounts exceeding the predefined range, with a consequent unhooking of the ski boot from the heel piece (1).

3. The heel piece of claim 1, **characterised in that** the joining means (10) are constituted by a disc (11), removably fixed to a lower end of the hub (40) and having an appropriately greater diameter than the hub (40), the disc (11) being destined to strike against an abutment (21) realised in a lower part of the seating (20).

4. The heel piece of claim 1, **characterised in that** the positioning organs (30) comprise a piston (31) housed slidably in the base (2) and subjected to action of elastic organs (32) destined to press the piston (31) radially against the hub (40), in a lateral surface of which hub (40) at least a first face (41) is fashioned, which face (41) is destined to be faced against the head (31A) of the piston (31) in the hooked configuration (K).

5. The heel piece of claim 4, **characterised in that** the positioning organs (30) are also able to define and elastically stabilise the non-hooked configuration (W) of the heel piece (1), and comprise a second face (42), realised at 180° from the first face (41), which second face (42) is destined to face the head (31A) in the non-hooked configuration (W).

6. The heel piece of claim 4 or 5, **characterised in that** two further faces (43, 44) are fashioned in the lateral surface of the hub (40), which two further faces (43, 44) are staggered by 90° with respect to the first face (41) and which two further faces (43) are able to elastically stabilise, in cooperation with the piston (31), further non-hooked configurations of the heel piece (1).

7. The heel piece of claim 4 or 5 or 6, **characterised in that** the faces (41, 42, 43, 44) exhibit a flat surface as well as the head (31A) of the piston (31).

8. The heel piece of claim 4 or 5 or 6, **characterised in that** the faces (41, 42, 43, 44) exhibit a concave surface which is complementary to a convex shape of the head (31A) of the piston (31).

9. The heel piece of claim 4 or 5 or 6, **characterised in that** the faces (41, 42, 43, 44) exhibit a convex surface which is complementary to a concave shape of the head (31A) of the piston (31).

10. The heel piece of claim 2, **characterised in that** the calibration organs (50) comprise a cup (51) which is externally threaded and engaged in a correspondingly threaded hole (52) realised in the base (2), which cup (51) is able to modify a preload of the elastic organs (32) provided in the positioning organs (30).

11. The heel piece of claim 6, **characterised in that** it comprises a window (53) afforded in the base (2), above the threaded hole (52), which window (53) is able to make a front head of the cup (51) visible from outside.

## Patentansprüche

1. Mit Gelenk versehenes Fersenteil für eine Alpinskibindung der Art, in der ein Gelenk (3) eine vertikale Achse aufweist und dafür ausgelegt ist, die Drehung eines oberen Blocks (4), mit dem Mittel (5) zur Befestigung eines Skischuhs verbunden sind, relativ zu einer an dem Ski (S) befestigten Basis (2) zu ermöglichen, um zwei Gebrauchskonfigurationen des Fersenteils (1) zu definieren, nämlich eine eingerastete Konfiguration (K) und eine nichteingerastete Konfiguration (W) der Mittel (5) zur Befestigung an dem Skischuh, wobei das Fersenteil (1) **dadurch gekennzeichnet ist, dass** es Folgendes beinhaltet: eine Nabe (40) mit vertikaler Achse, die fest mit dem Block (4) verbunden ist, sich nach unten erstreckt und dazu bestimmt ist, drehbar mit einer kreisförmi-

gen Aufnahme (20) in Eingriff zu gelangen, die in der Basis (2) ausgefertigt ist, um somit das Gelenk (3) zu bilden; Verbindungsmittel (10), um den Block (4) und die Basis (2) miteinander verbunden zu halten und die Drehung des Blocks (4) zu ermöglichen; Positionierorgane (30), die mit dem Gelenk (3) verbunden und dazu bestimmt sind, zumindest die eingerastete Konfiguration (K) des Fersenteils (1) zu definieren und federnd zu stabilisieren.

2. Fersenteil nach Anspruch 1, **dadurch gekennzeichnet, dass** es Einstellungsorgane (50) beinhaltet, die mit den Positionierorganen (30) verbunden sind, wobei diese Einstellungsorgane (50) in der Lage sind, einen von dem Block (4) gebotenen Drehungswiderstand von einem Mindestwert bis zu einem Maximalwert zu variieren, um den Block (4) in der eingerasteten Konfiguration (K) zu halten, wenn der Skischuh einer Belastung ausgesetzt ist, die innerhalb eines vorgegebenen Bereichs liegt, und um eine selbsttätige teilweise Drehung des Blocks (4) zu ermöglichen, wenn die Belastung Werte erreicht, die über den vorgegebenen Bereich hinausgehen, so dass demzufolge der Skischuh aus dem Fersenteil (1) ausgerastet wird.

3. Fersenteil nach Anspruch 1, **dadurch gekennzeichnet, dass** die Verbindungsmittel (10) aus einer Scheibe (11) bestehen, die abnehmbar an einem unteren Ende der Nabe (40) befestigt ist und einen angemessen größeren Durchmesser als die Nabe (40) aufweist, wobei die Scheibe (11) dafür ausgelegt ist, gegen einen Anschlag (21) anzustoßen, der in einem unteren Teil der Aufnahme (20) gefertigt ist.

4. Fersenteil nach Anspruch 1, **dadurch gekennzeichnet, dass** die Positionierorgane (30) einen Kolben (31) beinhalten, der gleitbar in der Basis (2) untergebracht ist und der Wirkung federnder Organe (32) unterliegt, die dazu bestimmt sind, den Kolben (31) radial gegen die Nabe (40) zu pressen, wobei eine seitliche Oberfläche dieser Nabe (40) zumindest eine erste Fläche (41) aufweist und diese Fläche (41) dafür ausgelegt ist, in der eingerasteten Konfiguration (K) dem Kopf (31 A) des Kolbens (31) zugewandt zu sein.

5. Fersenteil nach Anspruch 4, **dadurch gekennzeichnet, dass** die Positionierorgane (30) ferner in der Lage sind, die nichteingerastete Konfiguration (W) des Fersenteils (1) zu definieren und federnd zu stabilisieren, und eine zweite Fläche (42) aufweisen, die um 180° zu der ersten Fläche (41) versetzt ist, wobei diese zweite Fläche (42) dazu bestimmt ist, in der nichteingerasteten Konfiguration (W) dem Kopf (31 A) zugewandt zu sein.

6. Fersenteil nach Anspruch 4 oder 5, **dadurch gekennzeichnet, dass** zwei weitere Flächen (43, 44) in der seitlichen Oberfläche der Nabe (40) angefertigt sind, wobei diese weiteren Flächen (43, 44) um 90° zu der ersten Fläche (41) versetzt sind und wobei die zwei weiteren Flächen (43, 44) in der Lage sind, in Zusammenwirkung mit dem Kolben (31) weitere nichteingerastete Konfigurationen des Fersenteils (1) federnd zu stabilisieren.

7. Fersenteil nach Anspruch 4 oder 5 oder 6, **dadurch gekennzeichnet, dass** die Flächen (41, 42, 43, 44) eine abgeflachte Oberfläche aufweisen, ebenso wie der Kopf (31A) des Kolbens (31).

8. Fersenteil nach Anspruch 4 oder 5 oder 6, **dadurch gekennzeichnet, dass** die Flächen (41, 42, 43, 44) eine konkave Oberfläche aufweisen, die komplementär zu einer konvexen Form des Kopfes (31A) des Kolbens (31) ist.

9. Fersenteil nach Anspruch 4 oder 5 oder 6, **dadurch gekennzeichnet, dass** die Flächen (41, 42, 43, 44) eine konvexe Oberfläche aufweisen, die komplementär zu einer konkaven Form des Kopfes (31A) des Kolbens (31) ist.

10. Fersenteil nach Anspruch 2, **dadurch gekennzeichnet, dass** die Einstellungsorgane (50) eine becherförmige Aufnahme (51) beinhalten, die an der Außenseite mit einem Gewinde versehen ist und in eine entsprechende Gewindebohrung (52) eingesetzt ist, die in der Basis (2) ausgeführt ist, wobei die becherförmige Aufnahme (51) in der Lage ist, die Vorspannung der federnden Organe (32) zu verändern, die in den Positionierorganen (30) vorgesehen sind.

11. Fersenteil nach Anspruch 6, **dadurch gekennzeichnet, dass** es ein Fenster (53) beinhaltet, das in der Basis (2) über der Gewindebohrung (52) angefertigt ist, wobei dieses Fenster (53) dafür sorgt, dass die Stirnseite der becherförmigen Aufnahme (51) von außen sichtbar ist.

**Revendications**

1. Une pièce de talon articulée pour des fixations de ski alpin d'un type dans lequel une articulation (3) a un axe vertical et est destinée à permettre la rotation d'un bloc supérieur (4) auquel sont associés des moyens de fixation (5) d'une chaussure de ski, par rapport à une base (2) fixée au ski (S), de manière à définir deux configurations d'utilisation de la pièce de talon (1), soit respectivement une configuration d'accrochage (K) et une configuration de non-accrochage (W) des moyens de fixation (5) à la chaussure de ski, la pièce de talon (1) étant **caractérisée en**

**ce qu'**elle comprend : un moyeu (40) à axe vertical contraint solidairement au bloc (4), s'étendant vers le bas et destiné à s'accoupler de façon rotative avec un logement circulaire (20) réalisé dans la base (2), de manière à définir l'articulation (3) ; des moyens d'union (10) destinés à maintenir le bloc (4) et la base (2) mutuellement assemblés, permettant la rotation dudit bloc (4) ; des organes de positionnement (30), associés à l'articulation (3), destinés à définir et à stabiliser élastiquement au moins la configuration d'accrochage (K) de la pièce de talon (1).

**2.** La pièce de talon selon la revendication 1, **caractérisée en ce qu'**elle comprend des organes de réglage (50) associés aux organes de positionnement (30), lesdits organes de réglage (50) sont destinés à faire varier d'un minimum à un maximum une résistance à la rotation offerte par le bloc (4), de manière à maintenir ledit bloc (4) dans la configuration d'accrochage (K) en présence de sollicitations sur la chaussure de ski comprises dans une plage prédéfinie, et de manière à permettre une rotation partielle spontanée du bloc (4) en présence de sollicitations dont l'ampleur dépasse la plage prédéfinie, avec un décrochage conséquent de la chaussure de ski de la pièce de talon (1).

**3.** La pièce de talon selon la revendication 1, **caractérisée en ce que** les moyens d'union (10) sont constitués d'un disque (11), fixé de façon amovible à une extrémité inférieure du moyeu (40) et ayant un diamètre opportunément supérieur au moyeu (40), le disque (11) étant destiné à buter contre une butée (21) réalisée dans une partie inférieure du logement (20).

**4.** La pièce de talon selon la revendication 1, **caractérisée en ce que** les organes de positionnement (30) comprennent un piston (31) logé de façon coulissante dans la base (2) et soumis à l'action d'organes élastiques (32) destinés à presser radialement ledit piston (31) contre le moyeu (40), dans une surface latérale dudit moyeu (40) au moins une première face (41) est réalisée, ladite face (41) est destinée à se trouver face à la tête (31A) du piston (31) dans la configuration d'accrochage (K).

**5.** La pièce de talon selon la revendication 4, **caractérisée en ce que** les organes de positionnement (30) sont également destinés à définir et à stabiliser élastiquement la configuration de non-accrochage (W) de la pièce de talon (1), et comprennent une deuxième face (42), réalisée à 180° de la première face (41), ladite deuxième face (42) est destinée à se trouver face à la tête (31A) dans la configuration de non-accrochage (W).

**6.** La pièce de talon selon la revendication 4 ou 5, **caractérisée en ce que** deux autres faces (43, 44) sont réalisées dans la surface latérale du moyeu (40), lesdites deux autres faces (43, 44) sont décalées de 90° par rapport à la première face (41) et lesdites deux autres faces (43, 44) sont destinées à stabiliser élastiquement, en coopération avec le piston (31), d'autres configurations de non-accrochage de la pièce de talon (1).

**7.** La pièce de talon selon la revendication 4 ou 5 ou 6, **caractérisée en ce que** les faces (41, 42, 43, 44) présentent une surface plate comme la tête (31A) du piston (31).

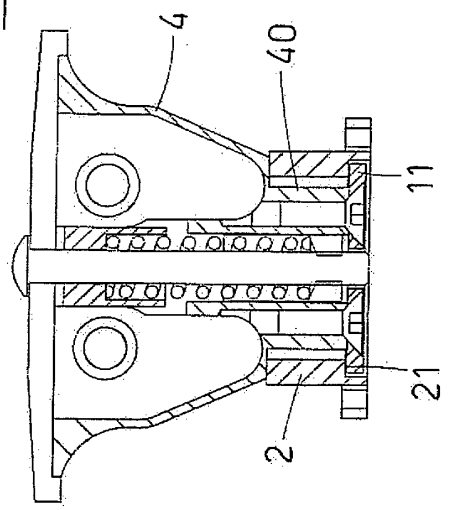
**8.** La pièce de talon selon la revendication 4 ou 5 ou 6, **caractérisée en ce que** les faces (41, 42, 43, 44) présentent une surface concave qui est complémentaire à une forme convexe de la tête (31A) du piston (31).

**9.** La pièce de talon selon la revendication 4 ou 5 ou 6, **caractérisée en ce que** les faces (41, 42, 43, 44) présentent une surface convexe qui est complémentaire à une forme concave de la tête (31A) du piston (31).

**10.** La pièce de talon selon la revendication 2, **caractérisée en ce que** les organes de réglage (50) comprennent un godet (51) qui est extérieurement fileté et en prise dans un trou taraudé (52) correspondant réalisé dans la base (2), ledit godet (51) est destiné à modifier une précharge des organes élastiques (32) prévus dans les organes de positionnement (30).

**11.** La pièce de talon selon la revendication 6, **caractérisée en ce qu'**elle comprend une fenêtre (53) réalisée dans la base (2), au-dessus du trou taraudé (52), ladite fenêtre (53) est destinée à rendre visible de l'extérieur une tête avant du godet (51).

FIG. 4



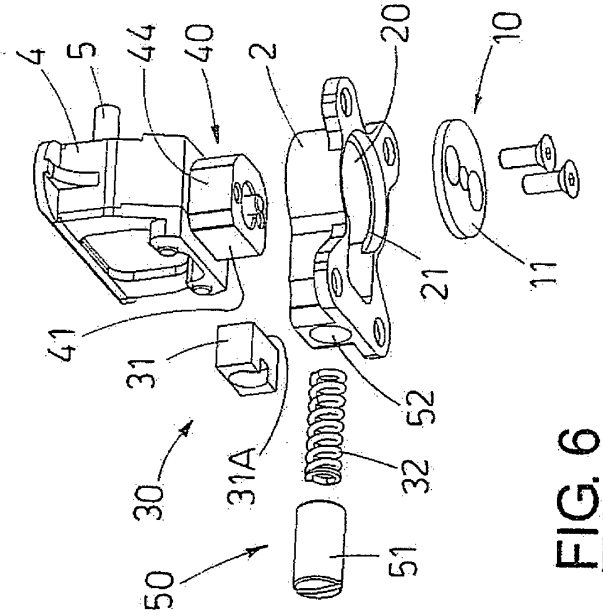
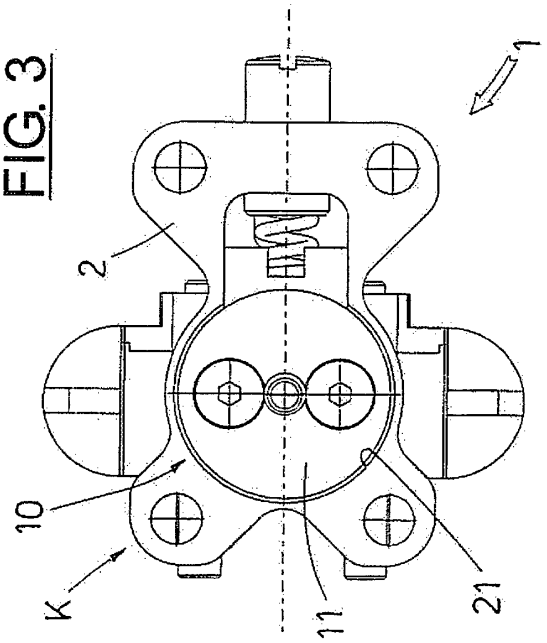




FIG. 6

FIG. 3



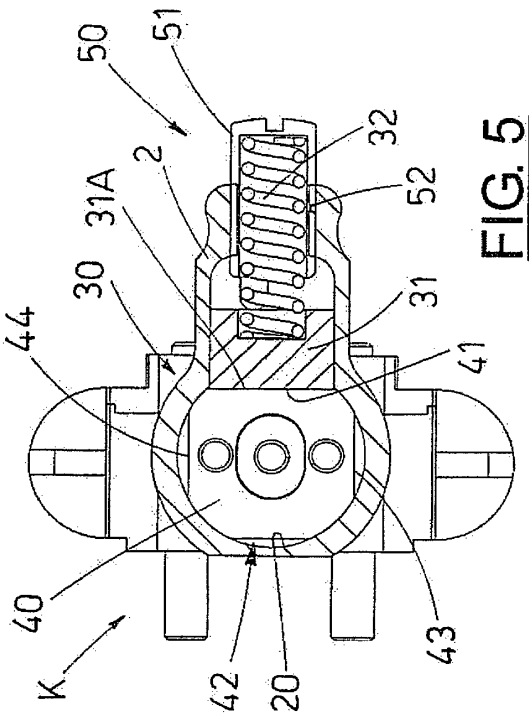




FIG. 5

FIG. 2A

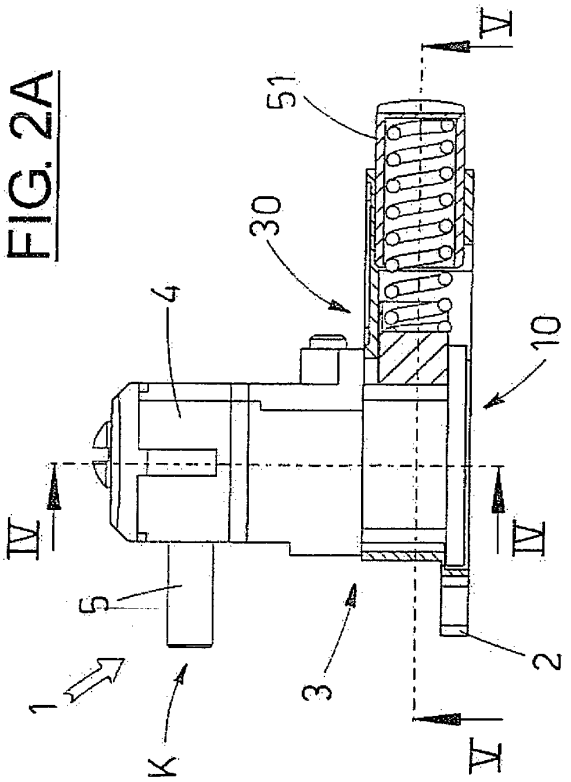



FIG. 2B

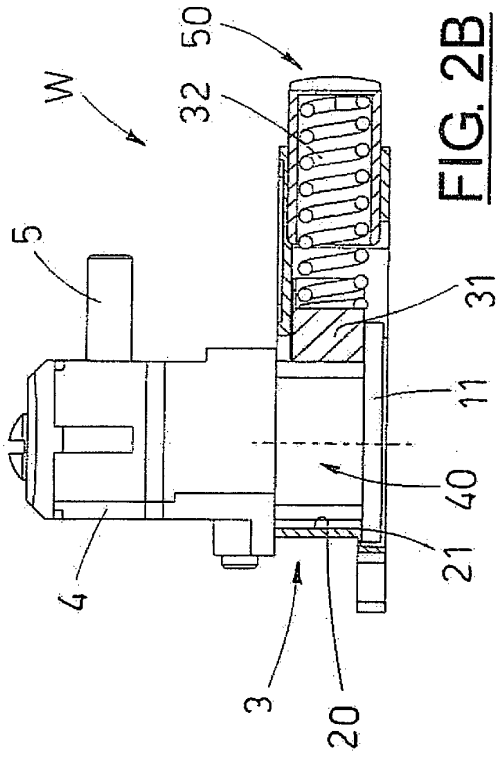
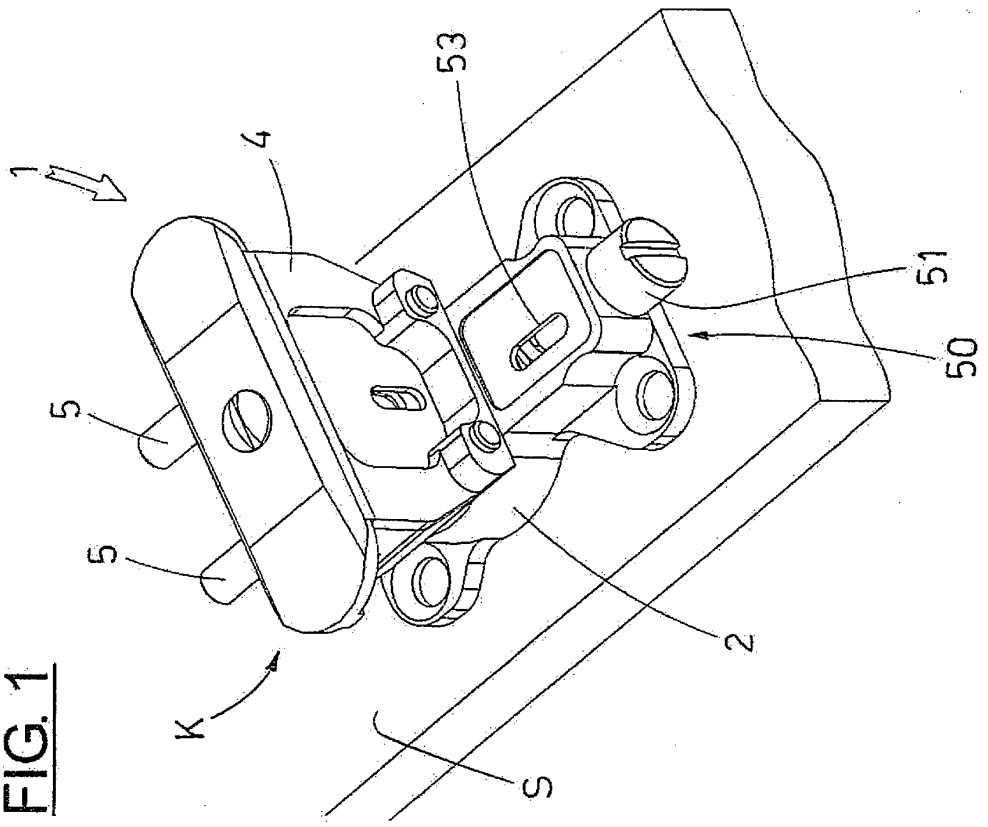



FIG. 1



## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


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