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(54) **HEEL PIECE WITH CLIMBING WEDGE FOR SKI MOUNTAINEERING**

(57) A heel-piece (10) with a heel raiser for ski mountaineering, comprising: a heel-raiser (11) which is hinged to the heel-piece (10) for rotating into a first position (A), in which it can restingly receive a heel of a ski boot, and for rotating into a second position (B), in which it cannot interact with the ski boot; a first element (1) which is magnetic or magnetisable and which is mounted on-board the heel raiser; a second element (2) which is magnetic or magnetisable and which is mounted on-board the heel-piece (10); the first element (1) and the second element (2) being arranged with respect to one another so that when the heel raiser (11) reaches the first position (A) and/or the second position (B), the first element (1) and the second element (2) interact magnetically with one another, giving rise to a first force which acts on the heel raiser (11).

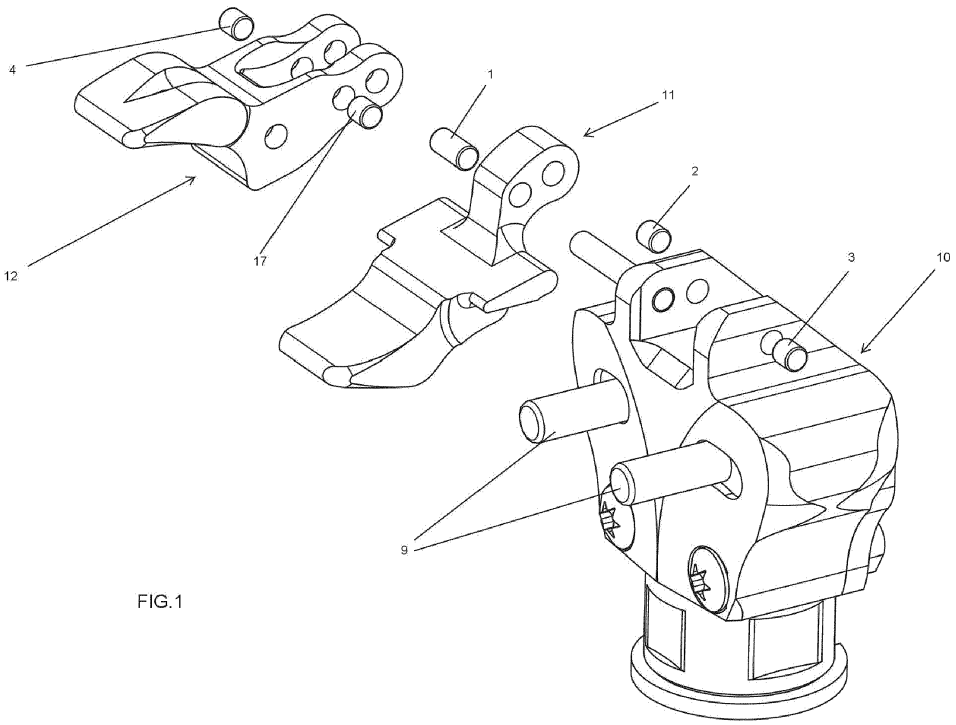

FIG.1

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Description

[0001] The present invention concerns the technical sector relating to a heel-piece for skis. In particular, the invention relates to a heel-piece with a heel raiser for the practice of ski mountaineering.

[0002] In the practice of ski mountaineering the skier can carry out mixed routes, either downhill or uphill. In downhill skiing, the heel of the ski boot hooks in the heel-piece, so as to remain solidly constrained thereto: the heel of the ski boot thus remains in contact with a first rest plane which usually is just a little higher than the plane identified by the ski. For the uphill part, on the other hand, the heel of the ski boot is unhooked from the heel-piece so as to remain free to move vertically: in order to limit stress on the calves and the Achilles heel of the user, the heel-piece can further be provided with a first heel raiser which, once inserted, defines a second rest plane for the heel of the ski boot, which second rest plane is higher than the first rest plane.

[0003] Therefore, during the descent the first heel raiser is de-inserted, so that it cannot interact with the ski boot, while during the ascent the first heel raiser can be inserted by the skier, and in this case restingly receive the heel of a ski boot.

[0004] Some heel-pieces are also provided with a second heel raiser, for defining a third rest plane that is higher with respect to the second rest plane and which is more suitable for steep inclinations in ascent.

[0005] In order to insert or de-insert a heel-raiser, a first known type of heel-piece requires the skier to stoop and rotate the heel-piece manually. This is uncomfortable and even dangerous on some very steep slopes.

[0006] To obviate this drawback, heel-pieces have appeared on the market in which the heel-raiser is maintained in the inserted and/or the de-inserted position by means of a spring: in this case, in order to move the heel-raiser from one position to another it is necessary to overcome the spring force, which can be obtained even only with a ski stick. However, a spring that over time tends to weaken and/or break and might not allow the heel-raiser to maintain the preselected (inserted or de-inserted) position; this anomalous behaviour of the spring might emerge during the use of the heel-piece, and therefore during the practice of ski mountaineering, which might lead to creating dangerous situations on difficult stretches of piste.

[0007] The aim of the invention consists in obviating the above-mentioned drawback.

[0008] The above-mentioned aim has been attained by means of a heel-piece with a heel raiser for ski mountaineering, according to claim 1.

[0009] The first element and the second element can be arranged in such a way that the first force moves the first heel raiser towards the first position and/or the second position, up to passing beyond it: in this case, the heel-piece must preferably also comprise a first abutment for halting the first heel raiser at first position and/or preferably comprises a second abutment for halting the first heel raiser at the second position. Alternatively, the first element and the second element can be arranged in such a way that the first force attracts the first heel raiser into the first position and/or into the second position, so that, in the absence of other external forces the first heel raiser is maintained stably in the first position and/or in the second position; in this case it is not necessary to include the first abutment and/or the second abutment described in the foregoing.

[0010] The first element and the second element are advantageously reliable over time, as they tend to maintain the magnetic properties thereof constant. It follows that the first force defined in this way is also constant over time.

[0011] By "magnetic" is meant an element which can be a permanent magnet or an electromagnet, when crossed by a current. By "magnetisable" is meant an element which can be made of a ferro-magnetic material, in the sense that it can be magnetised by a magnetic field produced for example by a permanent magnet. "Magnetisable" can also refer to an electromagnet of a type comprising a nucleus of a ferro-magnetic material, when it is not crossed by a current.

[0012] A further advantage of the invention consists in the fact that the sum of the weights of the first element and the second element is lower than the weight of the spring that is used in the heel-pieces of known type. Further, the use of the spring in the heel-pieces requires the use of additional components to be included on-board the heel-piece itself, which components are on the other hand absent in the heel-piece that is the object of the invention, which further reduces the weight thereof.

[0013] Specific embodiments of the invention will be described in the following parts of the present description, according to what is set down in the claims and with the aid of the appended tables of drawings, in which:

- figure1 is an exploded view of a first heel-piece of the present invention;
- figures 2, 3 are respectively a lateral view and a view from above of the first heel-piece of figure 1 in a first use configuration;
- figures 4, 5 are respectively the view along section line IV-IV of figure 2 and the view along section line V-V of figure 3;
- figures 6, 7 are respectively a lateral view and a view from above of the first heel-piece of figure 1 in a second use configuration;
- figures 8, 9 are respectively the view along section line VIII-VIII of figure 6 and the view along section line IX-IX of figure 7;
- figures 10, 11 are respectively a lateral view and a

view from above of the first heel-piece of figure 1 in a third use configuration;

- figures 12, 13 are respectively the view along section line XIII-XIII of figure 10 and the view along section line XIII-XIII of figure 11;
- figure 14 is an exploded view of a second heel-piece of the present invention;
- figures 15, 16, 17 are respectively a rear view, a lateral view and a view from above of the second heel-piece of figure 14;
- figure 18 is a view along section XVIII-XVIII of fig. 15;
- figure 19 is the same view as in figure 15, in which some parts have been sectioned to better evidence others;
- figure 20 is a view along section XX-XX of figure 19;
- figures 21-25 are the same lateral view as in figure 16 in five use configurations of the second heel-piece; in particular, figure 16 is identical to figure 21.

[0014] With reference to the appended tables of drawings, reference numeral (10) relates to a heel-piece (10) with a heel raiser (11) for practising ski mountaineering, which is the object of the present invention: at least a first heel raiser (11) which is hinged to the heel-piece (10) so as to rotate into a first position (A) (figures 6-9), in which the first heel raiser (11) can restingly receive the heel of a ski boot (not illustrated) during ski mountaineering, and so as to rotate into a second position (B) (figures 10-13); a first element (1) which is magnetic or magnetisable and which is mounted on-board the first heel raiser; a second element (2) which is magnetic or magnetisable and which is mounted on-board the heel-piece (10); at least one from between the first element (1) and the second element (2) being magnetic; the first element (1) and the second element (2) being arranged with respect to one another in such a way that when the first heel raiser (11) reaches or is in proximity to the first position (A) and/or to the second position (B), then the first element (1) and the second element (2) interact magnetically with one another, giving rise to a first force which acts on the first heel raiser (11).

[0015] By way of example, when the first heel raiser is in the second position (B), then it cannot interact with the ski boot during the practice of ski mountaineering: this is illustrated in figures 10-13.

[0016] On the other hand, if the heel-piece (10) is able to rotate about the axis thereof by about 180°, then the first heel raiser in the second position (B) will be able to interact with the ski boot during the practice of ski mountaineering (a configuration that is not illustrated.

[0017] The first element (1) and the second element (2) are preferably arranged with respect to one another so that when the first heel raiser (11) reaches the first position (A) and/or the second position (B), so that the first element (1) and the second element (2) interact magnetically with one another, giving rise to the first force which acts on the first heel raiser (11), the first element (1) and the second element (2) are arranged flanked (see for example figure 12) along a direction that is parallel to the first hinge axis (G).

[0018] This means that the first element (1) and the second element (2) can be aligned to one another (figure 12) or can be dealigned (this solution is not illustrated in the figures) even only by a few millimetres, for example (in the sense that the axis of the first element (1) is distanced from the axis of the second element (2) by only a few millimetres). In both cases, the flanked arrangement of the first element (1) and the second element (2) enables maximising the first force.

[0019] The first element (2) is preferably orientated in such a way as to have the axis thereof parallel to the first hinge axis (G), the second element (2) is orientated in such a way as to have the axis thereof parallel to the first hinge axis (G) (figures 1, 14), the first element (1) and the second element (2) being arranged with respect to one another so that when the first heel raiser reaches the first position (A) and/or the second position (B), so that the first element (1) and the second element (2) interact magnetically with one another and give rise to a first force which acts on the first heel raiser (11), the first element (1) and the second element (2) are facing one another (figures 10, 13, 21). The first element (1) and the second element (2) should be taken to be facing one another even if they are dealigned, for example by a few millimetres.

[0020] The heel-piece (10) preferably comprises a third element (3) which is magnetic or magnetisable, which is mounted on-board the heel-piece (10), which is arranged in such a way as to have the axis thereof parallel to the first hinge axis (G) and which is arranged so as to face the first element (1) when the first heel raiser (11) reaches the first position (A) and/or the second position (B), so that the first element (1) and the second element (2) interact magnetically with one another and give rise to the first force which acts on the first heel raiser (11), so that the magnetic interaction between the first element (1), the second element (2) and the third element (3) gives rise to a second force acting on the first heel raiser (11) which is greater than the first force.

[0021] In other words, when the first heel raiser (11) reaches the first position (A) and/or the second position (B), so that the first element (1) and the second element (2) interact magnetically with one another and give rise to a first force which acts on the first heel raiser (11), the first element (1), the second element (2) and the third element (3) can be flanked to one another along a direction that is parallel to the first hinge axis (G), with the first element (1) being interposed between the second element (2) and the third element (3). In this condition, the

magnetic interaction between the first element (1), the second element (2) and the third element (3) gives rise to a second force acting on the first heel raiser (11) which is greater than the first force.

[0022] As is known, the heel-piece (10) can comprise two plugs (9) for coupling with a ski boot (not illustrated). In a first embodiment (figures 1-13), the first heel raiser (11) is conformed such as to couple by friction with the pins (9) when the first heel raiser (11) is in the first position (A) (figures 2-9), the first element (1) and the second element (2) are arranged with respect to one another so that when the first heel raiser (11) reaches or is in proximity of the second position (B) (figures 10-13), the first element (1) and the second element (2) interact magnetically with one another, giving rise to the first force which acts on the first heel raiser (11) so as to attract it into the second position (B).

[0023] In addition, the heel-piece (10) can comprise: a second heel raiser (12) which is hinged with respect to a second hinge axis to the heel-piece (10) so as to rotate into a third position (C), in which the second heel raiser (12) can restingly receive the heel of a ski boot during ski mountaineering (figures 2-5), and so as to rotate into a fourth position (D) (figures 6-13); a fourth element (4) which is magnetic or magnetisable and which is mounted on-board the second heel raiser; at least one from between the first element (1) and the fourth element (4) being magnetic; the first element (1) and the second element (4) being arranged with respect to one another so that: when the first heel raiser (11) reaches the first position (A) and the second heel raiser (12) reaches the third position (C), the first magnetic element (1) and the fourth magnetic element (4) interact magnetically with one another, giving rise to a third force which acts on the second heel raiser (12) so as to maintain it in the third position (C); when the second heel raiser (12) reaches or is in proximity of the fourth position (D), the second element (2) and the fourth element (4) interact magnetically with one another, giving rise to a fourth force which acts on the second heel raiser (12) so as to attract it into the fourth position (D).

[0024] By way of example, when the second heel raiser is in the fourth position (B), then it cannot interact with the ski boot during the practice of ski mountaineering: this is illustrated in figures 10-13.

[0025] On the other hand, if the heel-piece (10) is able to rotate about the axis thereof by about 180°, then the second heel raiser in the fourth position (B) will be able to interact with the ski boot during the practice of ski mountaineering (a configuration that is not illustrated).

[0026] The second hinge axis can coincide with the first hinge axis (G).

[0027] The first heel raiser (11) and the second heel raiser (12) are preferably configured so that the heel of a ski boot can rest on the second heel raiser (12) at a height that is greater than the height at which the heel of a ski boot rests on the first heel raiser (11).

[0028] Therefore, when the first heel raiser (11) is in the first position (A) and the second heel raiser (12) is in the third position (C) (figures 2-5), then the heel of a ski boot can rest only on the second heel raiser (12). The third force that acts on the second heel raiser (12) tends to maintain it stably in the third position (C).

[0029] Using for example a ski stick, it is possible to move the second heel raiser (12) into the fourth position (D), in which the second heel raiser (12) remains stably, by effect of the fourth force which originates between the second element (2) and the fourth element (4) (figures 6-9). In this configuration of the heel-piece (10), the heel of a ski boot can rest on the first heel raiser (11).

[0030] Again, using for example a ski stick, it is possible to move the first heel raiser (11) into the second position (B), in which the first heel raiser (11) remains stably, by effect of the first force which originates between the first element (1) and the second element (2) (figures 10-13). In this configuration of the heel-piece (10), the heel of a ski boot can engage with the pins (9).

[0031] To enable the magnetic interaction between the fourth element (4) and the first element (1) when the second heel raiser (12) is in the third position (C) (thus giving rise to a force which is greater than the third force), and between the fourth element (4) and the second element (2) when the second heel raiser (12) is in the fourth position (D) (thus giving rise to a force which is greater than the fourth force), the second heel raiser (12) can also comprise a ninth element (17) which is magnetic or magnetisable and which is aligned with the fourth element (4).

[0032] The first element (1), the second element (2), the third element (3), the fourth element (4) and the ninth element (17) can be cylindrical in shape.

[0033] According to a second embodiment (figures 14-25), the heel-piece (10) comprises a control unit (14), see figure 19. Further, one from the first element (1) and the second element (2) is an electromagnet commanded by the control unit (14), which electromagnet comprises a nucleus made of a ferro-magnetic material (not illustrated), the electromagnet being further dimensioned so that when activated by a current having a predetermined direction and intensity, the first element (1) and the second element (2) interact magnetically with one another, giving rise to a fifth force which acts on the first heel raiser (11) and determines movement thereof from the first position (A) towards the second position (B) and/or vice versa. Figure 19 is always a battery (15), which can power the control unit.

[0034] The control unit preferably comprises a data receiving device, preferably via radio: this data can contain the command for activating and/or deactivating the electromagnet.

[0035] The other from between the first element (1) and the second element (2) is preferably a permanent magnet. Therefore, for example, the first element (1) can be a permanent magnet while the second element (2) can be an electromagnet.

[0036] When the electromagnet is not crossed by a current, the relative nucleus can be polarised only by the

permanent magnet when the first heel raiser (11) reaches or is in proximity of the first position (A) and/or the second position (B), so that the first element (1) and the second element (2) interact magnetically with one another, giving rise to a first force which acts on the first heel raiser (11).

[0037] On the other hand, when the electromagnet is crossed by a current having a predetermined direction and intensity, a fifth force is activated which acts on the first heel raiser (11) and determines movement thereof from the first position (A) towards the second position (B) and/or vice versa.

[0038] In a variant that is not illustrated, the first element (1) can be made only of ferro-magnetic material, while the second element (2) can be an electromagnet (or vice versa); in this case, when the first heel raiser (11) reaches or is in proximity of the first position (A) and/or the second position (B), a current will have to circulate constantly in order to create a magnetic interaction between the first element (1) and the second element (2), such as to originate the above-mentioned first force. In this case, in order to generate the fifth force the current in the electromagnet will have to increase or change direction, with the consequence that the first heel raiser (11) will move from the first position (A) towards the second position (B) and/or vice versa.

[0039] In the example illustrated in figures 14-25, the heel-piece (10) comprises a first plurality of elements (2, 5, 6, 7, 8), among which the second element (2), which can all be electromagnets and which are mounted on-board the heel-piece (10); the first element (1) is for example a permanent magnet. This first plurality of elements (2, 5, 6, 7, 8) is identified as follows: second element (2), fifth element (5), sixth element (6), seventh element (7) and eighth element (8). These elements of the first plurality of elements (2, 5, 6, 7, 8) might be in a greater or lesser number with respect to those illustrated in figures 14-25.

[0040] The elements of the first plurality of elements (2, 5, 6, 7, 8), can be arranged along an arc of circumference, the centre of which coincides with the first hinge axis (G), so that the first element (1) is flanked (and is preferably at least partly facing), along a direction that is parallel to the first hinge axis (G), to each element of the first plurality of elements (2, 5, 6, 7, 8) as each said first element progressively displaces from the first position (A) to the second position (B), or vice versa.

[0041] To realise the sequence of movements illustrated in figures 21-25, it is for example possible to act as follows: starting from the second position (B) (figure 21), the second element (2) is activated in "repulsion", in the sense that a current is passed into the electromagnet of the second element (2) in a given direction and intensity so that the first element (1) and the second element (2) repel one another, and the fifth element (5) is activated in "attraction". in the sense that a current is passed into the electromagnet of the fifth element (5) in a given direction and intensity so that the first element (1) and the fifth element (5) attract one another, with the consequence that the first heel raiser (11) is moved by a first angular step (figure 22); thereafter, the fifth element (5) is activated in repulsion and the sixth element (6) is activated in attraction, in ways alike to those described in the foregoing, with the consequence that the first heel raiser (11) is moved by a second angular step (figure 23); thereafter, the sixth element (6) is activated in repulsion and the seventh element (7) is activated in attraction, with the consequence that the first heel raiser (11) is moved by a third angular step (figure 24); lastly, the seventh element (7) is activated in repulsion and the eighth element (8) is activated in attraction, with the consequence that the first heel raiser (11) is moved by a fourth angular step (figure 25) up to reaching the first position (A). With an inverse sequence the first heel raiser (11) can be moved from the first position (A) to the second position (B).

[0042] The control unit (14) commands the first plurality of elements (2, 5, 6, 7, 8) according to the above-described procedures.

[0043] To increase the torque acting on the first heel raiser (11) to displace it from the first position (A) to the second position (B), and vice versa, the heel-piece (10) can comprise a second plurality of elements (13), see figures 14, 20, which are all electromagnets, are mounted on-board the heel-piece (10) and are also arranged along an arc of circumference the centre of which coincides with the first hinge axis (G), so that the first element (1) is aligned to (and preferably facing) each element of the second plurality of elements (13) as it progressively displaces from the first position (A) to the second position (B), or vice versa. Each element of the second plurality of elements (13) is preferably facing a corresponding element of the first plurality of elements (2, 5, 6, 7, 8). The sequence of activation of the electromagnets of the second plurality of elements (13) can be alike to what is described in the foregoing with respect to the first plurality of elements (2, 5, 6, 7, 8).

[0044] It is understood that the foregoing has been described by way of non-limiting example and that any constructional variants should be taken to fall within the protective scope of the present technical solution, as claimed in the following.

Claims

1. A heel-piece (10) with a heel raiser for ski mountaineering, comprising:

   at least a first heel raiser (11) which is hinged with respect to a first hinge axis (G) to the heel-piece (10) for rotating into a first position (A), in which the first heel raiser (11) can restingly receive a heel of a ski boot during ski mountaineering, and for rotating into a second position (B);

   characterised in that it comprises:

a first element (1) which is magnetic or magnetisable and which is mounted on-board the first heel raiser;
a second element (2) which is magnetic or magnetisable and which is mounted on-board the heel-piece (10);
at least one from between the first element (1) and the second element (2) being magnetic;
the first element (1) and the second element (2) being arranged with respect to one another so that when the first heel raiser (11) reaches or is in proximity of the first position (A) and/or the second position (B), the first element (1) and the second element (2) interact magnetically with one another, giving rise to a first force which acts on the first heel raiser (11).

2. The heel-piece (10) with the heel raiser (11) of the preceding claim, wherein the first element (1) and the second element (2) are arranged with respect to one another so that when the first heel raiser (11) reaches the first position (A) and/or the second position (B), so that the first element (1) and the second element (2) interact magnetically with one another, giving rise to the first force which acts on the first heel raiser (11), the first element (1) and the second element (2) are arranged flanked along a direction that is parallel to the first hinge axis (G).

3. The heel-piece (10) with the heel raiser (11) of the preceding claim, wherein the first element (1) is orientated in such a way as to have the axis thereof parallel to the first hinge axis (G), wherein the second element (2) is orientated in such a way as to have the axis thereof parallel to the first hinge axis (G), the first element (1) and the second element (2) being arranged with respect to one another so that when the first heel raiser (11) reaches the first position (A) and/or the second position (B), so that the first element (1) and the second element (2) interact magnetically with one another and give rise to a first force which acts on the first heel raiser (11), the first element (1) and the second element (2) are facing one another.

4. The heel-piece (10) with the heel raiser (11) of the preceding claim, comprising a third element (3) which is magnetic or magnetisable, which is mounted on-board the heel-piece (10), which is arranged in such a way as to have the axis thereof parallel to the first hinge axis (G) and which is arranged so as to face the first element (1) when the first heel raiser (11) reaches the first position (A) and/or the second position (B), so that the first element (1) and the second element (2) interact magnetically with one another and give rise to the first force which acts on the first heel raiser (11), so that the magnetic interaction between the first element (1), the second element (2) and the third element (3) gives rise to a second force acting on the first heel raiser (11) which is greater than the first force.

5. The heel-piece (10) with the heel raiser (11) of any one of the preceding claims, wherein the heel-piece (10) comprises two pins (9) for coupling with a ski boot, wherein the first heel raiser (11) is conformed such as to couple by friction with the pins (9) when the first heel raiser (11) is in the first position (A), and wherein the first element (1) and the second element (2) are arranged with respect to one another so that when the first heel raiser (11) reaches or is in proximity of the second position (B), the first element (1) and the second element (2) interact magnetically with one another, giving rise to the first force which acts on the first heel raiser (11) so as to attract it into the second position (B).

6. The heel-piece (10) with the heel raiser (11) of the preceding claim, comprising: a second heel raiser (12) which is hinged with respect to a second hinge axis to the heel-piece (10) so as to rotate into a third position (C), in which the second heel raiser (12) can restingly receive the heel of a ski boot during ski mountaineering, and so as to rotate into a fourth position (D); a fourth element (4) which is magnetic or magnetisable and which is mounted on-board the second heel raiser; at least one from between the first element (1) and the fourth element (4) being magnetic; the first element (1) and the second element (4) being arranged with respect to one another so that: when the first heel raiser (11) reaches the first position (A) and the second heel raiser (12) reaches the third position (C), the first magnetic element (1) and the fourth magnetic element (4) interact magnetically with one another, giving rise to a force which acts on the second heel raiser (12) so as to maintain it in the third position (C); when the second heel raiser (12) reaches or is in proximity of the fourth position (D), the second element (2) and the fourth element (4) interact magnetically with one another, giving rise to a force which acts on the second heel raiser (12) so as to attract it in the fourth position (D).

7. The heel-piece (10) with the heel raiser (11) of claim 1, comprising a control unit (14); wherein one from the first element (1) and the second element (2) is an electromagnet commanded by the control unit (14), which electromagnet comprises a nucleus made of a ferro-magnetic material, the electromagnet being further dimensioned so that when activated by a current having a predetermined direction and intensity, the first element (1) and the second element (2) interact magnetically with one another, giv-

ing rise to a fifth force which acts on the first heel raiser (11) and determines movement thereof from the first position (A) towards the second position (B) and/or vice versa.

8. The heel-piece (10) with the heel raiser (11) of the preceding claim, comprising a first plurality of elements (2, 5, 6, 7, 8), among which the second element (2), which are all electromagnets and are mounted on-board the heel-piece (10), wherein the elements of the first plurality of elements (2, 5, 6, 7, 8) are arranged along an arc of circumference, the centre of which coincides with the first hinge axis (G), so that the first element (1) is flanked, along a direction that is parallel to the first hinge axis (G), to each element of the first plurality of elements (2, 5, 6, 7, 8) as each said first element progressively displaces from the first position (A) to the second position (B), or vice versa.

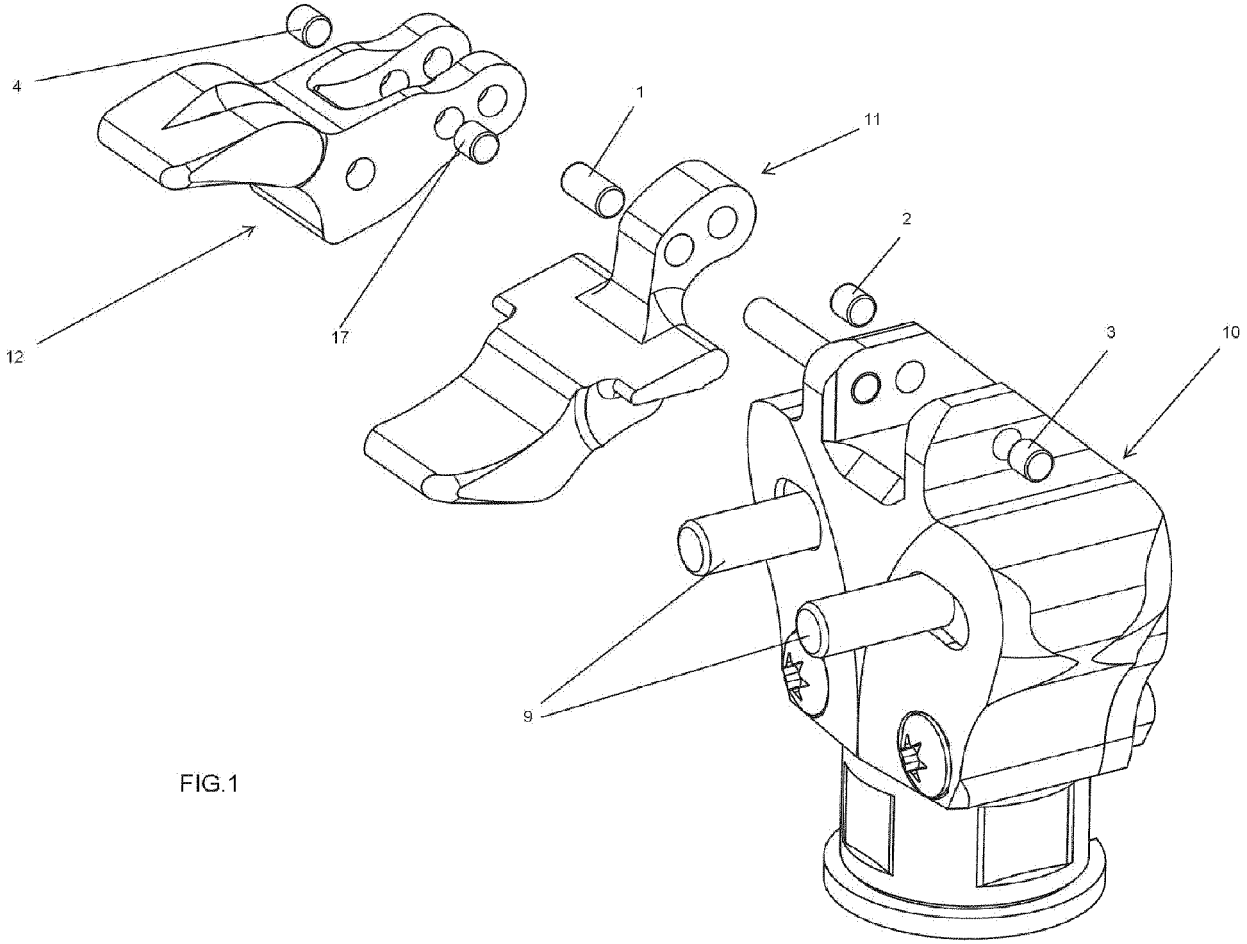

FIG.1

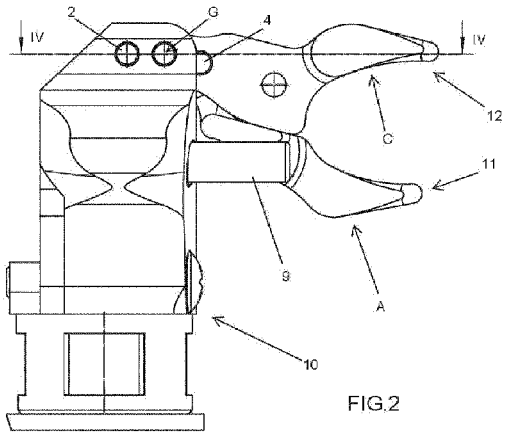

FIG.2

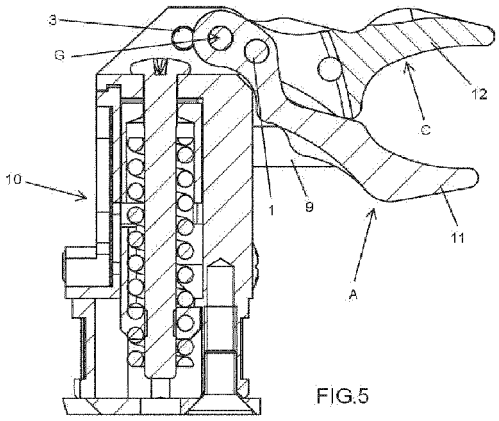

FIG.5

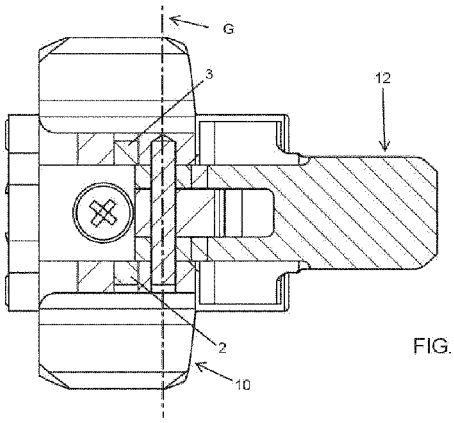

FIG.4

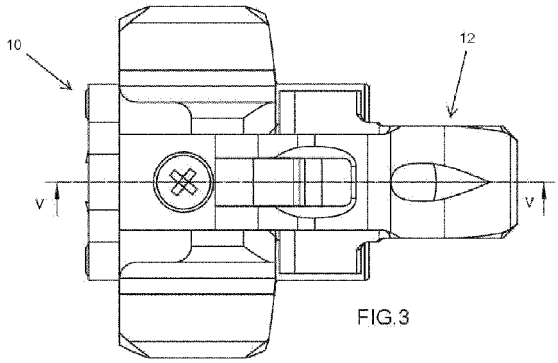

FIG.3

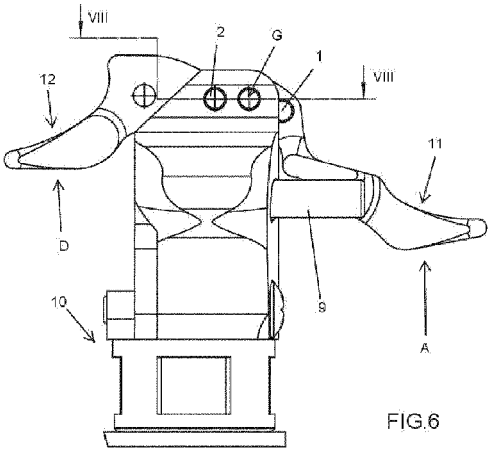

FIG.6

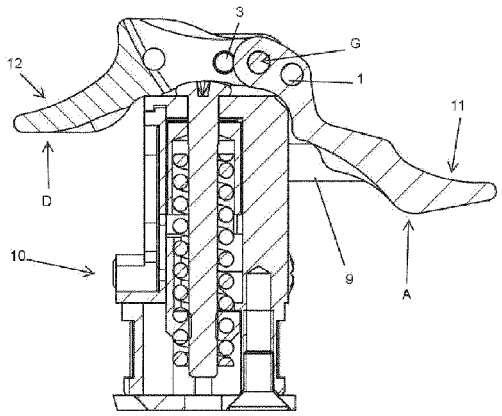

FIG.9

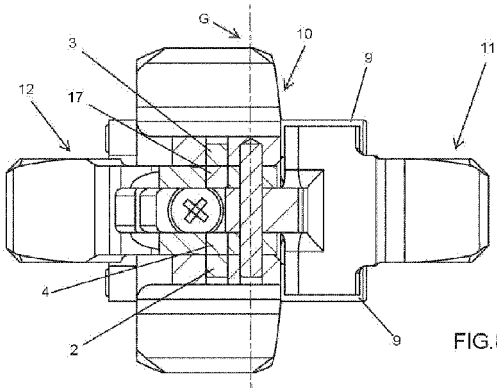

FIG.8

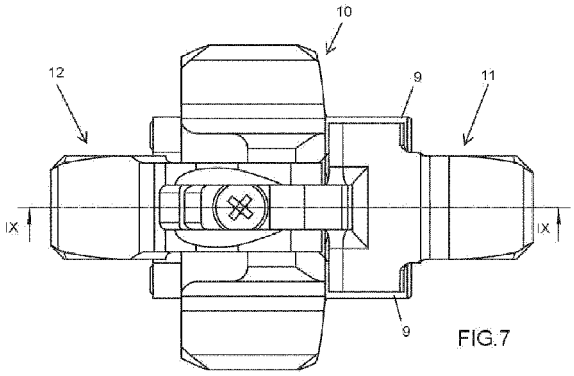

FIG.7

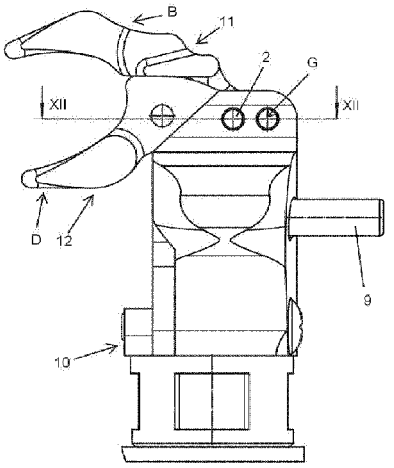

FIG.10

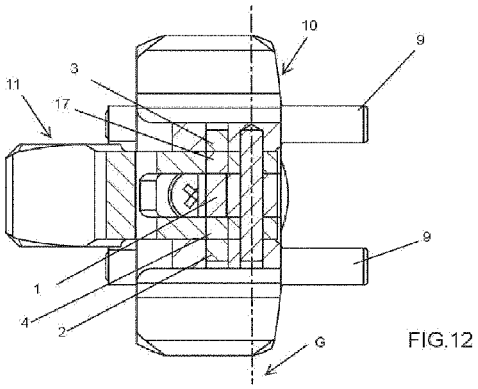

FIG.12

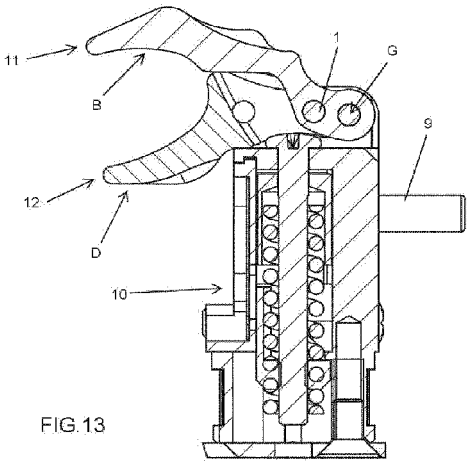

FIG.13

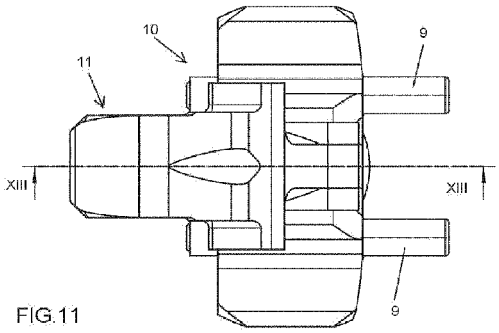

FIG.11

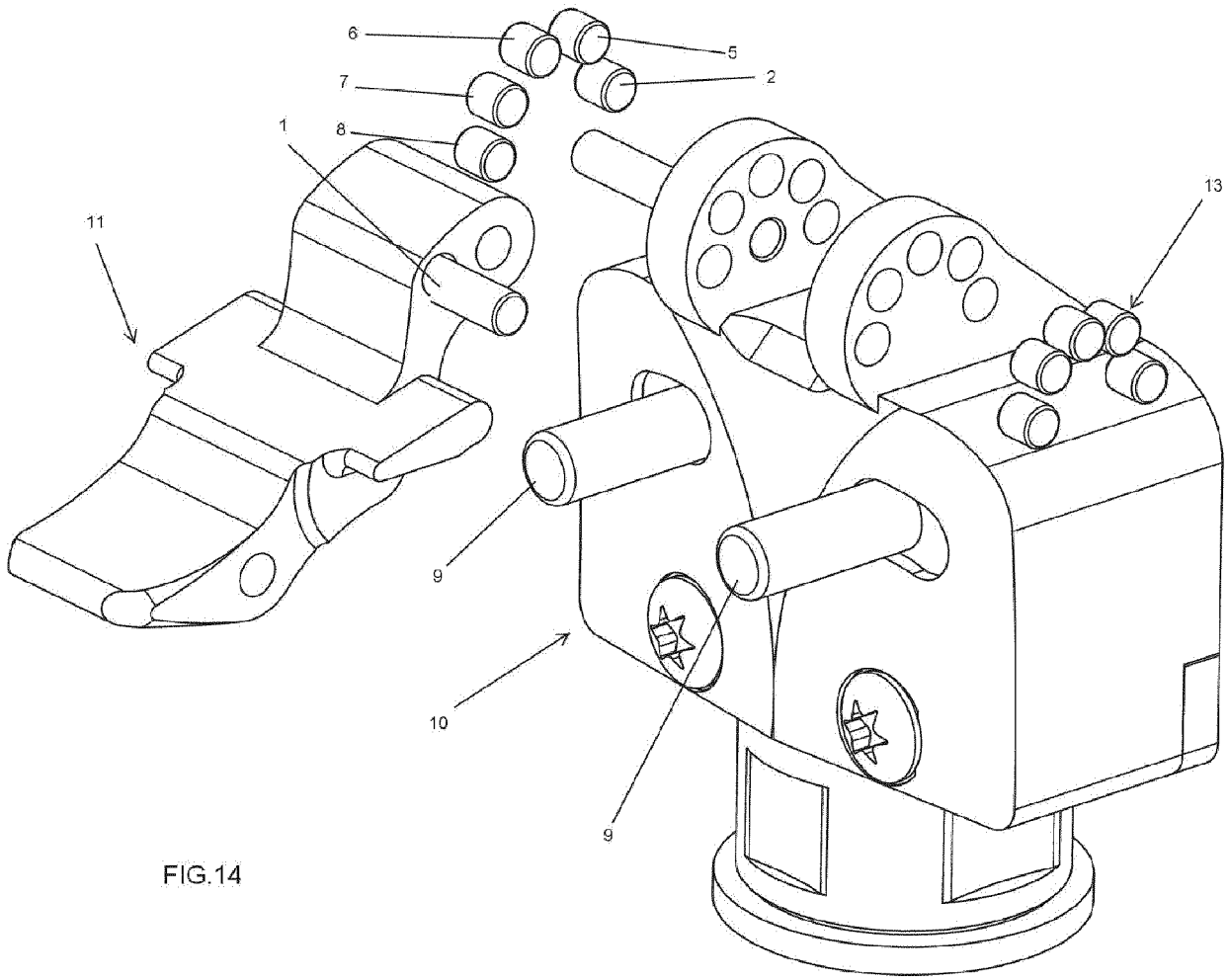

FIG.14

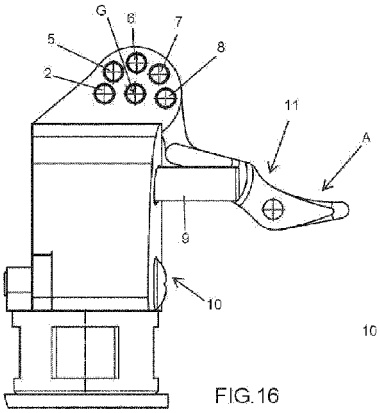

FIG.16

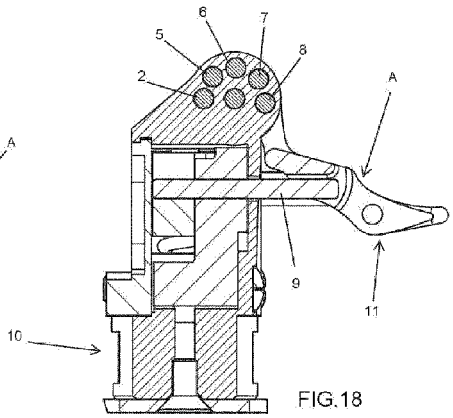

FIG.18

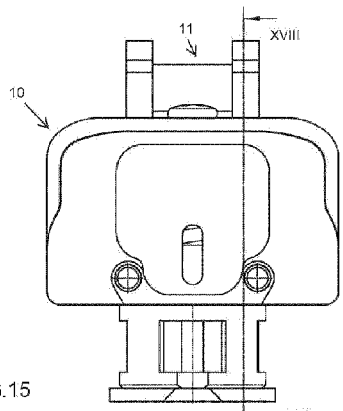

FIG.15

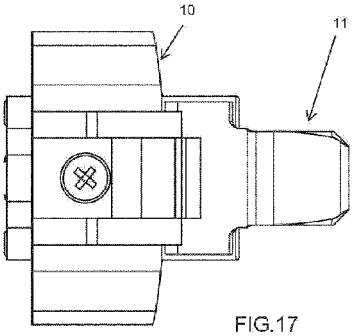

FIG.17

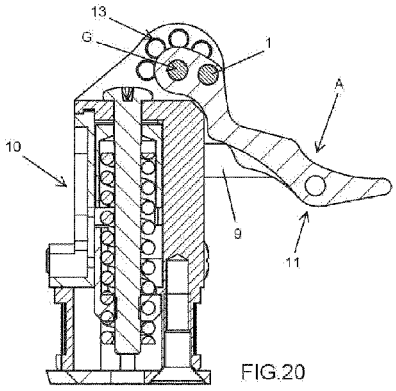

FIG.20

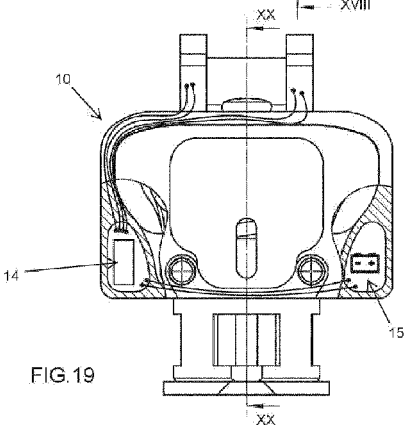

FIG.19

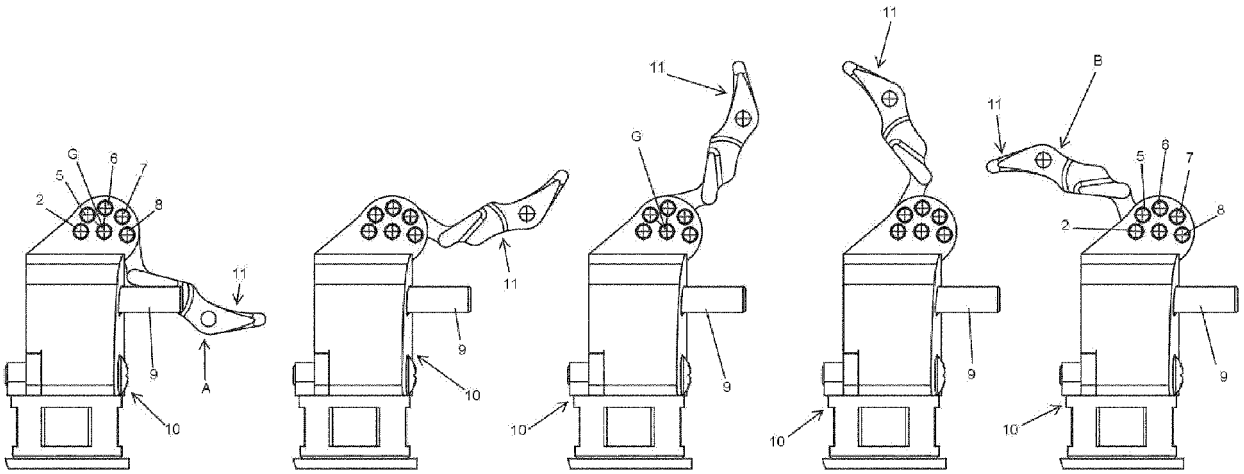

FIG.25 FIG.24 FIG.23 FIG.22 FIG.21

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EUROPEAN SEARCH REPORT

Application Number
EP 17 15 0682

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	WO 2012/024809 A1 (FRITSCHI AG SWISS BINDINGS [CH]; FRITSCHI ANDREAS [CH]) 1 March 2012 (2012-03-01)	1,2	INV. A63C9/084
A	* page 70, line 12 - page 71, line 2; figures 10a-10d *	3-8	ADD. A63C9/086
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A	* paragraph [0063] - paragraph [0069]; figures 1-2d, 4 *	3-8	
Y	EP 1 022 038 A1 (FRITSCHI AG SWISS BINDINGS [CH]) 26 July 2000 (2000-07-26) * paragraph [0016]; figures 3a-4 *	1,2	
A	WO 2013/173932 A1 (KOLLER STEFAN) 28 November 2013 (2013-11-28) * page 16, line 5 - page 18, line 27; figures 1a-1c *	1-8	
A	WO 2015/033807 A1 (KOBE STEEL LTD [JP]; KOBELCO CRANES CO LTD [JP]) 12 March 2015 (2015-03-12) * figures 1-18 *	1-8	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	23 June 2017	Brunie, Franck

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