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(54) Device to clamp, release and adjust portions of ski boots

(57) Device to clamp, release and adjust portions of ski boots (11), which are advantageously, but not only, ski boots for use with snow boards, the device being suitable to clamp, release and adjust the backwards and forwards rotation of the leg portion (12) of the boot in relation to the foot portion (13) on which the leg portion (12) is installed rotatably by means of lateral pivots (32), the device having a first complete clamping position (10b) (Fig.1), a second partial clamping position (10a) (Fig.2) and a third release position (10c) (Fig.3), the second partial clamping position (10a) being associated with an oscillation of the leg portion (12) by a desired determined angle in relation to a median angled position determined as desired by the user.

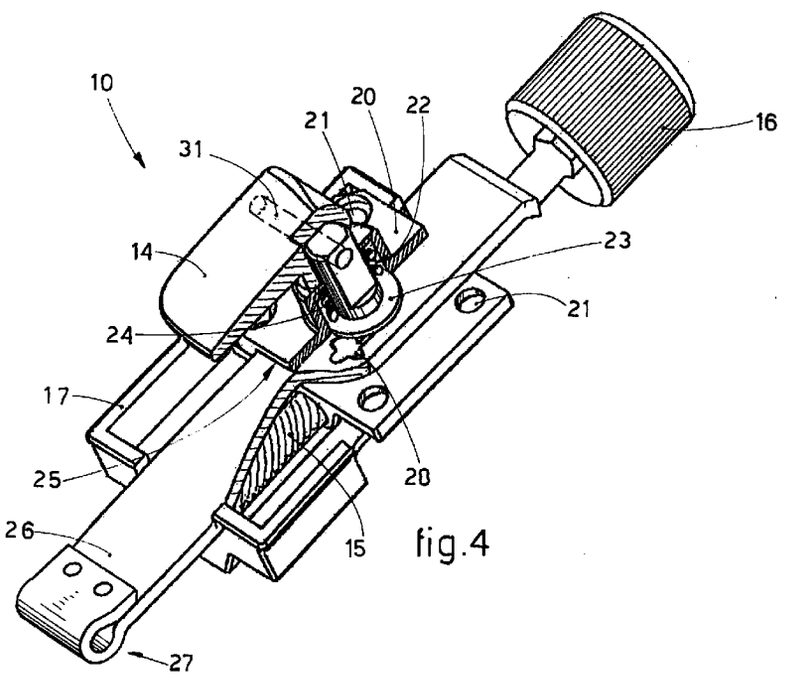

fig.4

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Description

This invention concerns a device to clamp, release and adjust portions of ski boots, as set forth in the main claim.

This clamping, releasing and adjusting device is applied to the field of footwear used for skiing and advantageously, but not only, for skiing with snow boards, in which a restricted travel of backwards and forwards oscillation of the leg portion in relation to the foot portion of the boot may be required even during skiing practice.

The device according to the invention is also applied advantageously to the footwear employed for other types of skiing such as downhill skiing, mountaineering skiing and acrobatic skiing in which an angular clamping of the leg portion of the ski boot in relation to the foot portion is required.

At the present time the problem of embodying a ski boot which enables correct walking to be performed when the skier is compelled to walk is much felt.

To be more exact, users require ever more often the availability of a boot which ensures a correct clamping of the foot during skiing but at the same time enables the leg portion of the boot to be bent in relation to the foot portion during walking so as to make possible a given bending of the ankle.

Moreover, users require more and more often ski boots with which it is possible to adjust very accurately but, at the same time, very quickly and simply the backwards/forwards angular position of the leg portion of the boot in relation to the foot portion.

To be more exact, in the performance of skiing with a snow board a boot is required in which during the performance a backwards and forwards determined and restricted oscillation of the leg portion is possible in relation to the foot portion of the boot.

Various systems have been disclosed which enable the backwards/forwards inclination of the leg portion in relation to the foot portion of the skiing boot to be clamped and released, and, more particularly, enable the leg portion of the skiing boot to be clamped and released in relation to the foot portion by acting on pre-arranged levers, pivots, keys or catches.

These devices, however, are very complex and complicated to operate.

Moreover, these devices have a structure which is fragile and hard to use in the event of intense humidity or cold, and therefore are often blocked owing to the penetration of water and/or snow within them and to the successive formation of ice.

Furthermore, the unavoidable wear caused by the use of these clamping and release devices entails a progressive decrease of the efficiency of the mechanisms with dangerous results since, where the leg portion is released in relation to the foot portion during skiing, the skier may lose control of the skis with results which may even be serious.

The clamping and release devices of the state of the art are also expensive and have an effect on the final cost of the ski boots.

IT-A-21619 A/88 discloses a device to clamp and release the rotation of the leg portion on the foot portion, the device including a stop means formed with a two-armed rotary lever, the respective abutment surfaces of which in the clamping position rest respectively on a lower abutment surface and an upper abutment surface included in the foot portion of the boot; the stop means is subjected to the action of at least one spring, which tends to bring the stop means back to the clamping position.

This means is fitted completely outside the ski boot and is therefore subject to actuation problems where there is snow or ice.

Besides, this device does not ensure enough safety since it is possible that the actuation lever fitted to the outer surface of the leg portion may be accidentally and unintentionally actuated, and thereby the leg portion may be released in relation to the foot portion of the boot, with the serious consequences which may be entailed thereby.

Moreover, the position of the actuation lever, especially in the release position, is such that it is readily subject to breakage since it protrudes considerably from the leg portion.

EP-A-0.582.803 discloses a ski boot in which the device that clamps and releases the leg portion in relation to the foot portion of the boot is embodied with a clamping lever, which can oscillate in the median plane in the backwards and forwards directions and abuts with its lower end against an abutment tooth provided on the outer surface of the foot portion so as to clamp the leg portion.

This oscillating lever is operated by cam actuation means or other means which are accessible from the exterior and which act on one of the ends of the oscillating lever.

This embodiment therefore requires extra parts, which increase the times for assembly of the boot and therefore the final cost of the boot.

Moreover, the above devices do not make possible a restricted travel of oscillation of the leg portion in relation to the foot portion of the boot as required by users who ski with snow boards.

WO-A-93/12683 discloses only the two positions for clamping and release of the upper on the foot portion without the ability to adjust the clamping position or to determine a partial clamping position.

EP-A-0.521.282 and EP-A-0.521.283 disclose a device for the clamping and release of the backwards and forwards rotation of the leg portion on the foot portion by means of an actuation means with respective linear or rotary displacement.

These devices do not permit the adjustment of the clamping position nor a partial clamping position for oscillation of the leg portion by a desired angle defined

in relation to a median angled position determined as desired by the user.

EP-A-0.249.149 discloses a clamping and release device which includes the ability to bend the leg portion slightly forwards, when the device is in the clamping position, by means of a resilient element, but adjustment of the clamping position is not included.

EP-A-0.358.599 discloses a clamping and release device which includes the ability to adjust the clamping position as desired within a given determined field but does not include a partial clamping position of the leg portion in relation to the foot portion.

FR-A-2.647.649 discloses a clamping and release device which includes the adjustment of the clamping position as desired. This device includes also the partial clamping of the leg portion in relation to the foot portion but the reduced travel is defined between a first fixed point of maximum forwards inclination or maximum backwards inclination and a second point which can be chosen between a determined and reasonable plurality of predetermined positions.

The present applicants have designed, tested and embodied this invention so as to overcome the shortcomings of the state of the art and to meet the ever more urgent requirements expressed for some time now by users, and also so as to achieve further advantages.

This invention is set forth and characterised in the main claim, while the dependent claims describe variants of the idea of the main embodiment.

The purpose of this invention is to provide a clamping, release and adjusting device which is fitted to the ski boots and has the purpose of clamping and releasing the reciprocal rotary backwards and forwards movements of the leg portion in relation to the foot portion of the boot as required to enable the user to walk.

Another purpose of the invention is to provide a device for adjustment of the backwards/forwards angular positioning of the leg portion in relation to the foot portion of the boot in the clamped usage position for the performing of skiing.

A further purpose of the invention is to provide an adjustment device which enables the leg portion to carry out a defined and restricted travel of backwards/forwards oscillation in relation to the foot portion of the boot during skiing with snow boards.

The device according to the invention is simple to embody and operate and makes possible a very accurate and continuous adjustment of the angular clamping position to suit the special requirements of the user.

The device according to the invention makes possible the rotary release of the leg portion from the foot portion of the boot while keeping stored, without any possibility of a mistake, the clamping position to which the leg portion is brought back when it is re-clamped.

The clamping, release and adjusting device according to the invention is fitted to the rear side of the boot and includes an adjustment knob means and a clamping/release lever means, both these means being easy to operate by the user wearing the boot.

The device according to the invention has a first complete clamping position, in which the leg portion is clamped at an angle to the foot portion of the boot in a position which can be adjusted as desired, and a second partial clamping position in which the leg portion is free to oscillate by a desired and determined angle in relation to the foot portion about a position which can be adjusted as desired.

The device according to the invention has a third release position in which the leg portion is free to rotate in the backwards and forwards directions in relation to the foot portion of the boot so as to make possible the correct walking of the user.

The device according to the invention includes a bar, which is solidly associated with the foot portion and in the complete release position is free to slide lengthwise in relation to a casing associated with the leg portion.

This casing is adjustably fitted lengthwise in position on the leg portion so as to enable the lengthwise position of the casing to be changed as desired in relation to the leg portion.

This casing cooperates with a slider, which cooperates with grooves included on the bar to prevent its sliding.

The slider has a partial clamping position, which permits a determined and restricted lengthwise sliding of the bar in relation to the casing so as to define a restricted angular travel of the leg portion in relation to the foot portion of the boot.

This partial clamping position is used advantageously during skiing with snow boards when it is required that the leg portion should be able to move by a desired and determined angle in relation to the foot portion of the boot.

The slider has a complete clamping position, in which the bar is solidly fixed to the casing, thus clamping the angular position of the leg portion in relation to the foot portion of the boot in a desired position.

This position can be altered as desired by acting on the means which position the casing in relation to the leg portion.

By means of the device according to the invention it is possible with a simple and quick operation:

- to release the bar from the casing and therefore the leg portion from the foot portion of the boot so as to enable the user to walk properly;
- to enable the bar to slide along a desired and determined segment in relation to the casing so as to make possible the oscillation of the leg portion in relation to the foot portion of the boot by a determined angle, for instance, for skiing with snow boards;
- to clamp the bar solidly to the casing, thus clamping the angular position of the leg portion in relation to the foot portion of the boot so as to make possible downhill skiing, mountaineering skiing or another type of skiing where an unchanging angular posi-

tioning of the leg portion in relation to the foot portion of the boot is required.

The attached figures are given as a non-restrictive example and show some preferred embodiments of the invention as follows:-

Fig.1	shows a three-dimensional rear view of a ski boot equipped with the clamping, release and adjusting device according to the invention in the complete clamping position;
Fig.2	shows a three-dimensional rear view of the ski boot of Fig.1 with the device according to the invention in the partial clamping position;
Fig.3	shows a three-dimensional rear view of the ski boot of Fig.1 with the device according to the invention in the release position;
Fig.4	shows in an enlarged scale a partly cut-away three-dimensional view of the clamping, release and adjusting device according to the invention;
Fig.5	shows a lengthwise section of the device of Fig.4;
Fig.6	is a view of the clamping/release pin of the device of Fig.4;
Fig.7	shows a plan view of the bar of the device of Fig.4;
Fig.8	is a knock-down three-dimension diagram of a second form of embodiment of the clamping and release device according to the invention;
Fig.9	shows a variant of the device of Fig.8;
Figs.10 and 11	show two other forms of embodiment of the clamping and release device according to the invention;
Figs.12a, 12b and 12c	show with partial diagrams the cooperation of the clamping pin with the groove of the bar of the devices shown in Figs.10 and 11 in the three different working positions.

In the attached figures the reference number 10 denotes generally a clamping, release and adjusting device according to the invention.

The device 10 according to the invention is applied to a ski boot 11 to clamp, release and/or adjust the angular position of a leg portion 12 in relation to a foot portion 13 of the boot in the backwards and forwards directions, the leg portion 12 being fitted so as to be able to rotate in relation to the foot portion 13 of the boot by means of lateral pivots 32.

The device 10 has a first complete clamping position 10b (Fig.1) in which the leg portion 12 is clamped at an angle to the foot portion 13 in a position determined as desired, a second partial clamping position 10a (Fig.2) in which the leg portion 12 is free to oscillate by a determined angle in relation to an intermediate point which can be altered as desired, and a third release position 10c (Fig.3) in which the leg portion 12 is free to oscillate in the backwards and forwards directions in relation to the foot portion 13 of the boot.

The device 10 according to the invention is positioned on the rear side of the ski boot 11 in a position readily accessible to the user.

In the form of embodiment shown in Figs.1 to 5 the device 10 according to the invention includes a clamping/release assembly actuated by a lever 14 and an adjusting assembly actuated by a screw-threaded shaft 15 associated with a knob 16, which is advantageously knurled.

The device 10 according to the invention includes an outwardly open container 17 firmly fixed to the leg portion 12 of the ski boot 11; the opposite end-walls 30 of the container 17 include holes 18 with which the screw-threaded shaft 15 cooperates; the screw-threaded shaft 15 is longitudinally stationary but is free to rotate about its axis.

The screw-threaded shaft 15 cooperates with a ring nut 19, which can move lengthwise along the container 17 and is upwardly associated with a casing 20.

In this case the casing 20 and ring nut 19 contain in their peripheries mating holes 21, with which fixture screws (not shown here) cooperate.

The casing 20 has at its lower ends lengthwise cavities 25, in which there slides lengthwise a bar 26 associated at one of its ends with the foot portion 13 of the boot 11.

In this case the bar 26 comprises an eyelet 27 by which the bar 26 is secured to the foot portion 13.

The bar 26 includes at an intermediate position a cross-shaped slot 28, which has a lengthwise segment 28a and a substantially perpendicular transverse segment 28b of a shorter length, the purpose of which will be made clear in the description that follows.

The casing 20 contains a seating 22 to lodge a pin 23, which can be rotated and be moved axially in a direction at a right angle to the ring nut 19, this pin 23 being associated with a spring 24.

The pin 23 terminates at its lower end with a slider 29 of an oblong shape substantially mating with the shape of the transverse segment 28b of the slot 28.

This pin 23 has substantially three different positions:

- a first complete clamping position, in which the slider 29 is positioned at a right angle to the lengthwise

axis of the slot 28 and cooperates with the transverse segment 28b of the slot 28, thus clamping the bar 26 longitudinally and therefore the leg portion 12 in relation to the foot portion 13 of the boot 11;

- a second partial clamping position, in which the slider 29 is positioned on the same axis as the lengthwise axis of the slot 28 and cooperates with the lengthwise segment 28a of the slot 28, thus permitting a lengthwise sliding of the bar 26 along a travel determined by the lengthwise segment 28a of the slot 28; with the pin 23 in this position the leg portion 12 is free to oscillate by a desired angle in a backwards or forwards direction in relation to the foot portion 13, as required when skiing with snow boards;
- a third raised release position corresponding to the release position 10c of the device 10 (Fig.3), in which the slider 29 does not cooperate with the slot 28 and the bar 26 is free to slide lengthwise in the cavities 25, thus releasing the leg portion 12 from the foot portion 13.

The pin 23 comprises at its upper end a lever 14, which is associated with the pin 23 by means of a locking pin 31 and enables the pin 23 to be rotated about its axis so as to bring the pin 23 from its partial clamping position (Fig.2) to the complete clamping position (Fig.1) and viceversa.

By rotating the lever 14 about the locking pin 31 it is possible to release the device 10 according to the invention inasmuch as, when the lever 14 is overturned by 180°, the pin 23 is raised and removes the slider 29 from the slot 28.

When the lever 14 is brought to the complete clamping position (Fig.1) and the slider 29 does not coincide with the transverse segment 28b of the slot 28, the slider 29 remains raised and resiliently thrust by the spring 24 against the bar 26 until the leg portion 12 has been positioned at the angle corresponding to the clamping position, in which the slider 29 springs forward to cooperate with the transverse segment 28b of the slot 28.

In the form of embodiment shown in Fig.8 the actuation means associated with the pin 23 comprise a first disk element 240 fitted rotatably to the casing 20 and also a second disk element 340 associated rotatably with the pin 23 by means of a gudgeon, which is not shown here.

The first disk element 240 includes on its upper surface cam means 43 consisting of wedge elements 44, with which there cooperate hollows 45 provided in the lower surface of the second disk element 340.

These hollows 45 are of a deep type 45a and of a shallow type 45b positioned alternately.

Depending on the relative angular position of the second disk element 340 in relation to the first disk element 240, the cam means 43 cooperate with the deep hollows 45a and with the shallow hollows 45b to define a low position and a high position of the pin 23.

Depending on the direction of rotation of the second disk element 340 in relation to the first disk element 240 in bringing the pin 23 to the lowered position, the slider 29 will be parallel or at a right angle to the lengthwise segment 28a of the slot 28 so as to determine the respective partial clamping position or complete clamping position.

In this case is shown a pin 38 connecting the eyelet 27 of the bar 26 to a hinge 39 which is solidly secured to the foot portion 13.

In the form of embodiment shown in Fig.9 the clamping and release means comprise a disk element 40 fitted rotatably to the casing 20 and having on its upper surface two grooves 33a and 33b located at different heights and offset by an angle to each other; with these grooves 33a, 33b there cooperates the locking pin 31 associated with the pin 23.

In this case the disk element 40 is associated with a lever 41 so as to bring the locking pin 31 into cooperation with the first groove 33a or second groove 33b so as to define respectively the release position or partial clamping position.

The pin 23 cooperates at its upper end with a rotary knob 42, which brings the slider 29 to a position parallel or perpendicular to the slot 28 so as to define the complete clamping position when the locking pin 31 cooperates with the second lower groove 33b.

In the forms of embodiment shown in Figs.10 and 11 the three different positions of clamping system are determined by acting only on the axial displacement of the pin 23 in relation to the bar 26 so as to define three different heights of the pin 23.

In these two forms of embodiment the pin 23 includes at its lower end a segment 36 of a reduced cross-section, which acts as a slider and has a cross-section coordinated with the width of the lengthwise segment 28a of the slot 28.

In the release position the pin 23 is lifted from the bar 26, which is free to slide (Fig.12a).

In the partial clamping position the segment 36 of a reduced cross-section cooperates with the lengthwise segment 28a of the slot 28, and the bar 26 is free to slide along a segment equal to the length of the slot 28 (Fig.12b).

In the complete clamping position the pin 23 is fully lowered and cooperates with the transverse segment 28b of a shape mating with the cross-section of the pin 23 so as to clamp the bar 26 in position (Fig.12c).

In the form of embodiment shown in Fig.10 the lever 14 is replaced by a disk element 140 which has on its upper surface three radial grooves 33a, 33b, 33c having different heights and being offset at an angle to each other; the locking pin 21 associated with the pin 23 cooperates with those radial grooves 33.

The disk element 140 is rotatably fitted on the casing 20.

The three grooves 33a, 33b, 33c are connected together advantageously by elements 34 having an inclined surface, with which the locking pin 31 cooperates when the disk element 140 is rotated to change the position of the clamping and release device.

In this case the three positions of complete clamping 10b, partial clamping 10a and release 10c of the device according to the invention correspond respectively with cooperation of the locking pin 31 with the grooves 33a, 33b and 33c.

In the form of embodiment shown in Fig.11 the lever 14 is replaced by a slider 35 able to move lengthwise on the casing 20 and including a lengthwise through slot 37 in which the pin 23 slides.

This slider 35 includes on its upper surface three grooves 33a, 33b, 33c at different heights, with which the locking pin 31 associated with the pin 33 cooperates to define the three different working positions.

The three grooves 33a, 33b and 33c are separated by elements 34 having an inclined surface, on which the locking pin 31 slides when the slider 35 is displaced from one position to another.

Claims

1. Device to clamp, release and adjust portions of ski boots (11), which are advantageously, but not only, ski boots for use with snow boards, the device being suitable to clamp, release and adjust the backwards and forwards rotation of the leg portion (12) of the boot (11) in relation to the foot portion (13) on which the leg portion (12) is installed rotatably by means of lateral pivots (32), the device being characterised in that it has a first complete clamping position (10b) (Fig.1), a second partial clamping position (10a) (Fig.2) and a third release position (10c) (Fig.3), the second partial clamping position (10a) being associated with an oscillation of the leg portion (12) by a desired determined angle in relation to a median angled position determined as desired by the user.

2. Device as in Claim 1, which comprises a container (17) associated with the leg portion (12) of the boot (11), in which container (17) is fitted an axially stationary screw-threaded shaft (15) free to rotate about its own axis, with which shaft (15) there cooperates a longitudinally movable ring nut (19) associated with a casing (20) containing a pin (23), which is perpendicular to the screw-threaded shaft (15) and comprises at its lower end a slider (29) and at its upper end actuation means, a bar (26) being included and being associated at one end with the foot portion (13) of the boot (11) and being installed so as to be able to slide longitudinally within the casing (20), the bar (26) containing a slot (28) with which there cooperates momentarily the slider (29) kept resiliently pressed by a spring (24).

3. Device as in Claim 1 or 2, in which the complete clamping position (10b) or partial clamping position (10a) are determined by acting with rotation on the screw-threaded shaft (15).

4. Device as in any claim hereinbefore, in which the slot (28) is shaped as a cross and comprises a lengthwise segment (28a) and a substantially perpendicular transverse segment (28b), with which segments (28a-28b) the slider (29) cooperates so as to determine respectively the position of partial clamping (10b) and the position of complete clamping (10a).

5. Device as in any claim hereinbefore, in which the means that actuate the pin (23) comprise a lever (14) associated by means of a perpendicular locking pin (31) with the pin (23).

6. Device as in any claim hereinbefore, in which the clamping and release of the leg portion (12) in relation to the foot portion (13) of the boot (11) are obtained by raising the pin (23) and rotating the lever (14) about the locking pin (31).

7. Device as in any claim hereinbefore, in which the change from the partial clamping position (10a) to the position (10b) of complete clamping of the leg portion (12) in relation to the foot portion (13) and viceversa is achieved by rotating the pin (23) by 90° about its own axis.

8. Device as in any of Claims 1 to 4 inclusive, in which the means to actuate the pin (23) comprise a disk element (40) fitted rotatably to the casing (20) and including on its upper surface two grooves (33a, 33b) offeset by an angle to each other and positioned at different heights, with which grooves (33a, 33b) the locking pin (31) cooperates.

9. Device as in Claim 8, in which the pin (23) is associated with a rotary knob (42) to bring the device to the complete clamping position (10b) when the locking pin (31) cooperates with the second groove (33b).

10. Device as in any of Claims 1 to 4 inclusive, in which the positions of complete clamping (10b), partial clamping (10a) and release (10c) are determined by the lengthwise position of the pin (23), the pin (23) including in its lower part a segment (36) of a reduced cross-section.

11. Device as in Claim 10, in which the actuation means comprise the disk element (40) fitted rotatably to the casing (20) and including in its upper surface three grooves (33a, 33b, 33c) offset at an angle to each other and positioned at different heights, with which grooves (33a, 33b, 33c) the locking pin (31) cooperates.

12. Device as in Claim 10, in which the actuation means comprise a slider (35) fitted so as to be able to slide on the casing (20) and including in its upper surface three parallel grooves (33a, 33b, 33c) perpendicular

to the lengthwise axis of the slider (35) and positioned at different heights, with which grooves (33a, 33b, 33c) the locking pin (31) cooperates.

13. Device as in Claim 11 or 12, in which the three grooves (33a, 33b, 33c) are connected together by elements (34) having an inclined surface.

14. Device as in any of Claims 1 to 4 inclusive, in which the actuation means comprise a first disk element (240) including wedge elements (44) on its upper surface and also a second disk element (340) rotatably associated with the pin (23) and including in its lower side hollows (45a, 45b) having different depths, the second disk element (340) being fitted rotatably on the first disk element (240).

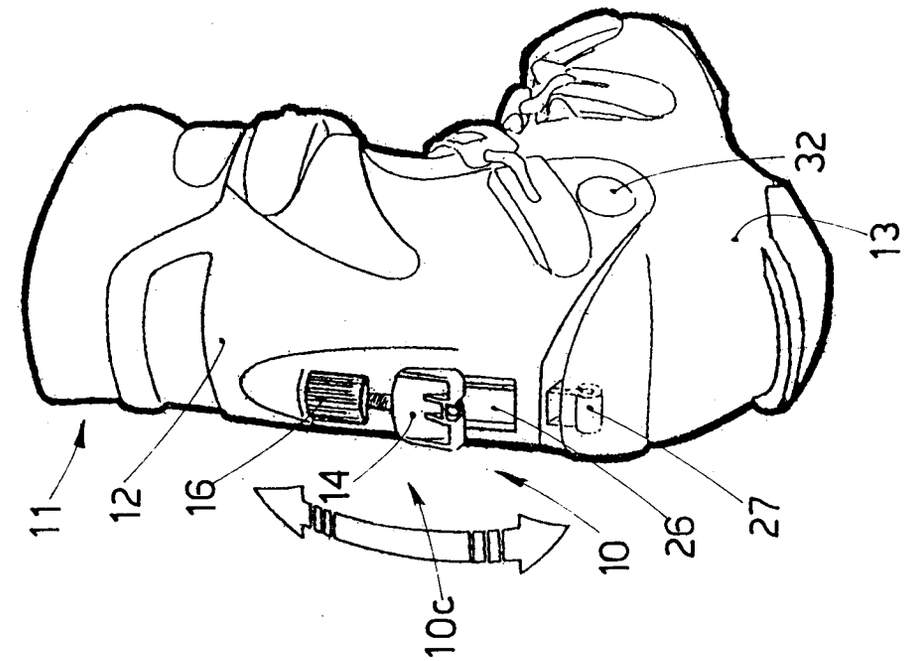

fig.3

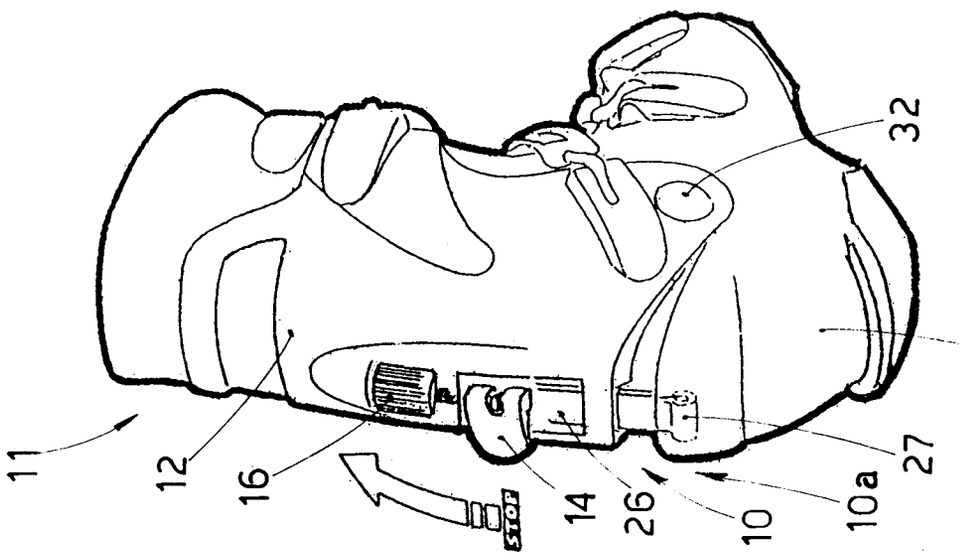

fig. 2

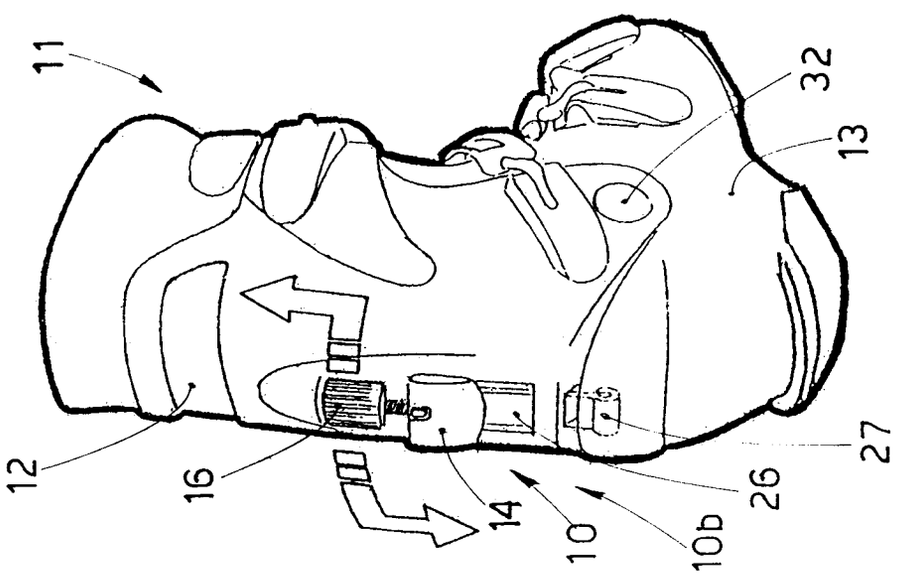

fig.1

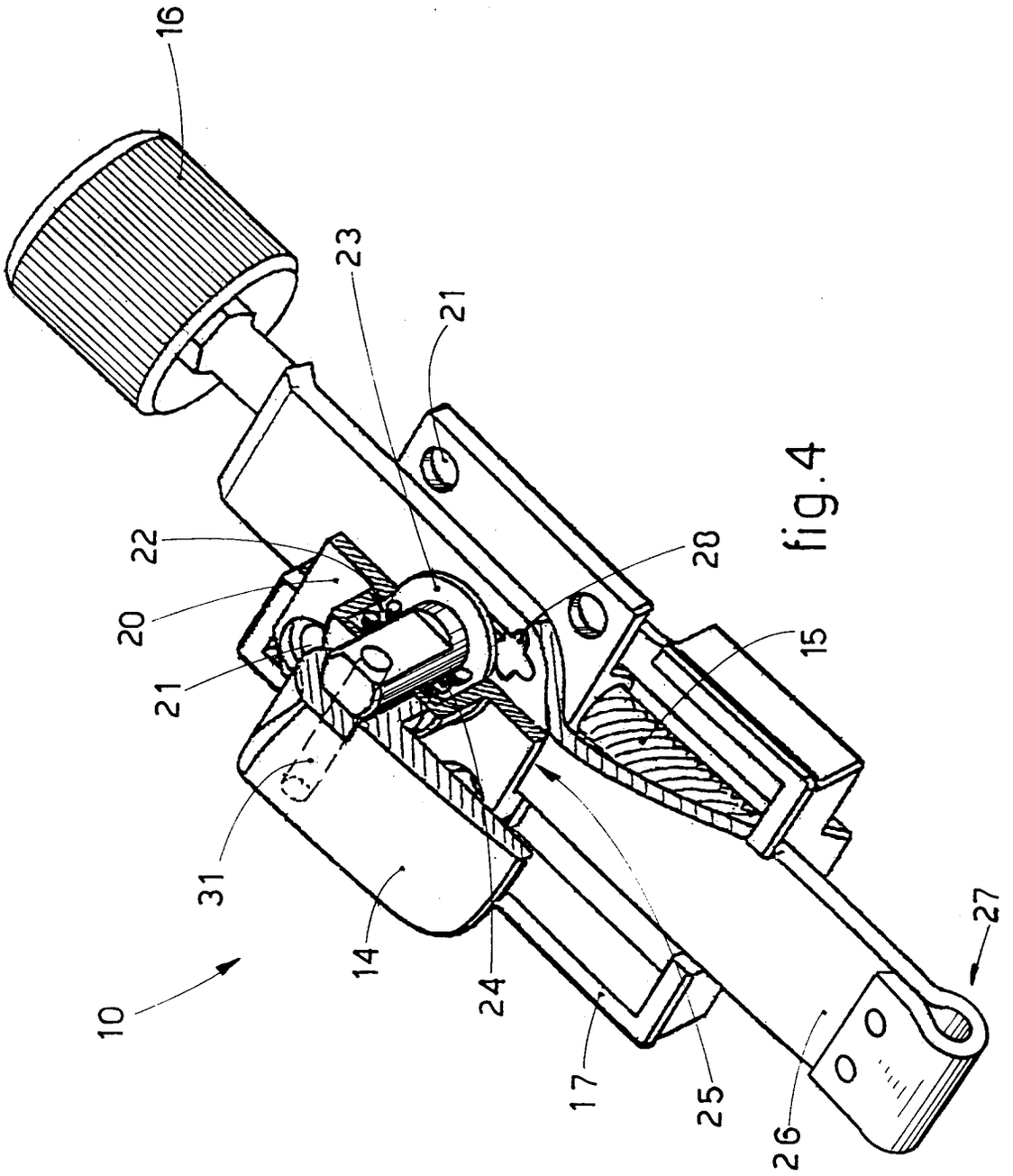

fig.4

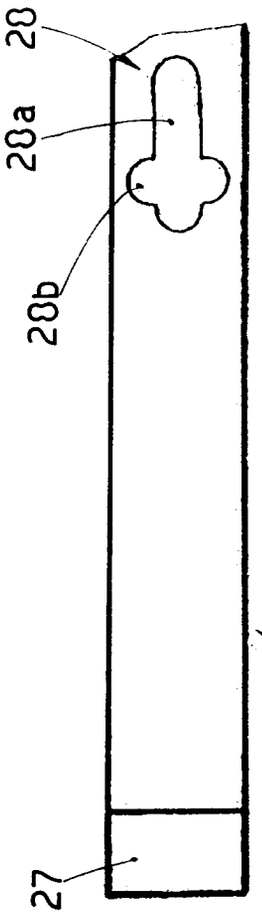

fig.7

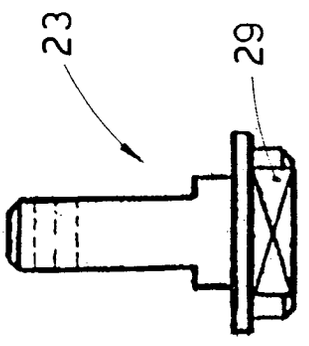

fig.6

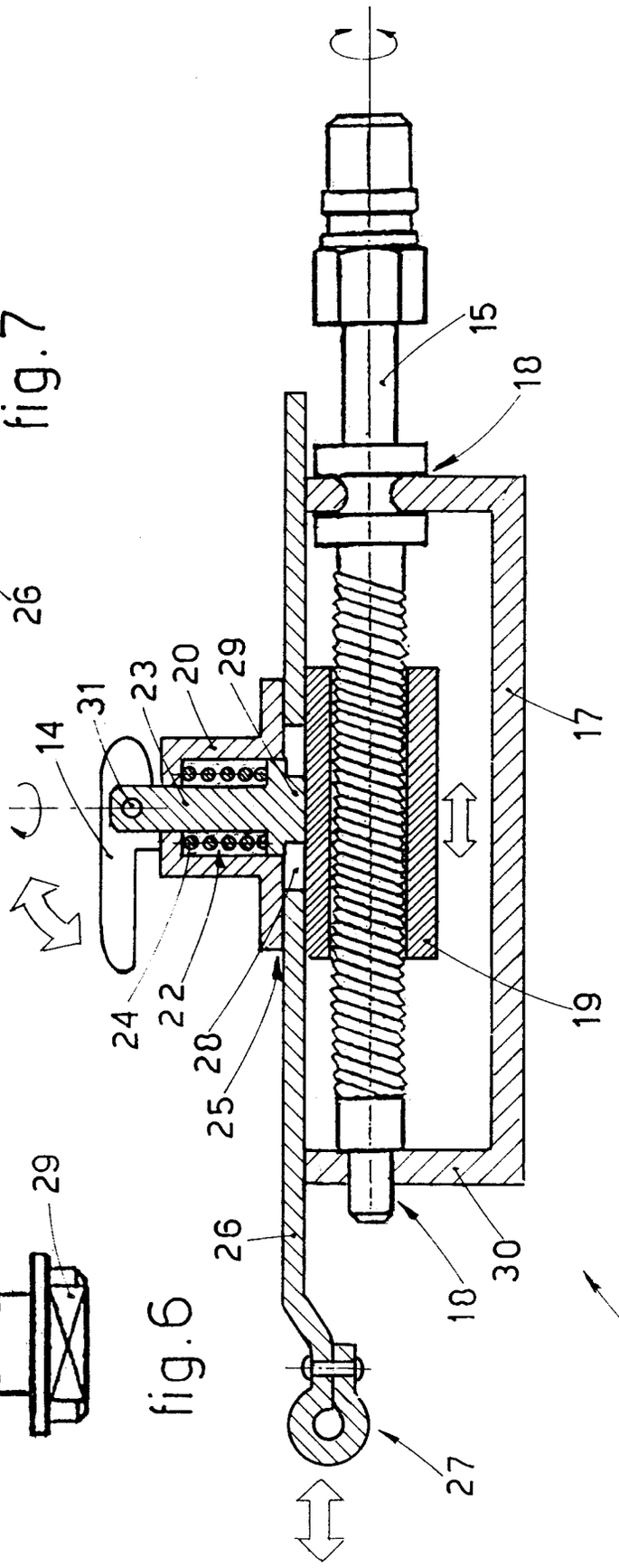

fig.5

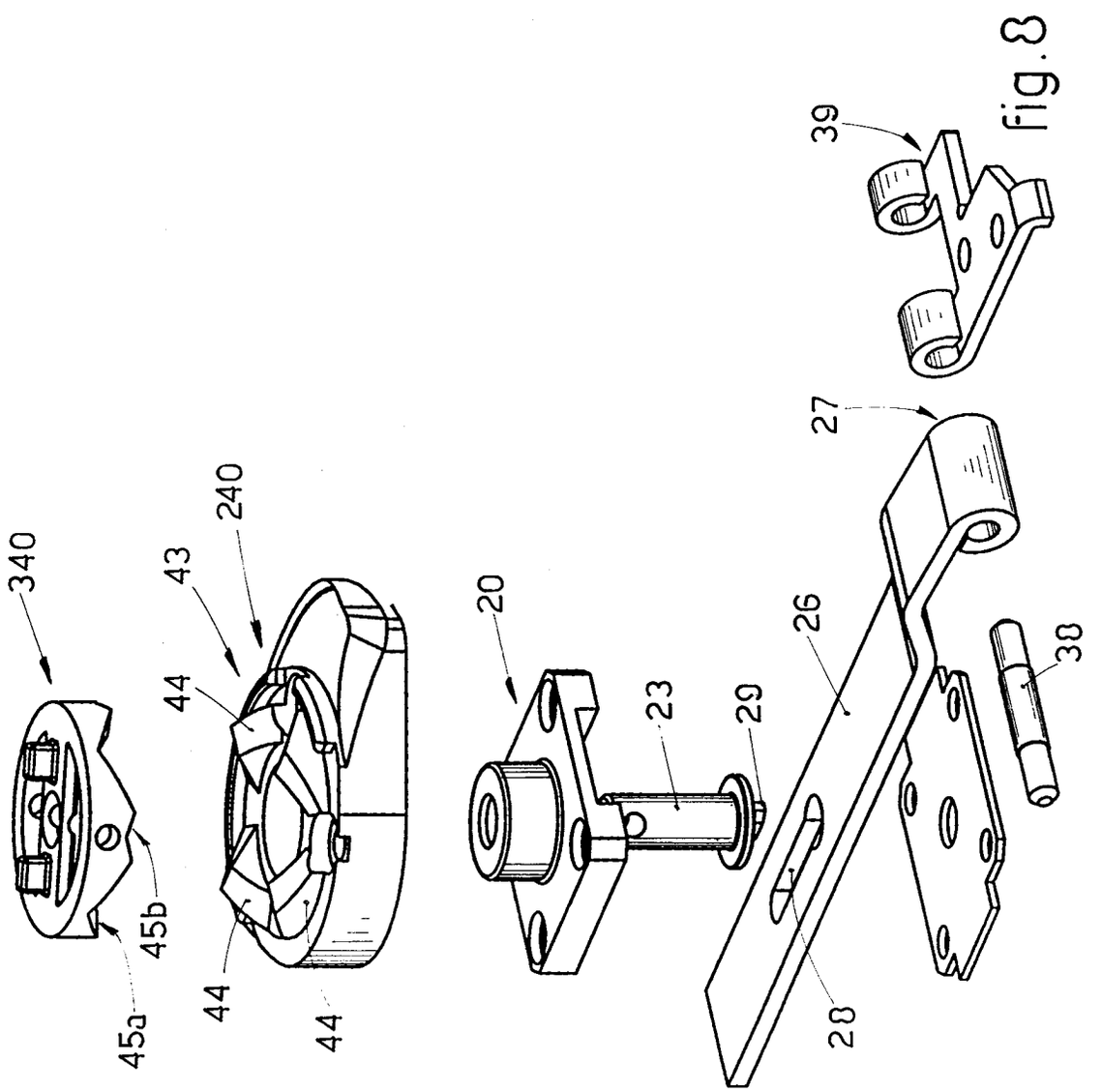

fig.8

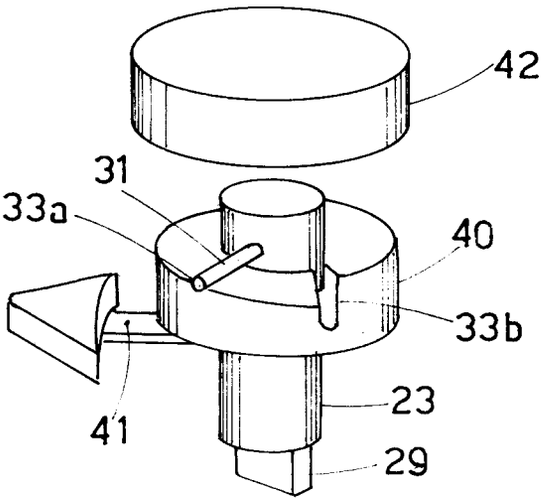

fig.9

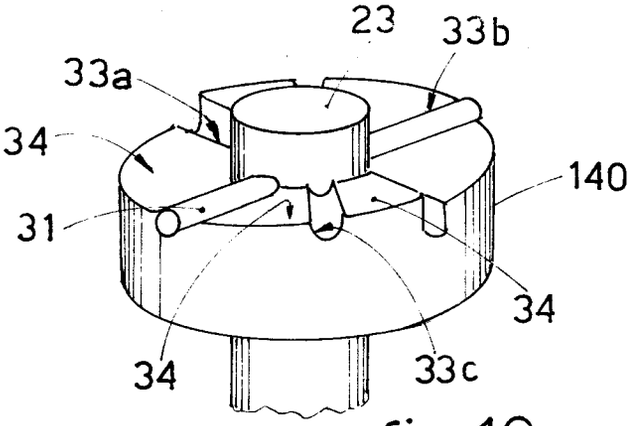

fig.10

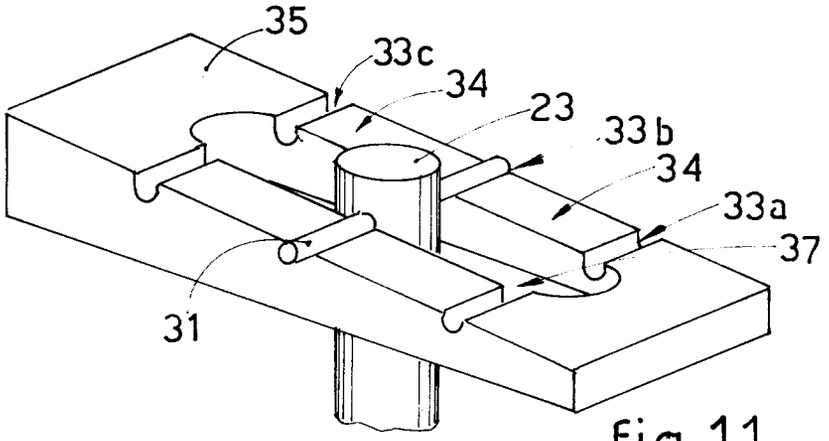

fig.11

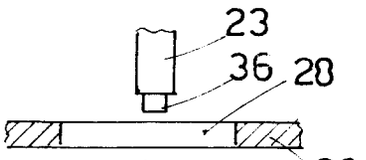

fig.12a

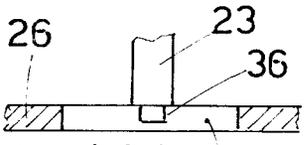

fig.12b

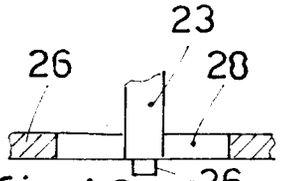

fig.12c

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 11 8282

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A,D	EP-A-0 521 283 (SALOMON) * the whole document *	1	A43B5/04
A,D	EP-A-0 521 282 (SALOMON) * the whole document *	1	
A,D	EP-A-0 248 149 (LANGE INT.) * the whole document *	1	
A,D	EP-A-0 358 599 (LANGE INT.) * the whole document *	1	
A,D	FR-A-2 647 649 (LANGE INT.) * the whole document *	1	
A,D	WO-A-93 12683 (KOFLACH) * the whole document *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

A43B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	9 February 1996	Declerck, J

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