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

(11) Publication number: **0 247 487 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **87107173.4**

(22) Date of filing: **18.05.87**

(51) Int. Cl.⁴: **A 43 C 11/00**, A 43 B 5/04

(30) Priority: **26.05.86 IT 8253886**

(43) Date of publication of application: **02.12.87 Bulletin 87/49**

(84) Designated Contracting States: **AT CH DE FR IT LI**

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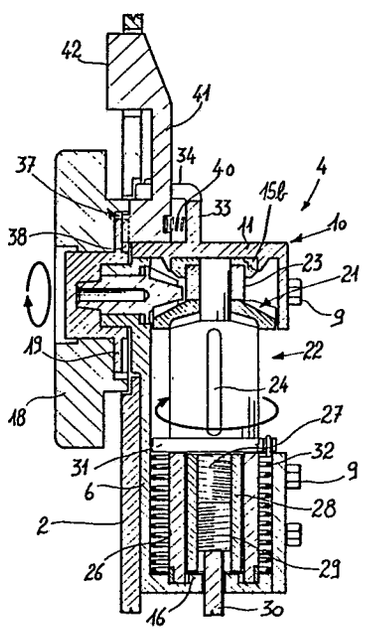
(54) Ski boot with fastening device.

(57) The ski boot has a fastening device which comprises a box-like body (4) which is associated with one of the ski boot quarters to be fastened together, a knob (18), and a toothed ring (19) associated therewith. The ring (19) cooperates with a tooth (37) for removably blocking its rotation. A lever (41) is provided which can be operated by the user and interacts with the tooth (37) for causing its quick coupling with and uncoupling from the ring (19). Inside the box-like body (4) is a bevel gear (21), for transmitting motion from the knob (18) to a winder (22), adapted for entraining a band-like element connected to the other of the ski boot quarters to be fastened together. A spring (32) is interposed between the winder (22) and the box-like body (4). The winder (22) comprises a bolt (29) which blocks the rotation thereof with respect to the boxlike body (4) after a preset and desired number of rotations. The spring (32) is adapted to allow the rapid rewinding of the winder (22).



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SKI BOOT WITH FASTENING DEVICE

The present invention relates to a ski boot with a fastening device.

The same Applicant disclosed, in European Patent application No. 85106345.3 filed on May 23, 1983 and European Patent No. 0 099 504, foot securing devices which which allow, by means of the use of a cable, to act on the foot instep presser and/or at the heel region to perform the closure of the boot.

The operation of the cable occurs by means of a knob of the type described in the European Patent No. 0 056 959 which allows to perform the rewinding of the cable, for its traction, on a spool which automatically remains in a blocked position.

A disadvantage found in said known type resides in the fact that the user must operate the knob in both the blocking and unblocking phases thereof; this operation cannot be performed quickly, since it is difficult to perform as the skier usually wears a glove.

A partial solution to said disadvantage has been disclosed by the Applicant in a published Italian Patent application no.21669 A/85 filed on July 23, 1985. Such devices for the securing of the foot wherein the unblocking occurs by virtue of a sensor, operated by the inner shoe or by a part of the shell or by the leg of the skier, which interacts with a ratchet, provided with a locking tooth which engages with a toothed ring, which can be operated by means of a knob on the outside of the quarter of the boot.

In another copending Italian Patent application, instead, a lever is provided which projects from the shell of the boot and which, when operated by the user, interacts with preset securing means adapted to releasably engage with the ring associated with the knob for the entrainment of the cable.

Such embodiments, though doubtlessly valid from a conceptual point of view, have a first disadvantage of being structurally complex and susceptible to possible malfunctions in the case of a lack of sufficient pressure on the sensor for the tooth to engage and block the teeth of the ring, and a second disadvantage of the need to impart to the knob a remarkable number of rotations in order to achieve the optimum closure of the flaps of the boot.

The main aim of the present invention is therefore to eliminate all of the disadvantages encountered in known types of ski boots incorporating fastening devices.

Within the above-cited aim, an object of the invention is to provide a ski boot with a fastening device which allows a remarkable simplicity of use for the user, allowing to facilitate the closure and opening operations of the flaps and/or of the quarters.

Another important object of the invention is to provide a ski boot with a fastening device which allows to achieve the optimum fastening of the flaps of the boot rapidly and gradually, as well as the quick unfastening of the same.

Another object of the invention is to provide a ski boot with a closure device which is structurally simple and which has with excellent characteristics of reliability.

Not least object of the invention is to provide a ski boot with a closure device which can be operated by the skier rapidly and simply even if the skier is wearing a glove.

The aim and the objects described above, as well as others which will become apparent hereinafter, are achieved by a ski boot with a fastening device, comprising a shell associated with two quarters adapted to be fastened together, a box-like body, associable with one of said quarters and provided with an actuation element, having associated therewith a toothed ring, adapted to cooperate with blocking means, adapted for releasably blocking rotation of said actuation element, there being furthermore provided an externally operable lever, adapted for selectively causing said blocking means to engage with and disengage form said ring, characterized in that it comprises a bevel gear, housed within said box-like body, operable by said knob and adapted for actuating a winding assembly, and connection element connected to the other quarter to be joined and adapted to be entrained by said winding assembly, between said winding assembly and said box-like body there being interposed an elastically deformable means, adapted for causing rewinding of said connection element.

Further characteristics and advantages of the invention will become apparent from the detailed description, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figs. 1 is a lateral view of a ski boot with a closure device according to the invention;

Fig. 2 is a rear perspective view of the ski boot of Fig. 1;

Fig. 3 is a sectional view taken along å mid-longitudinal cross section plane passing through the rear quarter of a ski boot according to the invention;

Fig. 4 is a cross sectional view;

Fig. 5 is a front perspective view of the lever;

Fig. 6 is an exploded view of the components of the closure device;

Fig. 7 is a cross sectional view taken along the plane VII-VII of Figure 4;

Fig. 8 is a lateral view of a ski boot with a fastening device according to the invention, as used to obtain the simultaneous closure of the quarter and securing of the foot;

Fig. 9 is a rear perspective view of the ski boot of figure 8;

Fig. 10 is a detail view of the shaft of the device for the closure of the quarter and the securing of the foot in the ski boot of Figs. 8 and 9;

Fig. 11 is a sectional view, taken along a mid-longitudinal cross section plane passing through the device associated with the rear quarter of the ski boot illustrated in Figs. 8 and 9; and

Fig. 12 is a schematic exploded view of the adjustment means of the device of Figs. 8 and 9.

With reference to the above described figures, the fastening device 1 is associated with a rear quarter 2 of a ski boot 3 and is composed of a box-like body 4, which is

partially closeable and is expediently accommodatable within a suitable seat 5 provided on said quarter 2.

The box-like body 4 is provided with a wall 6 advantageously having a semi-cylindrical shape and being positionable adjacent to the inner surface of the quarter 2 along an axis which substantially coincides with the longitudinal axis of the seat 5.

At the upper and lower perimetral edges of the wall 6, two pairs of flanges are provided, indicated by the reference numerals 7 and 8, which are arranged on the same plane, parallel with respect to the diametral plane of the wall 6, and advantageously provided with suitable holes for fastening means, such as nuts 9.

A first plate 10, essentially L-shaped and provided with a wing 11 which upwardly closes the wall 6, and a second plate 12, the surface whereof 13, facing towards the wall 6, also expediently has a substantially semi-cylindrical shape are respectively associable with said flanges 7 and 8. Below the wall 6, is a base 14 which connects the wall 6 to the flanges 8: on said base is provided a substantially cylindrical seat 15a wherefrom projects a cylindrical prong 16 having a through hole 17 formed therein.

The device 1 furthermore comprises a knob or the like actuation element 18, with which is associated a toothed ring 19, rotatably associated with the wall 6 proximate to its upper end and preferably at the mid-longitudinal axis. Said knob and ring are thus provided with an axle, on which a first conical gear 20, projecting within the body 4, is keyed and transmits the motion of the knob 18 to a second

conical gear 21 which is rigidly coupled to a winding assembly or winder, advantageously comprising a cylindrical shaft 22. Said shaft 22 is accommodated within the box-like body 4. A pin 23 projects upwardly and axially with respect to the shaft 22, and its head is accommodated in abutment within a seat 15b provided on the wing 11 of the plate 10; said shaft has a solid cylindrical central body, wherein a transverse through seat 24 is formed for a connection element for connecting the closure device to the front quarter, composed of a band 25a inserted therein. The latter projects outside the quarter 2 through a suitable slot provided at the sides thereof, its ends 25b being connected to the sides of the front quarter of the boot 3.

The shaft 22 is downwardly provided with a hollow body 26 which defines an axial seat 27 which is provided, in a transverse cross section, with a circular outer perimetral edge and an inner hexagonal edge for a complementarily shaped and internally threaded nut 28. The lower end of the hollow body 26 accommodates at the seat 15, a washer being advantageously arrangeable therebetween. A complementarily threaded bolt 29 engages with the nut 28, and has a central stem 30 which is accommodatable and slideable within the hole 17 formed in the prong 16, the end of said bolt 29 abutting thereon; said stem 30 prevents the rotation of the bolt 29.

Between the central body of the shaft 22 and the hollow body 26 is provided an annular flange 31 having a milling which defines an engagement seat for the end of an elastically deformable means composed of a torsion spring 32. The other end of the spring 32 is insertable within a

suitable seat defined on the base 14. Proximate to the free end of the wing 11 of the first plate 10, a shoulder 33 protrudes which has a tab 34, arranged parallel to the wing 11 and eccentrically with respect to its mid-longitudinal axis; two axially aligned through holes are provided on the tab 34, which projects in the direction of the free end of the wing 11, a small pin 35 being insertable between said through holes.

Thus, a means for releasably blocking of the rotation of the knob 18 can be positioned between the tab 34 and the flap 11, composed of a ratchet 36, comprising a central body advantageously in the shape of a parallelepipedon having a through hole, which is the seat for the small pin 35 and is provided proximate to an end thereof and at the surfaces facing said wings 11 and tab 34. At the other end of said central body is a tooth 37, which projects towards the ring 19 to engage with and block the teeth 38 thereof. At the surface of the body of the ratchet 36 opposite to the one from which the tooth 37 protrudes, a seat 39 is formed for accommodating the end of a spring 40 which interacts, at its other end, with the shoulder 33. The ratchet 36 can be operated by means of a lever 41, which projects perpendicular to said central body along an axis which is parallel to the pivot axis of the small pin 35. Said lever 41 is expediently provided at its free end with a button 42 which projects from the quarter 2 through a suitable opening provided thereon.

The operation of the device 1 is as follows: regarding the opening of the quarters, the skier, by pressing only the button 42, imparts a rotation to the ratchet 36 about the

axis of the small pivot 35, thus disengaging the tooth 37 from the teeth 38 of the ring 19. Accordingly the knob 18 can rotate freely and so can the shaft 22, allowing the unwinding of the band 25 wound thereon; the skier then achieves the opening of the boot by simply moving the rear quarter 2 backwards. Simultaneously with respect to the unwinding of the band 25, the spring 32 is loaded and axial motion of the bolt 29 occurs as indicated in Fig. 3. Once the opening has been performed, the skier releases the button 42: the spring 40 then pushes the ratchet 36 and causes the tooth 37 to engage again with the teeth of the ring 18, thereby blocking movement of the knob 18.

In order to effect the closure of the ski boot, it is thus sufficient to place the rear quarter 2 close to the front one and press the button 42, thus disengaging the teeth 37 of the ratchet from the teeth 38 of the ring.

Since the rotation of the knob 18, and therefore of the shaft 22, is no longer blocked, the latter rewinds rapidly, and the spring 32 discharges with similar speed.

The band 25 is thus tensioned and the desired degree of securing is achieved by rotating the knob 18, thus further discharging the spring.

In order to avoid an excessive loading of the spring 32 during the opening phase, the bolt 29 is allowed to perform a translatory motion, opposite to the one indicated in Fig. 3, which causes it to abut with the prong 16.

Figs. 8-11 illustrate a second embodiment of the device, which is capable of simultaneously performing the closure of the quarters and the securing of the foot. In particular, Figs. 10 and 11 illustrate a device 100 which is

modified, with respect to the device 1, so that it is able to perform simultaneously the winding of the band 25a, as described above, and of a traction element which acts on a foot presser element. The traction element is preferably a cable 50 associated, at one of its ends, with a spool 22a provided on the shaft 22 in a position proximate to the region of rewinding of the band 25a.

The cable 50 unwinds inside the boot by means of transmissions, for example by means of the pulleys 51 and 52 fixed inside said boot, and transversely embraces a presser 53, which in this case acts on the instep of the foot.

Advantageously, means are provided for the adjustment of the useful length of the cable 50, comprising an adjustment element 54 fixed to the shell of the boot, preferably in the front lateral region and connected to the free end of the cable 50. The adjustment element 54 can be of any known type deemed suitable, or of the type illustrated schematically in Fig. 12, and is fixed to the quarter so that it can be accessed from outside for the adjustment of the pressure on the foot.

As illustrated in Fig. 12, the adjustment element 54 comprises a stem 55 which is threaded and rotatably associated with the quarter of the boot. The stem 55 is provided with an end 56 rigidly coupled to the quarter and with a stem 57 which projects out of the quarter. A lever 58 is associated with the free end of the stem 105 to allow the user to rotate the stem; a small block 59 is associated with the threaded portion of the stem 55 so that a rotation of the stem is matched by a translatory motion of the small

block 59. The end of the cable 50 is rigidly coupled to the small block 59 by means of the ring 60, so that by rotating the stem 55 by means of the lever 58, the tension of the cable 50 is adjusted.

The operation of the device is similar to what has been described previously, except that in this case the securing of the foot is achieved simultaneously with respect to the closure of the quarters.

The adjustment element 54 allows an independent adjustment of the pressure on the foot and the "memorization" or calibration of said setting, so that it is no longer necessary to perform such calibration every time the boot is worn. In practice, the skier, after putting the boot on, acts on the knob 18 to close the quarters, then performs the adjustment of the pressure exerted on the foot by the presser 53 by means of the adjustment element 54. In order to remove the boot, it is sufficient to act on the button 42, in the manner described previously, to open the quarters and simultaneously release the foot from the action of the presser 53. When wearing the boot again, it is necessary to act only on the knob 18, since it is not necessary to act again on the adjustment element 54 except when it is desired to vary the adjustment of the pressure on the foot performed previously.

It has thus been observed that the invention has achieved the aim and the objects intended, a device having been obtained which allows a remarkable practicality in use for the user, since it allows the same to facilitate the operations of closure and opening of the flaps and/or of the quarters and the securing of the foot.

Said device also allows to achieve a very rapid closure, the optimum closure of the flaps and/or quarters and the quick unfastening thereof, the device being structurally very simple and being provided with excellent characteristics of reliability.

Naturally, the invention thus conceived is susceptible to numerous modifications and variations, all of which are within the scope of the same inventive concept.

All the details may therefore be replaced with technically equivalent elements, while in practice, the materials employed, so long as compatible with the specific use, as well as the dimensions and the contingent shapes, may be any according to the requirements.

CLAIMS

1. Ski boot with a fastening device comprising a shell associated with two quarters adapted to be fastened together, a box-like body, associable with one of said quarters and provided with an actuation element, having associated therewith a toothed ring, adapted to cooperate with blocking means, adapted for releasably blocking rotation of said actuation element, there being furthermore provided an externally operable lever, adapted for selectively causing said blocking means to engage with and disengage from said ring, characterized in that it comprises a bevel gear, housed within said box-like body operable by said knob and adapted for actuating a winding assembly, and a connection element connected to the other quarter to be joined and adapted to be entrained by said winding assembly, between said winding assembly and said box-like body there being interposed an elastically deformable means, adapted for causing rewinding of said connection element.

2. Ski boot according to claim 1, characterized in that said knob and said ring, are rotatably associated with a wall of said box-like body by means of an axle, at the end of the latter, projecting within said box-like body, there being keyed a first conical gear.

3. Ski boot according to claim 1, characterized in that said winding assembly comprises a cylindrical shaft accommodatable and rotating within said box-like body, said shaft being provided with a solid central body to which a second conical gear is upwardly rigidly coupled and cooperates with said first gear and downwardly with a hollow

body, between said two central and hollow bodies there being provided an annular flange.

4. Ski boot according to claims 1 and 3, characterized in that it comprises a pin, arranged axially with respect to said second conical gear and protruding upwardly, the head thereof being accommodated in abutment within a suitable seat provided on a flap of said box-like body.

5. Ski boot according to claims 1 and 4, characterized in that said central body comprises a transverse through seat for an element for connecting to the other of said flaps to be joined, composed of a band which protrudes from the rear quarter through suitable lateral slots.

6. Ski boot according to claims 1 and 4, characterized in that said shaft has a hollow body which defines, in its interior, an axial seat defining, in a transverse cross section, a perimetral inner polygonal edge and an outer circular edge, the free end of said hollow body being accommodated within a seat formed on the base of said box-like body, axially with respect to said base there protruding partially within said axial seat a tab provided with a through hole.

7. Ski boot according to claims 1 and 6, characterized in that said hollow body comprises an axial seat accommodating a complementarily shaped element cooperating with means adapted to block the rotation of said winding assembly with respect to said body after a preset and desired number of rotations.

8. Ski boot according to the preceding claims, comprising an elastically deformable means interposed between said winding assembly and said box-like body, said

elastically deformable means comprising a cylindrical torsion spring the ends whereof are one accommodated in a seat provided on said annular flange and the other in a seat provided on said base.

9. Ski boot with a fastening device, comprising a base associated with two quarters, a box-like body associated with one of said quarters and provided with a knob with associated a toothed ring which cooperates with means for the removable blocking of the rotation of said knob, a lever being furthermore provided which can be operated from the outside and interacts with said blocking means for their quick coupling and uncoupling with said ring, characterized in that it comprises within said box-like body a bevel gear operated by said knob and operating at least two winding assemblies, a first winding assembly for an element for connecting said quarters and a second winding assembly for a traction element which acts on a foot presser element, to perform simultaneously the closure of said quarters and the securing of the foot.

10. Device according to claim 9, characterized in that said traction element is composed of a cable and is provided with means for the adjustment of its useful length which are accessible from the outside.

11. Device according to claim 9, characterized in that said foot presser element is a presser placed at the instep of the foot.

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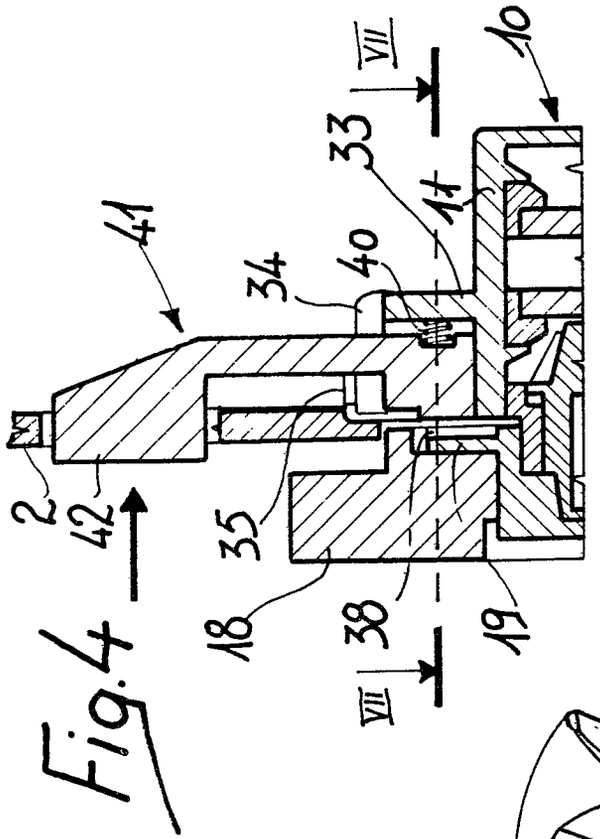

Fig.4

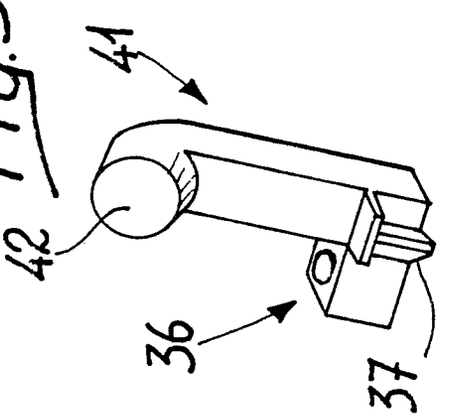

Fig.5

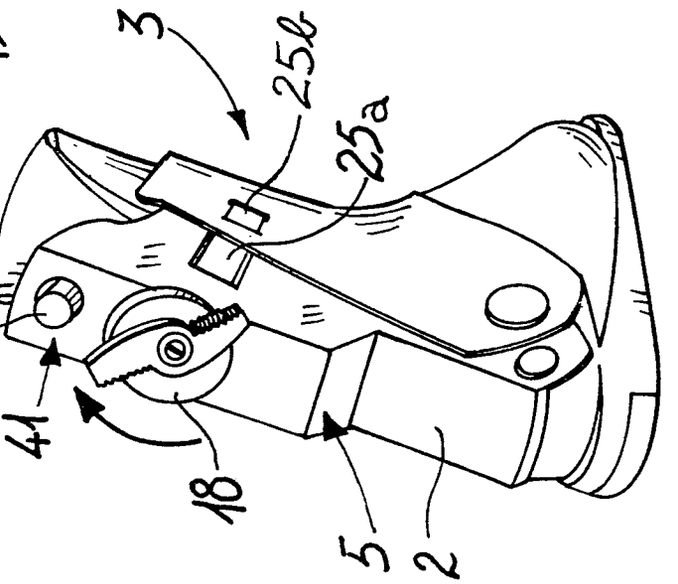

Fig.2

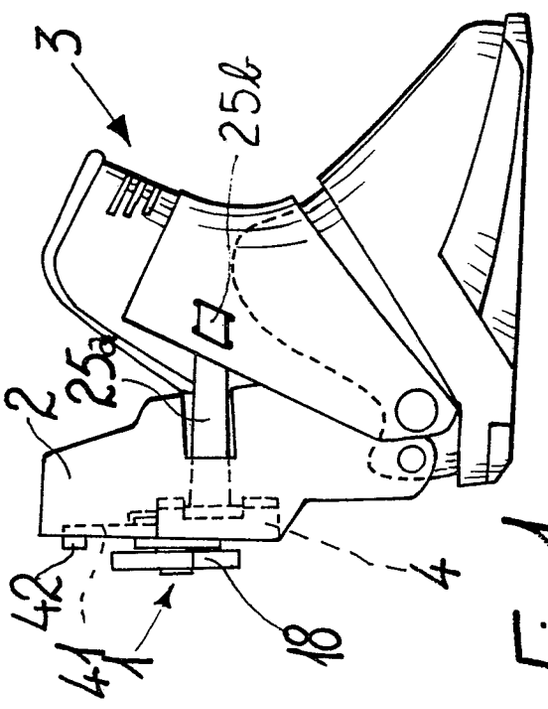

Fig.1

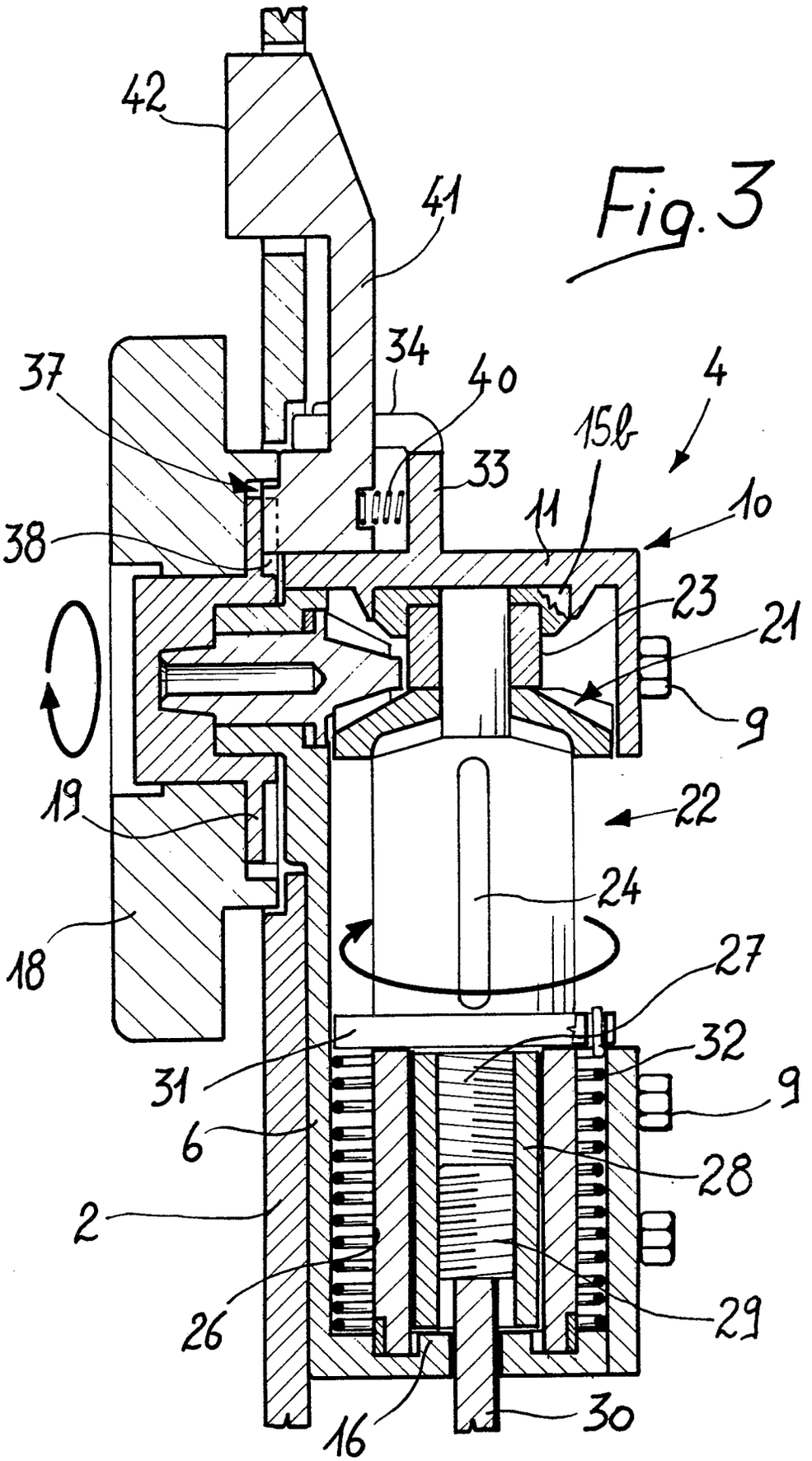
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Fig. 3

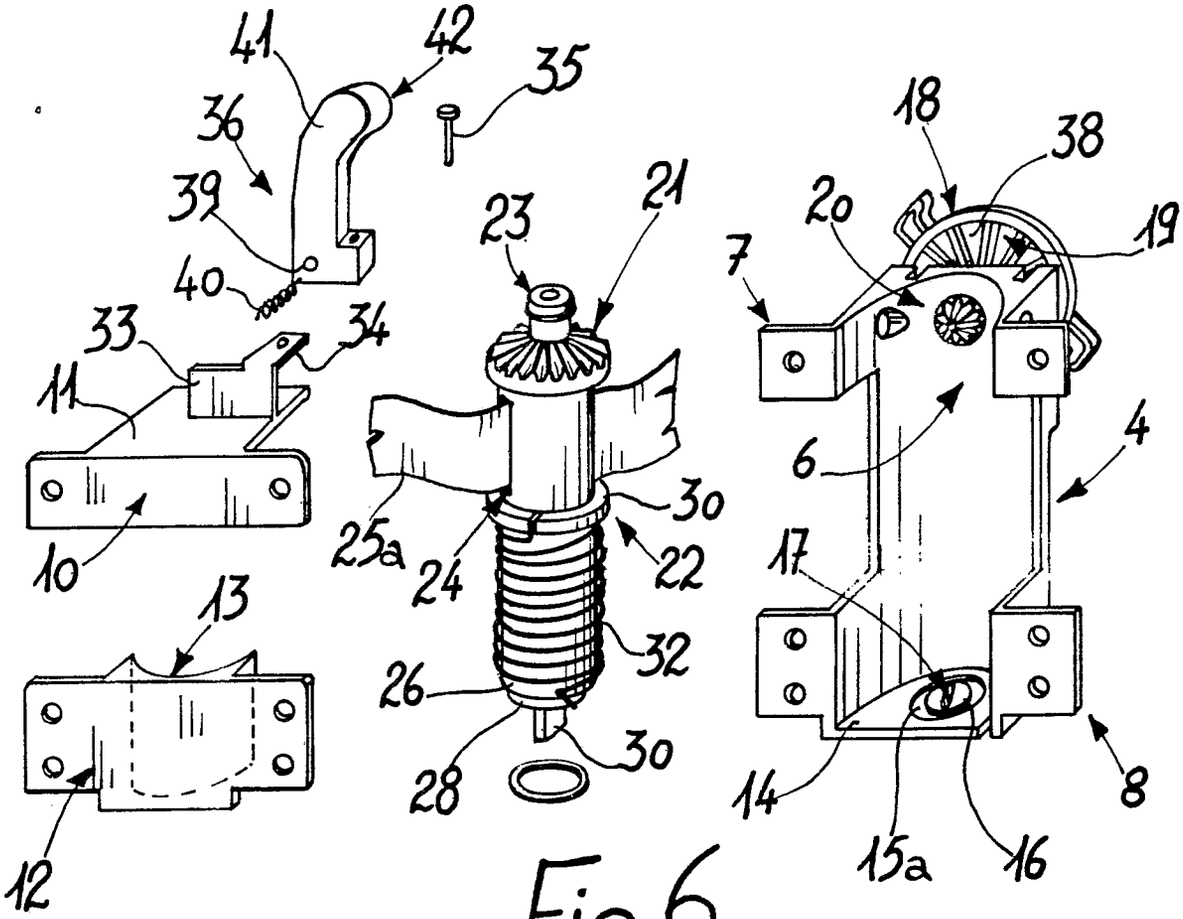
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Fig. 6

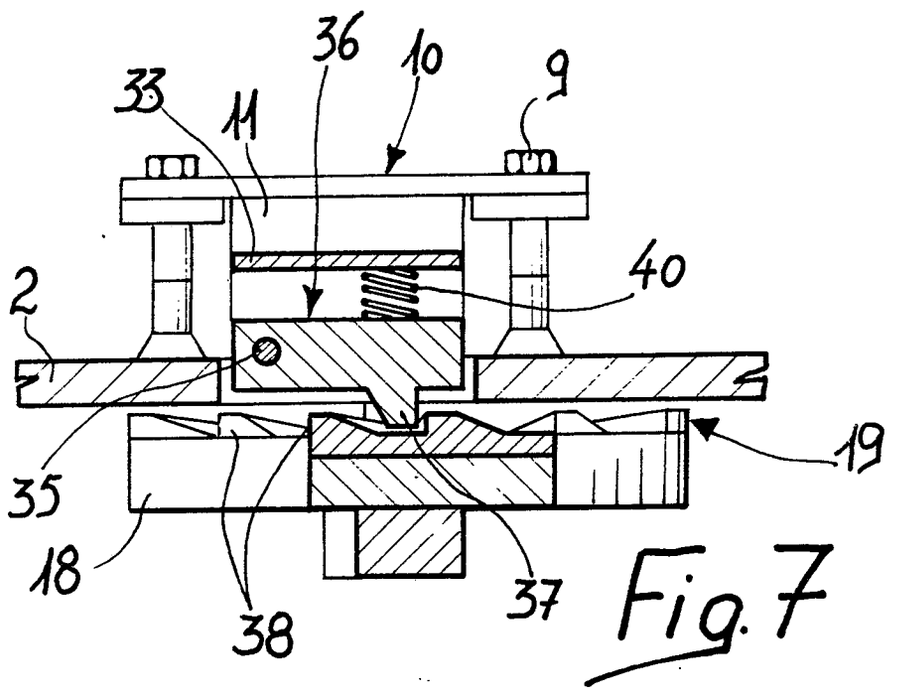
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Fig. 7

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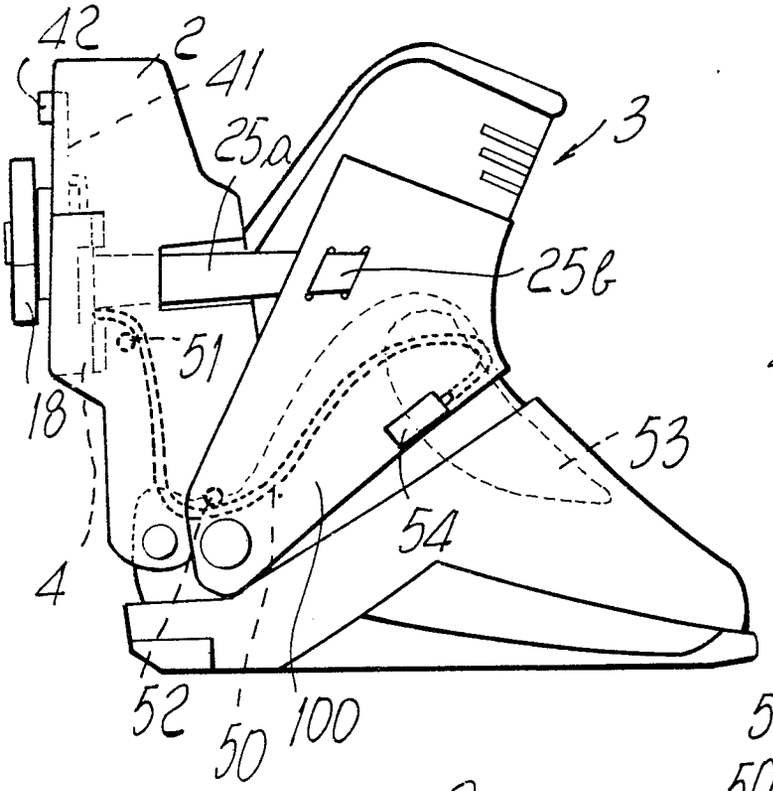

FIG. 8

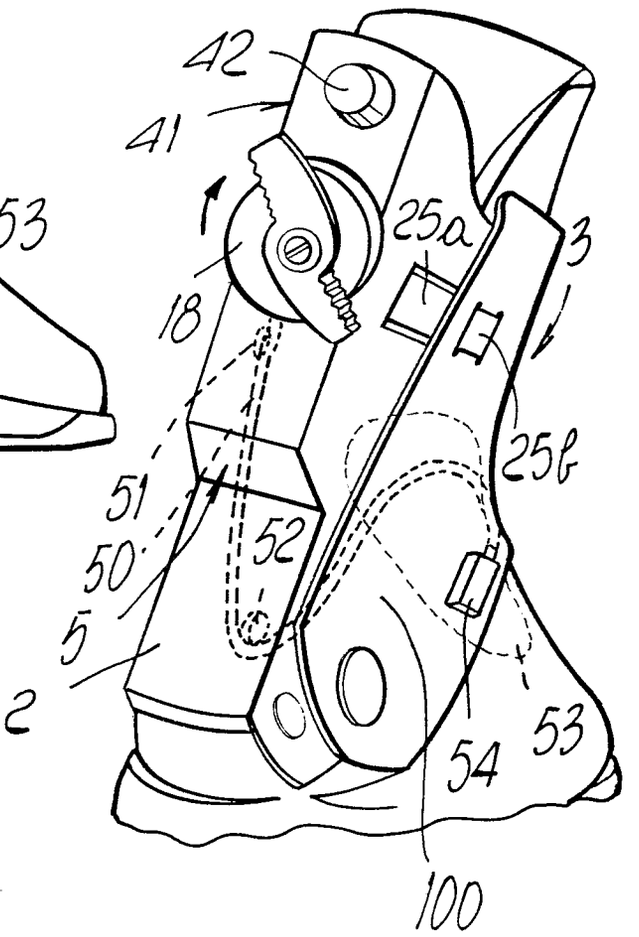

FIG. 9

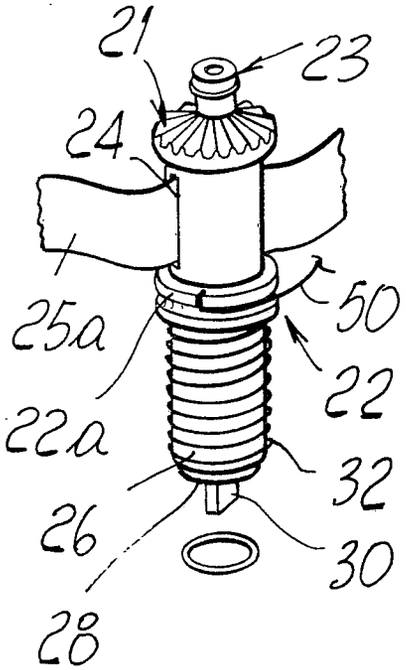

FIG. 10

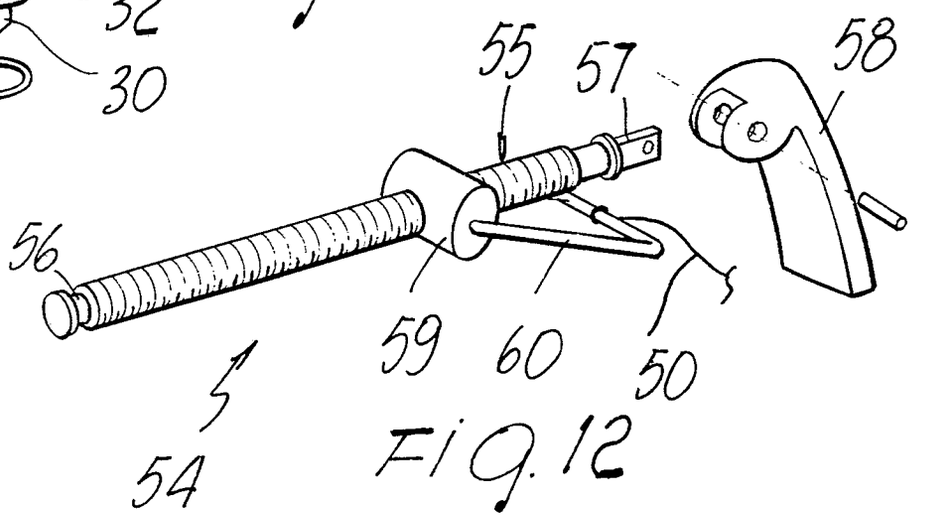

FIG. 12

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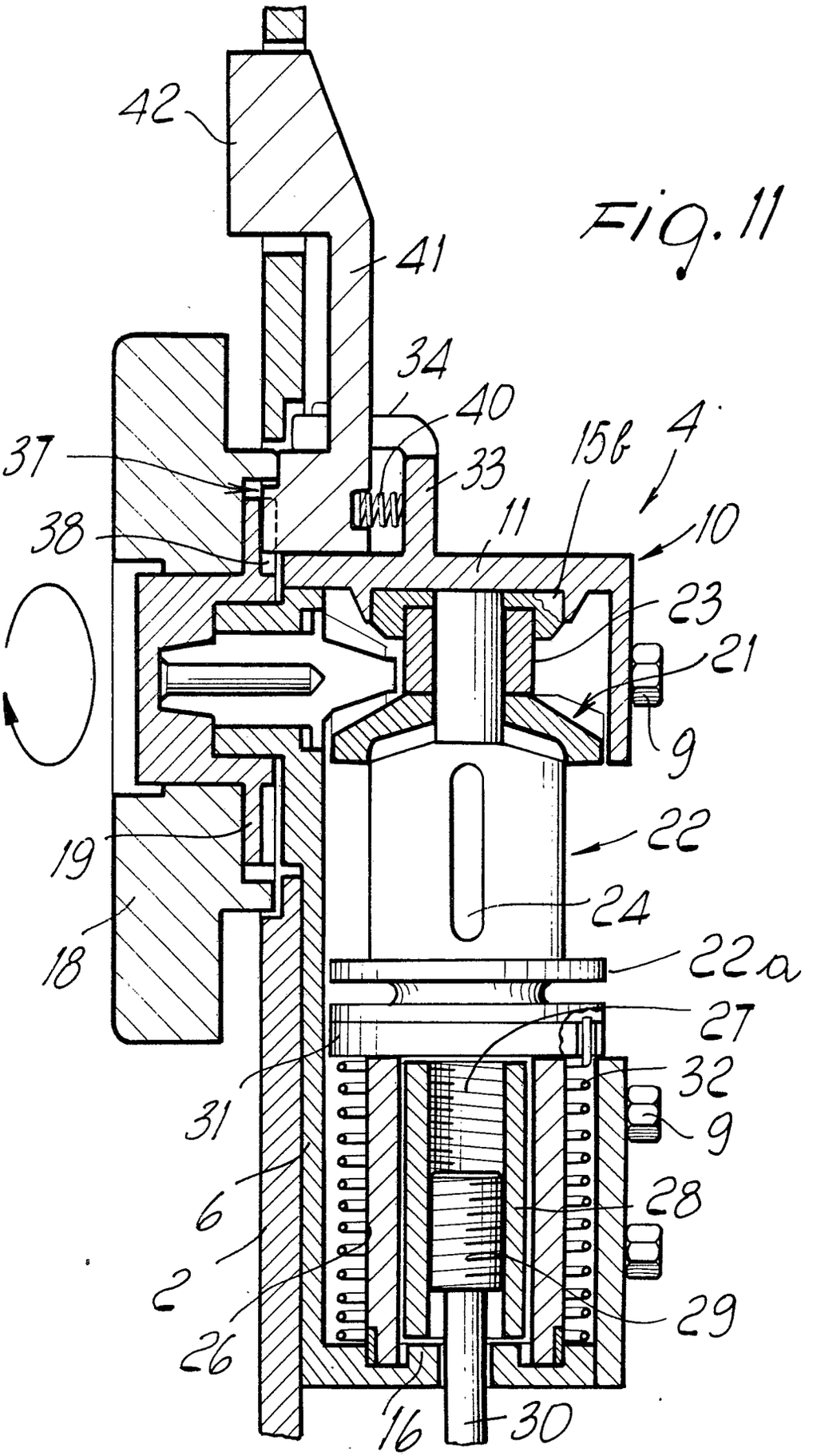

Fig. 11