United States Patent

Smolka et al.

[15] **3,685,847**

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[54] **TENSION CONTROL FOR SKI BINDINGS**

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[73] Assignee: **Wiener Metallwarenfabrik Smolka & Co.,** Wien-Mauer, Austria

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[30] **Foreign Application Priority Data**

April 9, 1969 Austria ..... A 3454/69

[52] **U.S. Cl.** ..... **280/11.35 T,** 267/177

[51] **Int. Cl.** **A63c 9/00,** A63c 9/08, A63c 9/24

[58] **Field of Search** ..... 267/177, 70, 74, 33, 22, 175, 267/151, 152; 293/89; 280/11.35 T, 11.35 P; 308/244; 188/196 V

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Primary Examiner—Drayton E. Hoffman
Attorney—Woodhams, Blanchard and Flynn

[57] **ABSTRACT**

Adjustable tensioning means for mechanical parts, particularly ski bindings. In a mechanical device such as a releasable ski binding having a backing abutment at one end thereof and an anchoring or locating means at the other end thereof, variation in tension can be provided by locating one or more inserts, such as washers, between the spring and either the abutment or the locating or anchoring means. Such washers are, in this invention, provided with nesting contours such that the washers can be inserted into or released from operating position only by partial retraction of the spring and axial movement of the washer. In some embodiments the inserts are movable mounted for insertion or removal by a lateral motion.

5 Claims, 14 Drawing Figures

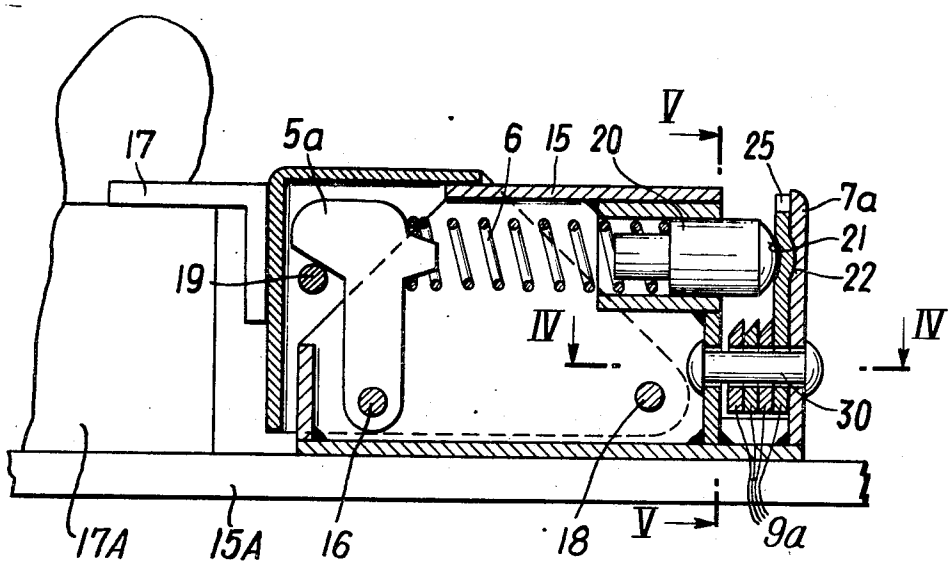


FIG. 1

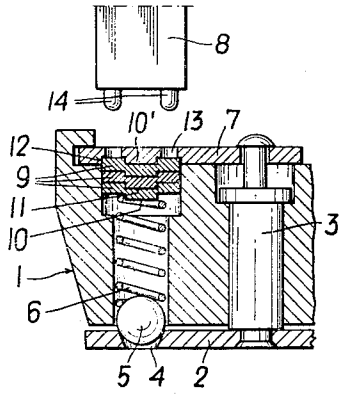


FIG. 6

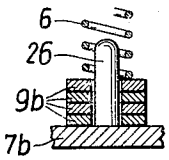


FIG. 7

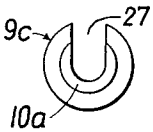


FIG. 8

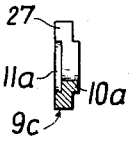


FIG. 9

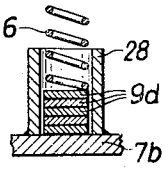


FIG. 10

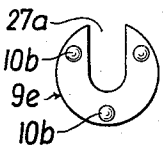


FIG. 11

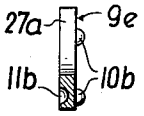


FIG. 12

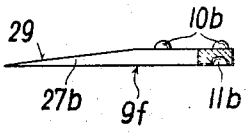


FIG. 2

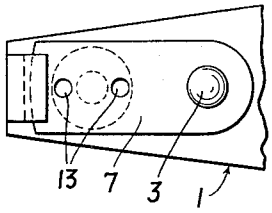


FIG. 13

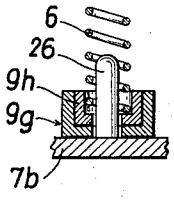


FIG. 14

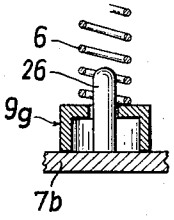


FIG. 3

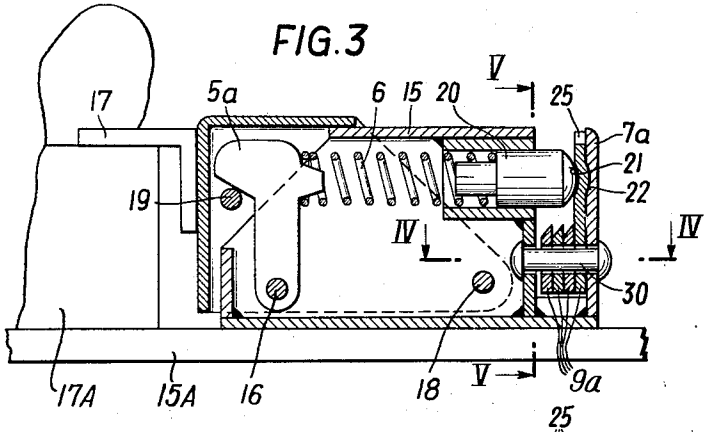


FIG. 5

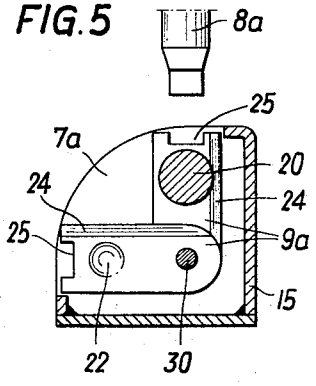
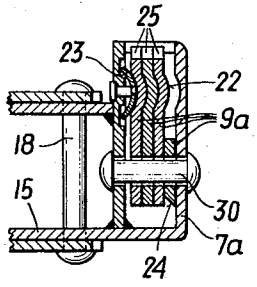


FIG. 4



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TENSION CONTROL FOR SKI BINDINGS

The invention refers to a spring connector which holds together two mechanical parts, especially two parts of a ski binding, whereby a spring is supported on the one side by an abutment and engages an anchoring device on the other.

With previously known spring anchors, changing of the spring tension can be achieved by an adjustment device in the form of a screw or something similar. Such an adjustment may be made by practically anyone merely with the use of a coin. Should the skis be left unattended somewhere, any stranger could conceivably make such an undesirable change in adjustment which could not very readily be discovered by the proper owner. In addition, such a maladjustment is frequently made by the skis' owner himself, particularly with a beginning skier. At times the adjustment even changes very gradually by itself. Whenever the binding is improperly adjusted, it could either disengage with only a very small pressure, or it could readily fail to release the boot in the event of excessive pressure, such as that from a fall. In either event, such malfunction could readily lead to bone fractures or other injuries.

It had already been suggested that the problem could be met by using several inter-changeable springs of various tensions. This again creates a disadvantage, because it makes it necessary to have in stock a large assortment of springs, practically one set of springs for each binding, and such springs, are relatively expensive.

It is, therefore, the intended function of the invention to remove these disadvantages, and to create an adjustment device which can be operated only with a special tool. A change of adjustment can thereby be made only by a trained mechanic or by the owner of the skis, provided he has received proper instruction. In most cases, the binding will be mounted to the ski at the time of purchase, and will be properly adjusted and set by the salesman, who is the expert in this case. Loan skis will be adjusted by properly trained service personnel.

According to the invention, the assigned function will be fulfilled by changing the lateral tension of the spring with the addition of one or more washer discs between the spring and the abutment and respectively between the spring and the anchoring pin. The force of the spring will hold these washers against the abutment, and they may be removed only by overcoming the spring tension. This requires considerable strength and is possible only with the aid of a tool together with some minimum knowledge of the construction. These washers are essentially all the same size and can be produced quite inexpensively.

The drawing illustrates the nature of the invention in a variety of embodiments:

FIGS. **1** and **2** show the anchored part of a swing plate in top and side view;

FIGS. **3–5** show a heel binding;

FIG. **4** being a cross section according to line IV–IV; and

FIG. **5** being a cross section according to line V–V of FIG. **3**;

and FIGS. **6**, **7** and **8**, **9**, **10** and **11**, **12**, **13** and **14** show additional construction details illustrating the basic nature of the invention.

As can be seen in FIGS. **1** and **2**, two parts, i.e., the plate body **1** of a swing plate and a base plate **2** are fastened to each other. The pin **3** is firmly connected to the base plate **2**, about which plate body **1** can swing when the anchor is loosened. An anchoring device **5** of plate body **1** is backed by a resilient device **6** and projects into an indentation **4** in the base plate **2**. The abutment **7** for the spring **6** is formed by a lever which also swings about the pin **3**. Washers **9** are placed between the abutment **7** and the spring **6**.

Depending upon at what tension the disengaging of the anchoring device is to take place, additional washers may be added to increase the tension of the spring or one or more washers may be removed to reduce the spring tension. When all washers **9** are removed, the spring is supported directly by the abutment **7**, resulting in minimum force.

In order to be able to increase or reduce the number of washers **9**, the abutment **7** which is designed as a lever, must be swung out of alignment with the spring **6**. Such a swung out position can be achieved only with the aid of a tool **8**. A concentric protrusion **10** of one washer **9** fits into the concentric indentation of the next. A concentric annular profile or groove **12** is cut into the abutment and a defining protrusion **10**. The topmost washer **9** grips into this groove and the abutment is locked into position, so that it cannot swing out by itself.

Two holes **13** are drilled into the abutment **7**, into which the two pins **14** of tool **8** are placed, in order to move the abutment. The pins **14** are made long enough to be able to depress the washer discs, whereby the topmost washer disc **9** is pressed out of the annular groove **12**. Now it is possible to swing out the abutment which is designed as a lever. When the abutment **7** is swung out, the number of washer discs **9** is corrected as desired and the abutment **7** moved over them. In the illustrated middle position, the topmost washer disc will snap into the annular groove **12**.

According to FIGS. **3–5**, the spring sets on an anchoring device designed as a lock which is housed in a casing **15** secured to a ski **15***a* and which can be swung about the axis **16**. A sole clamp **17** for releasably holding a ski boot **17***a* is also supported by the casing **15** and can be swung about the axis **18**. The anchoring device **5***a* engages a bolt **19** which is firmly connected to the clamp **17**. The anchoring device can be disengaged only in the event of an excessive force in an upward direction which through the bolt **19** acts on the anchor **5***a* against the force of the spring **6**.

The spring **6** is seated in a pin **20** at the back wall of the casing **15** which forms the abutment **7***a*. Between the abutment **7***a* and the spring **6**, and respectively between the spring **6** and the pin **20**, several small plates **9***a* may be inserted through swinging about the axis **30**, whereby the lateral force or pretension of the spring **6** may be adjusted to suit required conditions.

The small plates **9***a* have profiles or indentations **21** and protrusions **22**, so that each protrusion **22** fits into the profile or indentation **21** of the next following plate. Through this means, an undesirable movement of the plates **9***a* is prevented. In its rest position, an additional spring element **23** grips into a plate **9***a*, so that even in a disengaged position any self-induced movement of the plates **9***a* is prevented.

On one side the plates **9***a* are slanted so that sharp edges **24** are created which allow for an easy swinging respectively between the abutment **7***a*, the spring **6** and the pin **20**. The plates **9***a* are supported inside the casing **15** and do not extend above the casing and can be reached only through the opening of the casing. The plates **9***a* have on their free front sides, a cut out **25** into which a tool shaped like a screw driver may be placed. With the aid of this tool, the plates **9***a* may be moved toward or away from the abutment **7***a*, depending on the required adjustment of the anchoring force. The opening of the casing **15** can also be equipped with an easily removable cover, in order to protect the adjustment mechanism against such things as dirt, snow, ice, etc.

FIG. **6** shows a pin **26** firmly connected to the abutment **7***b*. The spring **6** is supported by washer discs **9***b* which are concentrically bored and arranged on the pin **26**. In the case of an adjustment, the spring has to be pressed upwards and, depending on the required conditions, washer discs may either be added or removed.

FIGS. **7** and **8** illustrate a washer **9***c* which on the one side has a protrusion **10***a* and on the other an indentation **11***a*. A slotted cutout **27** allows for this washer to be placed on a pin from the side between the abutment and the spring. With the arrangement of several such washers **9***c*, the protrusion **10***a* of one washer grips into the indentation **11***a* of the next following, in order to prevent any self-induced loosening.

FIG. **9** shows a socket **28** firmly connected to abutment **7***b*, into which may be placed one or more washers between the abutment **7***b* and the spring **6**, depending on the desired conditions.

FIGS. **10** and **11** show a similar washer **9***e* as in FIG. **7** and **8**, with a slotted cutout **27***a* for placing it on a bolt perpendicular to its axis. However, this washer has three hump-like protrusions **10***b* which grip into three similar indentations **11***b* of the following washer.

FIG. **12** shows a cross section of a similar washer **9***f* as illustrated in FIG. **10** and **11**. The slotted cutout **27***b*, however, is considerably longer, and the side parts **29** of the long slot **27***b* are slanted, which allows for easier insertion.

According to FIGS. **13** and **14**, approximately cup-shaped washers **9***g*, **9***h* are provided which are positioned between the abutment **7***b* and the spring **6** and through their central boring are placed on a bolt **26** which is firmly connected to the abutment **7***b*. These cup-shaped washers may be nested, as shown in FIG. **13**. For the purpose of changing the lateral tension of the spring, the inner washer can be taken out, or both washers can be removed. In addition, another washer **9***g* may be placed on the bolt **26** in reverse position, as shown in FIG. **14**, or this may be done with washer **9***h* which is somewhat lower than washer **9***g*. Still further, according to FIG. **14**, the washer **9***h* could be arranged on pin **26** in two positions on top of washer **9***g*. Therefore, seven different adjustment positions are possible.

It is understood that the nature of the invention is not restricted to the illustrated embodiments. For example, cup-shaped washers could also be used with the construction according to FIGS. **13** and **14**. Under certain conditions a proper adjustment may be achieved with only one washer. In addition, it would be possible to design an abutment, for example, as in FIG. **1** with a conventional bayonet lock. The washers could also be made with eyes or something similar, so that they could be gripped with a hooklike tool when they are removed. There are additional variations of the construction design which lie within the frame of reference of the invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a ski binding for releasably holding a ski boot to a ski having a first member fixed to said ski and a second member for engaging a ski boot and adapted to move relative to said first member between boot holding and boot releasing positions, safety release apparatus for releasably connecting said first member to said second member, the improvement comprising:

abutment means on one of said first and second members and having first profile means thereon;

anchor means on said one of said first and second members and adapted to move relative to said abutment means, movement of said anchor means being in response to movement of said second member relative to said first member;

spring means positioned between said abutment means and said anchor means and aligned with said first profile means on said abutment means for resiliently resisting a movement of said anchor means and for urging said anchor means to a position to releasably hold said second member in said boot holding position; and

a plurality of removable spacer means positioned between said spring means and one of said abutment means and said anchor means for selectively controlling the tension of said spring means and thereby the force necessary to release said releasable connection between said first and second members and thence permit said relative movement between said first and second members to release said boot, each of said plurality of removable spacer means having second profile means thereon adapted to cooperate with said first profile means on said abutment means to effect and maintain an alignment of said spacer means with said first profile means and said spring means, each of said plurality of removable spacer means being selectively pivotally secured to said abutment means and pivotal into and out of a position between said abutment means and said spring means.

2. Safety release apparatus according to claim **1**, wherein an edge of each of said removable spacer means is slanted to facilitate the pivotal movement into said position being between said abutment means and said spring means.

3. Safety release apparatus according to claim **1**, including clamping means for holding the ones of said removable spacer means not positioned between said abutment means and said spring means in a fixed location.

4. Safety release apparatus according to claim **1**, wherein said abutment means and said anchor means are mounted on said first member.

5. In a ski binding for releasably holding a ski boot to a ski having a first member fixed to a ski and a second member for engaging a ski boot and adapted to move

relative to said first member between boot holding and boot releasing positions, safety release apparatus for releasably connecting said first member to said second member, the improvement comprising:

abutment means on one of said first and second members;

anchor means on said one of said first and second members and adapted to move relative to said abutment means, movement of said anchor means being in response to movement of said second member relative to said first member;

spring means positioned between said abutment means and said anchor means for resiliently resisting the movement of said anchor means; and

a plurality of removable spacer means pivotally secured to said one of said first and second members and adapted to be selectively moved into and out of a position between said spring means and one of said abutment means and said anchor means to selectively control the tension of said spring means and thereby the force necessary to release said releasable connection between said first and second members.

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