TENSION CONTROL FOR SKI BINDINGS

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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
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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 fall 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 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 15a and which can be swung about the axis 16. A sole clamp 17 for releasably holding a ski boot 17a is also supported by the casing 15 and can be swung about the axis 18. The anchoring device 5a 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 5a 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 7a. Between the abutment 7a and the spring 6, and respectively between the spring 6 and the pin 20, several small plates 9a 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 9a 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 9a is prevented. In its rest position, an additional spring element 23 grips into a plate 9a, so that even in a disengaged position any self-induced movement of the plates 9a is prevented.
On one side the plates 9a are slanted so that sharp edges 24 are created which allow for an easy swinging respectively between the abutment 7a, the spring 6 and the pin 20. The plates 9a 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 9a 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 9a may be moved toward or away from the abutment 7a, 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 7b. The spring 6 is supported by washer discs 9b 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 9c which on the one side has a protrusion 10a and on the other an indentations 11a. A slotted cutout 25 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 9c, the protrusion 10a of one washer grips into the indentation 11a of the next following, in order to prevent any self-induced loosening.

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

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

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

According to FIGS. 13 and 14, approximately cup-shaped washers 9g, 9h are provided which are positioned between the abutment 7b and the spring 6 and through their central boring are placed on a bolt 26 which is firmly connected to the abutment 7b. 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 9g may be placed on the bolt 26 in reverse position, as shown in FIG. 14, or this may be done with washer 9h which is somewhat lower than washer 9g. Still further, according to FIG. 14, the washer 9h could be arranged on pin 26 in two positions on top of washer 9g. 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:

1. abutment means on one of said first and second members;
2. 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;
3. spring means positioned between said abutment means and said anchor means for resiliently resisting the movement of said anchor means; and
4. 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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