Nov. 16, 1971 C. A. HANSON ET AL 3,619,914

BOOT TENSIONING DEVICE

Filed Feb. 13, 1970 2 Sheets-Sheet 1

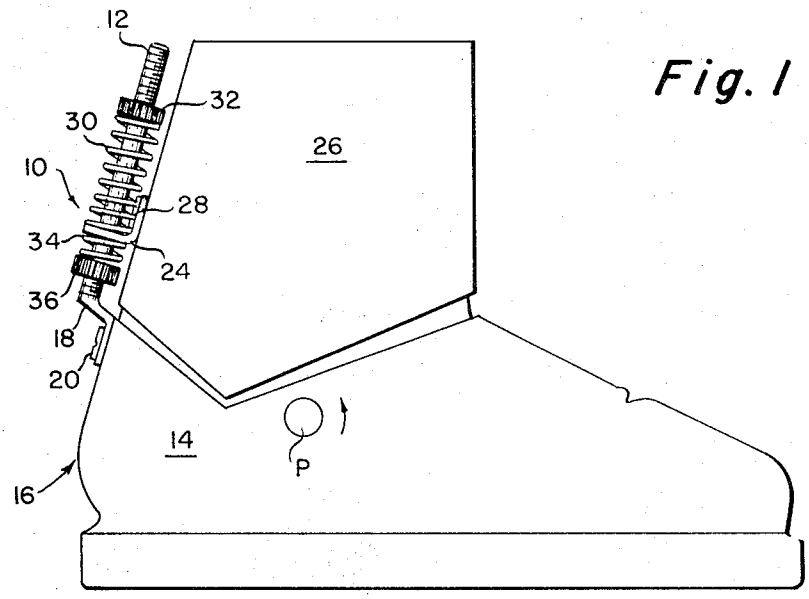

Fig. 1

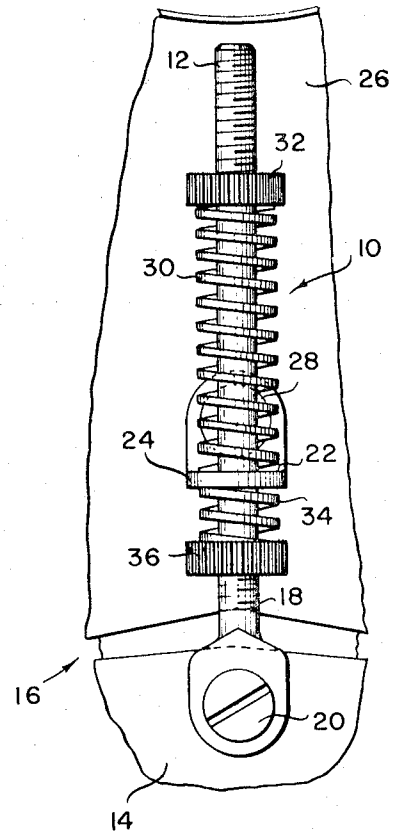

Fig. 2

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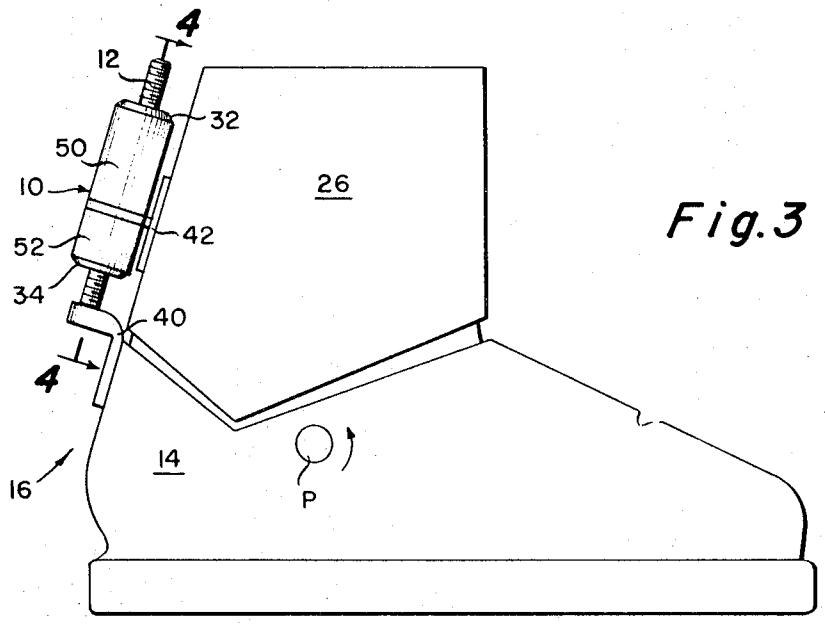

Fig. 3

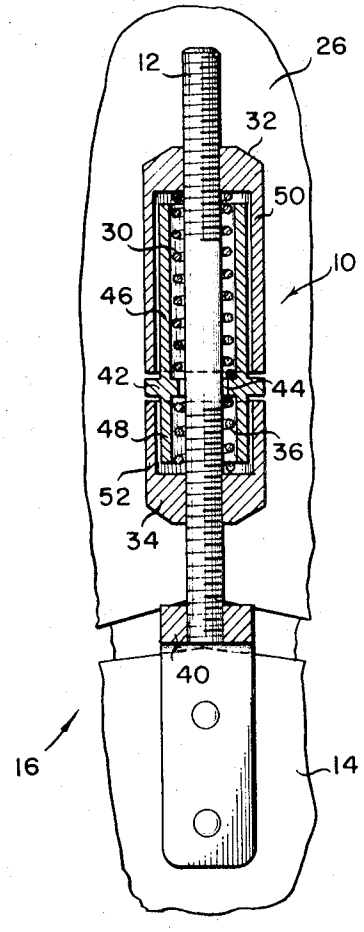

Fig. 4

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BOOT TENSIONING DEVICE

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U.S. Cl. 36—2.5 AL 10 Claims

ABSTRACT OF THE DISCLOSURE

A tensioning device for a ski boot of the type having a foot receiving portion and a gaiter pivotally attached thereto comprising spring means which may be adjusted to vary the angle between the gaiter and the foot-receiving portion and/or the tension on the pivotal movement between the gaiter and foot-receiving portion.

This invention relates to a hinge angle adjusting and tensioning device for use on ski boots wherein either because of a special connection or because of the inherent flexibility of the boot there is "angular" or "pivotal" relative movement in the forward direction between the "gaiter" or ankle encircling portion of the boot and the foot-receiving portion.

This invention is particularly useful on plastic ski boots now well known to the ski manufacturing art. One particular plastic boot is disclosed in Pat. No. 3,239,952 issued Mar. 15, 1966, entitled Ski Boot. Plastic ski boots possess substantial rigidity and, therefore, serve as a very good connection between the foot of the skier and the ski. Of primary importance is that lateral movement of the foot or leg relative to the ski be prohibitive to a substantial extent. It is desirable, however, to have limited forward movement of the ankle relative to the foot portion of the boot to permit a skier to lean forward on the skis for better control as necessary. Since some plastic boots do possess a substantial degree of rigidity it has been found desirable to provide a "gaiter" which is pivotally connected to the foot-receiving portion of the boot to allow the forward, leaning movement of the skier relative to the skis. The gaiter may be pivotally attached by means of hinge pins. It may be integral with the foot-receiving portion of the boot and "hingedly" or "pivotally" connected thereto by an inherently flexible intermediate section. Of course, this invention is useful also on non-plastic boots where there is angular or pivotal movement between the "gaiter" or ankle encircling portion and the foot-receiving portion.

To provide the greatest degree of versatility, for a ski boot, it is desirable to provide means on the boot for adjusting the (1) angle between the gaiter and the foot-receiving portion and (2) to provide tensioning or hinge biasing means which may be adjusted to suit the needs of the individual skier. The angle, of course, will vary with the particular physical characteristics of the skier while the tension may be varied in accordance with the force that the skier can exert through his legs, ankles and feet to control the movement of the skis while skiing. A heavier and larger skier may require greater resistance to his foot and ankle movements than a skier of slighter build.

It is an object of this invention to provide a hinge angle adjusting and tensioning device for a ski boot enabling the skier to quickly and easily adjust the device to suit his individual requirements and preferences.

It is a specific object of this invention to provide a hinge angle adjustment and tensioning device on the external rear surface of the boot permitting easy accessibility of the device for purposes of adjustment.

A preferred embodiment of the device of this invention comprises a hinge angle tensioning device mounted on the exterior surface of a ski boot of the type having a foot-receiving portion and a gaiter pivotally attached to said foot-receiving portion comprising a vertically extending support, which can be a threaded rod, attached to the foot-receiving portion and a bracket having an aperture therein attached to the gaiter. The rod or support extends through the aperture in the bracket and is mounted for sliding movement relative to the bracket when the gaiter is pivoted relative to the foot-receiving portion. Upper and lower stop means or knobs are adjustable along the length of said support or rod on either side of the brackets. First and second springs are mounted on the support or rod with the first spring means located between the upper stop means and the bracket whereby the spring means may be compressed or shifted with the bracket along the rod by relative adjustment of the stop means.

In another embodiment of the invention, the upper and lower stop means have cylindrical skirt portions extending toward the bracket with the bracket also having cylindrical skirt portions extending in opposite directions away from the brackets such that the skirts on the knobs telescopically receive the skirts on the brackets. The spring means are enclosed within the telescopic skirt portions and are thereby concealed and protected from the elements.

The spring means mentioned above can be either coil springs concentrically mounted on the support or rod or they can be of an elastomeric material mounted on the support or rod. In lieu of purely mechanical resilient device it may be desirable to employ a combination of spring or resilient devices and fluid or hydraulic dampening means. A piston and cylinder and variable restricted orifice arrangement is used in conjunction with a spring.

These and other objects of the invention will become more apparent to those skilled in the art by reference to the following detailed description when viewed in light of the accompanying drawing wherein:

FIG. 1 is a side view in elevation of a ski boot having the boot tensioning device of this invention attached thereto;

FIG. 2 is a rear view of the boot of FIG. 1 showing the tensioning device with most of the boot broken away;

FIG. 3 is a side view in elevation of a modification of the boot tensioning device as attached to a ski boot; and

FIG. 4 is a rear view of the boot of FIG. 3 showing the tensioning device with most of the boot broken away.

Referring now to FIG. 1, the tensioning device of this invention is generally indicated by the numeral **10**. A vertically extending support in the form of a threaded rod **12** is attached at its lower end to a foot-receiving portion **14** of a ski boot **16** by means of bracket **18** which is secured to the foot-receiving portion **14** by rivet **20**. The threaded rod extends generally upwardly along the rear exterior surface of the ski boot and through an aperture **22** in bracket **24** which is attached to a pivoted gaiter **26** by means of rivet **28**. The rod **12** is slidably received in the bracket **24** in such a manner as to freely permit pivotal movement of the gaiter **26** relative to the foot-receiving portion **14** of the boot **16**. First spring means in the form of a coiled spring **30** is concentrically positioned on the threaded rod **12** between bracket **24** and upper stop means shown as threaded knob **32**. The knob **32** is adjustable relative to bracket **24** along the length of rod **12** to adjustably compress the spring **30**. Second spring means **34** is concentrically mounted on the rod **12** between the bracket **24** and lower stop means in the form of knob **36**. The knob **36** is likewise adjustable along the length of rod **12** relative to the bracket for compressing spring **34**. The ankle

gaiter **26** is pivotally attached to the foot-receiving portion **14** at hinge point P.

In operation, when it is desired to adjust the tension applied to the pivotal movement between the gaiter and the foot-receiving portion, both the upper and lower knobs **32** and **36** are adjusted toward each other to increase the spring tension without increasing the angle between the gaiter and foot-receiving portion or away from each other to decrease the tension without increasing the angle. The upper knob will have to be shifted a greater distance along the rod **12** than the lower knob due to the difference in spring lengths in order to maintain the same angle. When it is desired to adjust the angle, the upper and lower knobs **32** and **36** are simultaneously and equally adjusted in the same direction. For example, if both knobs were adjusted upwardly along the rod **12** an equal amount, the bracket and springs would be shifted along the rod and thereby the angle between the gaiter **26** and the foot-receiving portion **14** would be lessened but the spring tension would remain the same in that the springs are not further compressed. By adjusting both knobs downwardly, the spring and brackets **24** are shifted downwardly thereby causing the gaiter to pivot rearwardly increasing the angle between the top of the foot and the front of the ankle. In order to adjust both the spring tension and the angle between the gaiter and foot-receiving portion, one knob may be adjusted relative to the other. For example, if only the knob **32** is moved downwardly, the compression of the spring **30** will increase thereby overcoming the heretofore equal tension on the spring **34** causing the bracket **24** to move downwardly causing the gaiter to pivot rearwardly. The opposite result would occur with upward adjustment of the lower knob. If desired, the hinge angle can be locked by totally compressing both springs.

Referring now to FIG. 3, another embodiment of the invention is shown. The rod **12**, instead of having an integrally attached lower bracket, is threadedly received in bracket **40** which is suitably attached to the lower foot-receiving portion **14** of the boot **16**. The bracket **42** which is attached to the pivoted gaiter **26** receives the rod **12** through an aperture **44**. The bracket also has oppositely extending cylindrical skirt portions **46** and **48** which serve as receiving wells for the concentrically mounted springs **30** and **36**. The upper and lower threaded knobs **32** and **34** abutt against the upper end of the spring **30** and the lower end of the spring **36** respectively as in FIG. 1. Each knob, however, is provided with a cylindrical skirt portion **50** and **52**. The skirt portions **50** and **52** telescopically receive the skirt portions **46** and **48** attached to the bracket **42** whereby the springs **30** and **34** are enclosed and protected against the elements. The operation of the embodiment of FIG. 3 is substantially identical to that of FIG. 1. The device of FIGS. 3 and 4 is shown in the maximum compression position. It is to be understood that by varying the lengths of the respective skirt portions the range of compression and angulation can be increased or decreased.

The knobs **32** and **34** in both FIGS. 1 and 3 are knurled to provide sufficient gripping surface. Further, in lieu of the coiled springs as shown in the embodiment of FIGS. 1 and 3, suitable compressible, elastomeric material may be substituted therefor as desired. Also within the scope of this invention is the use of a hydraulic fluid dampening device in combination with the dual springs. The housing of FIG. 3, for example, could be sealed to contain hydraulic fluid and a piston. A needle valve could be adjusted to increase or decrease the fluid dampening action.

In a general manner, while there has been disclosed an effective and efficient embodiment of the invention, it should be well understood that the invention is not limited to such an embodiment as there might be changes made in the arrangement, disposition, and form of the parts

without departing from the principle of the present invention.

We claim:

1. A tensioning and angle adjustment device for a ski boot of the type having a foot-receiving portion and an ankle receiving portion pivotally attached to said foot-receiving portion comprising a vertically extending support attached to one of said portions, a bracket attached to the other of said portions, means mounting said support for relative movement with respect to said bracket, upper and lower stop means on said support on either side of said bracket and adjustable along the length of said support, first biasing means on said support between said upper stop means and said bracket and second biasing means effective between said lower stop means and said bracket whereby said first and second biasing means may be compressed and shifted longitudinally of said support by relative adjustment of said stop means.

2. A tensioning device as defined in claim **1** and wherein said support is a threaded rod and said upper and lower stop means are knobs threaded on said rod.

3. A tensioning device as defined in claim **2** and including a second bracket integrally attached to one end of said rod for attachment to said one of said portions.

4. A tensionign device as defined in claim **2** and including a second bracket attached to said one of said portions and threadably receiving said threaded rod.

5. A tensioning device as defined in claim **1** and wherein said first and second biasing means are first and second coiled springs.

6. A tensioning device as defined in claim **1** and wherein said first and second biasing means are of an elastomeric material.

7. A tensioning device as defined in claim **1** and wherein said upper and lower stop means have first and second elongated cylindrical skirt portions respectively extending toward said bracket, and said bracket has third and fourth elongated cylindrical skirt portions extending in opposite directions from said bracket,

said skirt portions telescopically mating and substantially enclosing said first and second spring means.

8. A tensioning device for a ski boot of the type having a foot-receiving portion and an ankle portion pivotal with respect to said foot-receiving portion comprising, support means extending between said ankle portion and said foot-receiving portion and permitting relative pivotal movement therebetween, biasing means mounted about said support means biasing said pivotal movement and adjustment means for relocating said biasing means with respect to said support means and for varying tension of said biasing means.

9. The tensioning device as defined in claim **8** and wherein said support means comprises an elongated vertically extending rod fixed at its lower end of said foot-receiving portion, a bracket attached to said ankle portion having an aperture therein for slidably receiving said rod, said rod normally extending through said aperture, said biasing means comprising first and second biasing means mounted on said rod on each side of said bracket.

10. A tensioning device as defined in claim **9** wherein said adjustment means comprises upper and lower stops mounted for axial movement on said rod, and detent means for holding said stops in fixed positions, said upper and lower stops located on either side of said bracket for adjustably compressing said biasing means against said bracket.

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PATRICK D. LAWSON, Primary Examiner