United States Patent [19]

Hanson et al.

[11] **3,807,060**

[45] **Apr. 30, 1974**

[54] **SKI BOOT HAVING MULTI-DIRECTIONAL FLEXURE MEANS AND CANTING MEANS**

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[73] Assignee: **Hanson Industries, Inc.,** Boulder, Colo.

[22] Filed: **Mar. 5, 1973**

[21] Appl. No.: **338,292**

[52] **U.S. Cl.** ..... **36/2.5 AL**

[51] **Int. Cl.** **A43b**

[58] **Field of Search** ..... 36/2.5 R, 2.5 AL, 5

[56] **References Cited**

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Attorney, Agent, or Firm—Merriam, Marshall, Shapiro & Klose

[57] **ABSTRACT**

A ski boot having flexure means for adjusting the degree of stiffness both in the forward and rearward directions and canting means whereby the required cant for a particular skier can be adjusted.

15 Claims, 5 Drawing Figures

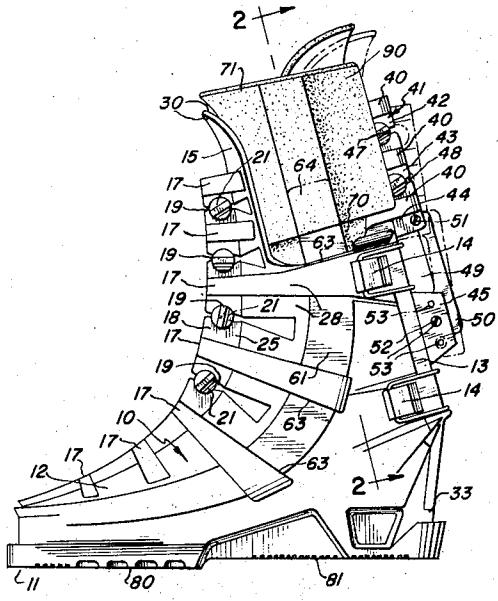


FIG. 3

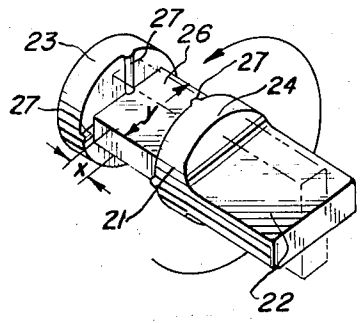
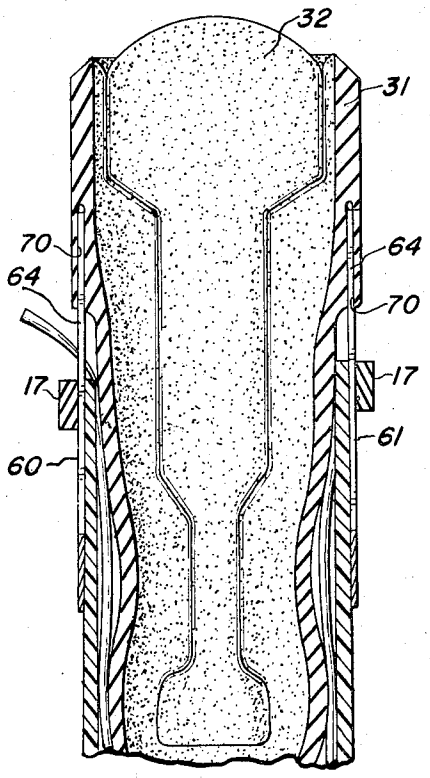


FIG. 1

FIG. 2



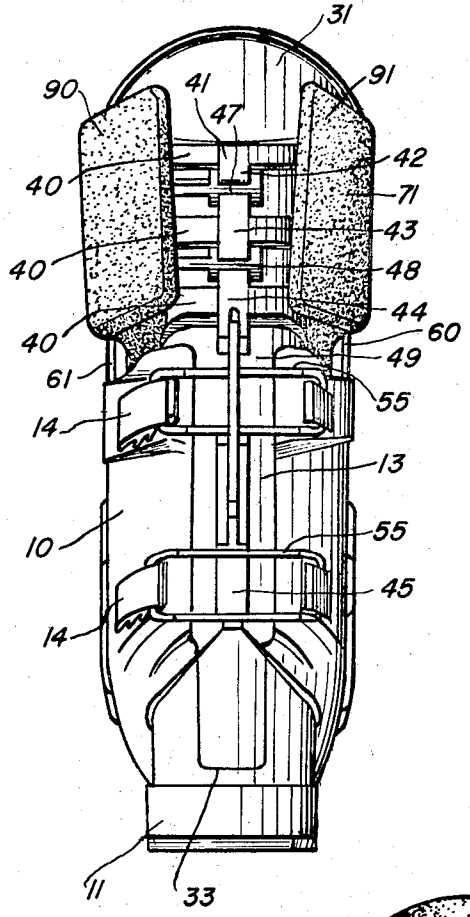

31
90
41
47
91
42
40
71
43
40
48
44
40
60
49
61
55
14
13
10
55
45
14
11
33

FIG. 4

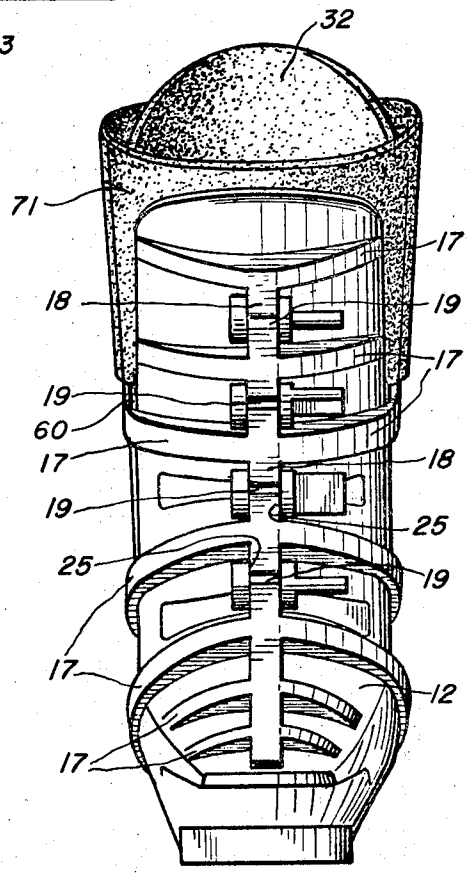

32
71
17
18
19
17
19
60
17
18
19
25
25
19
17
12
17

FIG. 5

SKI BOOT HAVING MULTI-DIRECTIONAL FLEXURE MEANS AND CANTING MEANS

BACKGROUND OF THE INVENTION

This invention relates to a ski boot having a substantially rigid outer shell which includes means for adjusting the degree of stiffness both in the forward and rearward directions as well as providing means for adjusting the cant of the boot to the particular requirements of an individual skier.

It is generally desirable to have the lateral stiffness in a ski boot as high as can be practically attained; however, the amount a ski boot should flex in the forward and rearward directions will differ with circumstances. There are some instances in which a skier, particularly of the caliber of an expert or racer, will desire adjustment in the stiffness of the boot, because of the terrain and nature of the snow, to increase the overall stiffness of the boot thereby decreasing the amount of forward and rearward flex or lean permitted the skier.

In our pending U.S. application Ser. No. 276,561 filed July 31, 1972, now U.S. Pat. No. 3,738,025, a stiffness control or flexure system was disclosed, which, when incorporated in a ski boot, enables a skier to readily adjust the stiffness of the ski boot while on a mountain in response to snow or slope conditions, or for the personal preference of the skier.

While the flexure system disclosed in the referenced application is satisfactory for many applications, it has been observed that there are some skiers, particularly racers and expert skiers, who desire even more control over the stiffness of the shell of the boot.

Additionally while various methods for canting a boot are known, these methods have not been entirely satisfactory. In those instances where the cant is achieved by either molding the boot with an angle or by the build-up or removal of material at the sole of the shell so that the boot is canted at a desired angle, a problem is encountered when the boot is inserted into the bindings. Unfortunately, the cant in the boot does not allow the boot to fit properly into the bindings absent modifications of the boot or binding.

Another means of achieving the desired cant of the boot has been a boot pad which is located on the ski. This pad serves to provide the desired cant when a boot is placed on the pad. Still further, the inner portion of the boot in some instances has been designed to permit the canting of an individual's foot within the boot itself.

These methods of canting the boot have not been entirely satisfactory due, in some instances, to the requirements of a particular skier or the time and cost associated with providing the necessary cant. What is desired is to have a ski boot which can be readily and easily adjusted to provide the cant required for the particular individual wearing the boot.

SUMMARY OF THE INVENTION

Briefly described, the invention disclosed and claimed herein relates to a ski boot which incorporates means for a skier to control both the forward and rearward stiffness flexure system of the boot in response to the particular snow and slope conditions or personal preference of the skier. Moreover, the ski boot of the present invention provides an adjustable canting means whereby the necessary cant in which a skier's knees will

be located substantially over the axial center line of the skis will be achieved for the particular individual wearing the boot.

The flexure control system involves the presence in the ankle position of the boot of at least one and preferably several traverse openings in a wall or rib which extends along the front of the boot from the ankle to the toe. Similarly, there is at least one and preferably more openings in a wall or rib which extends along the back of the boot from the heel area to above the ankle in the rear tongue of the boot. The openings extend through and materially reduce the thickness of the shell walls and thereby permit greater flexibility in the ankle portion of the shell both in the forward and rearward directions.

In order to control the amount of flexibility thus created, there is positioned within each opening a substantially rigid elongated flex rod having a cross section which, in the major direction, is approximately equal to the size of the opening while in the remaining directions the cross section is less than the size of the opening. Each rod can be rotated to a particular position in which its width substantially fills the opening, thereby in effect eliminating the opening in the wall and the flexibility resulting therefrom. By rotating a rod so that a narrower dimension is positioned within the opening, partial deformation or compression of the opening is permitted; i.e. the ankle portion will flex until the walls of the opening bear against the sides of its associated flex rod. In this position, greater flexibility of the walls in the front portion and back or rear of the boot is selectively afforded as will hereinafter become apparent.

The boot of the present invention also comprises two relatively stiff members each of which extends along a portion of each side of the boot. The members, which can be made of metal or other suitable material, extend up beyond the ankle area of the boot. The lateral members preferably are molded into the outer shell for a portion of their length with a portion of each member extending freely outward from the shell. The outward extending portions are adapted to be adjusted laterally to retain that portion of the leg between the knee and ankle of the skier in an appropriate position such that a skier's knee will be positioned substantially over the center line of the ski.

DETAILED DESCRIPTION OF THE DRAWINGS

The invention will be better understood from the following detailed description thereof, taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a side view of a ski boot showing the rear tongue of the boot flexed in two different positions by adjustment of the flexure post located on the rear tongue of the ski boot;

FIG. 2 is a section view along lines 2—2 in FIG. 1 and shows the adjustable canting members molded in the shell of the ski boot with portions of the canting members extending out from the shell and enclosed by the liner;

FIG. 3 shows a perspective view of a flex rod of the present invention used for adjusting the flexure of the boot;

FIG. 4 shows a rear view of the ski boot of the present invention; and

FIG. 5 shows a front view of the ski boot of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings, FIGS. 1–2, there is shown a ski boot comprising an exterior shell **10** having sole portion **11** and an upper or foot receiving portion **12** formed of a substantially rigid plastic material. Entry to the boot for the wearer's foot is provided by rear access opening member **13** which is closed by a buckle closure system **14.**

The front ankle portion **15** of upper **12,** i.e., the portion immediately adjacent the wearer's instep, is provided with seven horizontal or transverse side stiffening ribs **17** and a vertical front stiffening wall or rib **18** which extends from the toe of the shell to the top most transverse rib **17.** Vertical rib **18** has openings or notches **19** in the rib between adjacent lateral ribs **17.** A flex rod **21** is housed within each opening, as illustrated in FIGS. **1** and **3,** and is rotatably held within the rib. The rod can be rotated by turning finger grip **22.**

A flex rod useful in the invention comprises two circular heads **23, 24** which are adapted to abut the sides **25** of vertical wall or rib **18.** Heads **23, 24** are connected together by means of a rib stiffening member **26** which has a major axis "*y*" and a minor axis "*x*" located 90° to the major axis. The major axis of the flex rod should be substantially equal to the maximum width of its associated opening in the unstressed state, thereby substantially preventing the opening from becoming narrower and thereby increasing the resistance of the shell to forward flexure.

When flex rod **21** is rotated so that its minor axis "*x*" is within the opening as shown at **8,** the opening can be distorted by forward lean on the boot by the skier until the walls of the opening bear on the flex rod and further flexing is prevented. The particular flex rod shown in FIG. **3** can be made of plastic, metal or other suitable material and can be rotated by turning finger grip **22** to a position of minimum flex to maximum flex.

Bosses **27** are located on the inner faces of heads **23.** The sides **25** of vertical rib **18,** at least in the area of the opening are recessed at about 90° to the opening so that as rod **21** is rotated, the rod will rotate until bosses **27** are seated in the recess which serves to lock the rod into position until it is rotated again by rotating finger grip **22.**

The flex rod, as shown at **4** in FIG. **1,** can be positioned with its major axis "*y*" turned in a substantially vertical position along rib **18** to occupy substantially the entire opening **19** when the boot is in its rest or undistorted condition. With the flex rods adjusted in this manner, forward pressure by the wearer's leg on the top **30** of shell **10** would only minimally deform the forward wall of the boot shell. The boot would thus exhibit the maximum stiffness of which it is capable.

However, when flex rods **21** are rotated to a position where the minor axis "*x*" is located within opening **17,** such as shown at **8** in FIG. **1,** pressure on top **30** of boot **10** permits the boot to compress in an accordian or bellow's fashion, thereby causing ankle portion **28** of the shell to flex to its maximum. It is appreciated that the desired forward flex can be adjusted merely by rotating one or more flex rods **21** to the desired location. If all the flex rods are turned to a substantially horizontal position, substantial maximum flex is permitted whereas turning rods **21** to a position whereby rods **21** are in a substantially vertical position along rib **18,** substantial minimum flex is achieved.

Referring to FIGS. **1** and **4,** backward flexure control is also provided in boot **10.** Access opening or rear tongue member **13** is a hinged member which includes a substantially rigid outer shell wall **31** with a liner member **32** made of foam or other suitable material cemented or adhered to the inner wall of the rear tongue. The rear tongue is adapted to be hinged at **33** to the shell in the manner shown and disclosed in our pending application Ser. No. 231,967 filed Mar. 6, 1972.

As seen in FIG. **4,** back or tongue member **13** is provided with three horizontal or transverse side stiffening ribs **40** and a vertical back stiffening rib **41** composed of four sections **42, 43, 44** and **45** with openings **47, 48** and **49** between the respective sections.

Flex rods **21** are positioned in openings **47** and **48.** The flex rods in the back member operate in the same manner previously described with respect to the flexure adjusting system for forward flex of the boot.

Between rib sections **44** and **45** there is located vertical post **50.** Post **50** comprises a strip of material such as aluminum which is adapted to be fastened at its respective ends to rib sections **44, 45** by means of screws **51, 52.** Section **45** has three holes **53** while post **50** also has three spaced adjusting holes. When it is desired to change the position of member **13** to accommodate varying leg sizes, a hole in post **50** and one of the holes **53** are aligned after which screw **52** is inserted in the hole of rib section **45,** thereby pushing the top portion of the rear tongue member forward as shown in FIG. **1.**

When post **50** is pulled downward and screw **52** is placed into the bottom hole in rib section **45,** the rear tongue **13** is pulled backward as exemplified in dotted lines in FIG. **1** thereby accommodating another leg size. Moving post **50** to any one of the three adjusting holes **53** serves as an adjustment for different size legs.

By adjusting post **50** and flex rods **21** in the rear member **13,** the backward angle and flexure of the boot is controlled. Post **50** is spaced from the back of rear member **13,** as seen more clearly in FIG. **1** in order that cable **55** of buckle closure system **14** can be inserted between the post **50** and wall **31.**

In addition to means for adjusting both the forward and rearward flexure in the boot as well as accommodating different leg sizes, an adjustable canting means is also provided.

Referring to FIGS. **1** and **2,** metal strips **60, 61** preferably are molded into the boot. While a portion of the outer walls of the strips are exposed, transverse ribs **17** extend over the strips as shown at **63** in FIG. **1.** A portion **64** of each strip **60, 61** extends freely out from shell **10.** Freely extending portions **64** on strips **60, 61** serve to provide a means for providing the desired cant for a particular skier.

While a skier is wearing the boot, portion **64** on each strip **60, 61** can be bent laterally which causes the wearer's leg between the ankle and the knee to move laterally to a desired position. Specifically, a skier, while wearing the boots, can drop a plumb from the knee of a skier. Strip portions **64** can then be bent laterally as required by suitable means to lock the wearer's leg in the desired or canted position which is where the plumb would be in a vertical plane which passes through the longitudinal axis of a ski. Following a cant

adjusting operation, portions **64** of strips **60, 61** can then be inserted into slots **70** in liner member **71** which is disposed within the shell **10.**

Member **71** extends from the top of the boot into the shell where it wraps about the foot of a skier.

The liner contains a cavity which is adapted to be filled with wax or other suitable material such as described in our pending application Ser. No. 216,081 filed Jan. 7, 1972. Liner **71** and liner **32** attached to rear tongue member **13** are contoured so that upon closure of the boot by buckle system **14,** the liners will mate together to substantially enclose the foot of the wearer.

Flaps **90, 91** on liner **71** extend about the top of rear tongue member **13** to preclude snow or other material from entering the boot.

The bottom of the boot includes a sole portion **80** and a heel portion **81** which is elevated above the sole portion as clearly seen in FIG. **1.** Elevating the boot at the heel permits the boot to rest on boot plates which are usually attached to a ski in association with various heel bindings presently available on the market. Accordingly, the boot of the present invention fits snugly on a ski and at the same time is adapted to fit properly into most heel bindings presently available.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, as modifications will be obvious to those skilled in the art.

We claim:

1. A boot including an ankle portion, said boot being adapted for controlling the forward and backward flex in a boot, said boot comprising:

a substantially rigid shell having an ankle portion adapted to cover the forward surface of a wearer's ankle and a back portion adapted to cover the back surface of a wearer's ankle;

means for controlling the stiffness of said shell against flexure in the forward and backward directions,

said forward and back ankle portions of said shell each having at least one transverse opening therein, said openings reducing the wall thickness of said shell sufficiently to substantially decrease the resistance to flexure of said ankle portion in the forward and rearward directions; said opening in said forward surface being compressed by forward flexure of the ankle portion and said opening in said back portion being compressed by rearward flexure of the ankle portion; and,

adjustable flexure control means associated with said openings in said forward and backward portions to limit the compression of the application of pressure and thereby control the stiffness of said shell.

2. The boot of claim **1** wherein said flex control means includes an elongated member having a major and a minor axis, said member being rotatably positioned longitudinally within said opening to limit the extent of compression thereof caused by flexure of said ankle portion.

3. The boot of claim **2** wherein said member includes two spaced heads, each head having an inner and outer wall, said heads being connected together at their inner walls by said elongated member, and a turning means attached to the outer wall of one of said heads for turning said rod in said opening.

4. A boot in accordance with claim **3** wherein each of said rods has locking means for locking said head in position.

5. The boot of claim **1** in which said shell is provided with a vertical stiffening rib extending from about the toe of said boot to about the top of the ankle portion of said boot, and a vertical stiffening rib extending along the back of said boot.

6. The boot of claim **5** in which each of said ribs having a plurality of openings therein adapted for receipt of a rotatable flex member.

7. The boot of claim **1** and further including adjustable canting means located on at least one side of said boot and adapted for selected lateral movement whereby the knees of a skier can be centered over the center line of a ski when the boot is inserted in bindings on skis.

8. The boot of claim **7** in which said adjustable canting means includes a rigid strip of material located and attached to said boot, said strip having a portion extending freely relative to said shell, said freely extending portion being adapted to be moved laterally relative to said boot whereby a skier's leg between the ankle and knee can be pushed to a desired position by movement of said strip.

9. The boot of claim **8** and further including a second strip located on the opposite side of said boot from said first strip.

10. The boot of claim **9** and further including a liner disposed within said shell and extending above said shell said liner having means for enclosing said freely extending portion of said strip.

11. The boot of claim **10** wherein said liner further includes a wrap around member extending about said back portion of said boot for preventing materials such as snow from entering said boot.

12. The boot of claim **1** further including post means attached to said back portion for adjusting the position of said back portion substantially relative to said ankle portion.

13. The boot of claim **12** wherein said back portion includes spaced ribs; a post member having two ends; at least one of said ends having a plurality of means for being adjustably connected to one of said spaced ribs at a selected position and the remaining end of said post being attached to said remaining rib.

14. A boot including an ankle portion, said boot being adapted for controlling the forward and backward flex and the cant in a boot, said boot comprising:

a substantially rigid shell having an ankle portion adapted to cover the forward surface of a wearer's ankle and a back portion adapted to cover the back surface of a wearer's ankle;

means for controlling the stiffness of said shell against flexure in the forward and backward directions,

said forward and back ankle portions of said shell each having at least one transverse opening therein, said openings reducing the wall thickness of said shell sufficiently to substantially decrease the resistance to flexure of said ankle portion in the forward and rearward directions; said opening in said forward surface being compressed by forward flexure of the ankle portion and said opening in said back portion being compressed by rearward flexure of the ankle portion;

adjustable flexure control means associated with said openings in said forward and backward portions to limit the compression of the application of pressure and thereby control the stiffness of said shell; and,

adjustable canting means located on each side of said boot for laterally positioning the leg of a skier relative to the center line of a ski.

15. The boot of claim **14** in which said adjustable canting means includes a rigid strip of material located on each side of said boot, each of said strips comprising a portion extending freely relative to said shell, said freely extending portion being adapted to be moved laterally relative to said boot whereby a skier's leg between the ankle and knee can be pushed to a desired position by movement of said strip.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,807,060 Dated April 30, 1974

Inventor(s) Alden B. Hanson; Chris A. Hanson

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 63, delete "flexure system"; Column 2, line 5, delete "position" add --portion--; Column 4, line 6, following "a" insert --wrap around--; Column 5, line 35, delete "an" insert --a forward--; line 37 following "back" insert --ankle--; line 48 delete "surface" insert --ankle portion--; line 50 following "back" insert --ankle--; line 50, delete "rearward" insert --backward--; line 53, delete "backward" insert --back ankle--; line 54, delete "of" insert --on--; line 56, delete "flex" insert --flexure--; line 62, delete "member" insert --flexure control means--; line 67, delete "rod" insert --elongated member--; Column 6, line 2, delete "rods" insert --flexure control means--; line 9, delete "in which" insert --and--; line 10, following "plurality of" insert --said transverse--; line 10, following "openings therein" insert --and being--; line 11, delete "a rotatable flex member" insert --said adjustable flexure control means--; line 15, delete "the knees" add --a knee--; line 19, following "includes a" insert --first--; line 19, following "of material" delete "located and"; line 25, following "of said" insert --freely extending portion of said--; line 38, following "back" insert --ankle--; line 39, following "back" insert --ankle--; line 39, following "said" insert --forward--; line 46, following "to" insert --another of--; line 46, delete "remaining rib" insert--spaced ribs--; line 51, delete "an" insert --a forward--; line 53, following "a back" insert --ankle--; line 63, delete "rearward" insert --backward--; line 64, delete "surface" insert --ankle portion--; line 66, following "said back" insert --ankle--; line 66, delete "rearward" insert --backward--; Column 7, line 2, delete "backward" insert --back ankle--; line 3, following "compression of" insert --said openings from--.

Signed and sealed this 29th day of October 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents