March 16, 1971 G. E. MORGAN 3,570,148

SKI BOOT CONSTRUCTION

Filed Aug. 21, 1969 3 Sheets-Sheet 1

FIG. 1

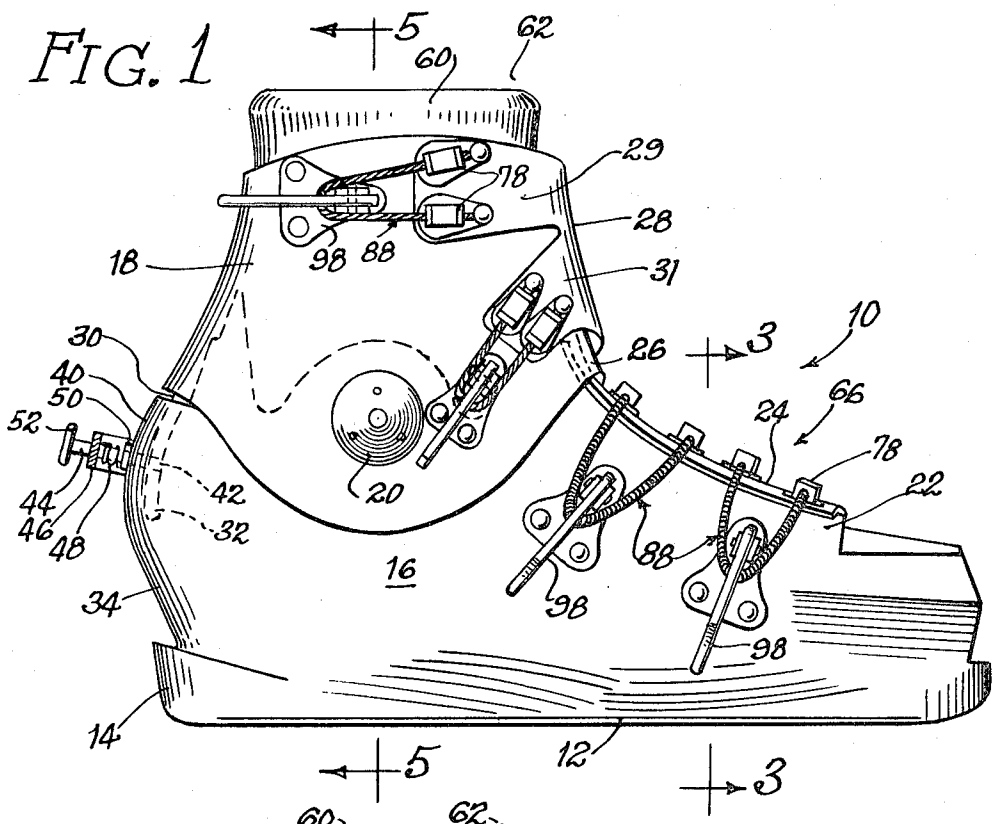
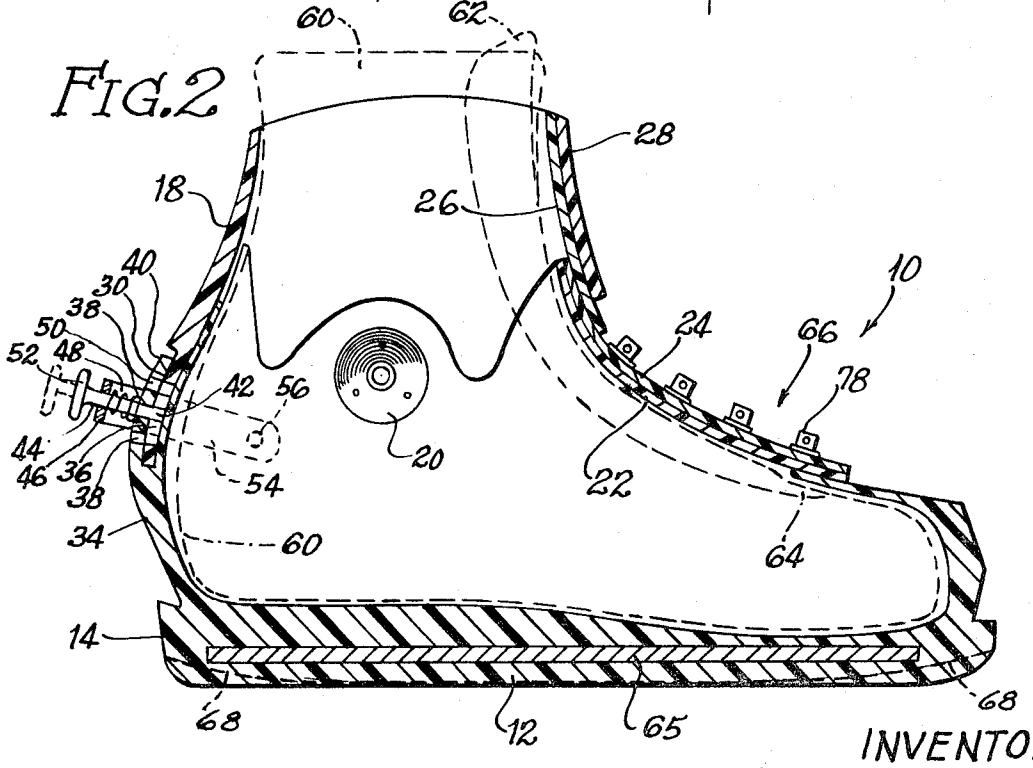


FIG. 2



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and Ladd Attys

March 16, 1971 G. E. MORGAN 3,570,148

SKI BOOT CONSTRUCTION

Filed Aug. 21, 1969 3 Sheets-Sheet 2

FIG. 3

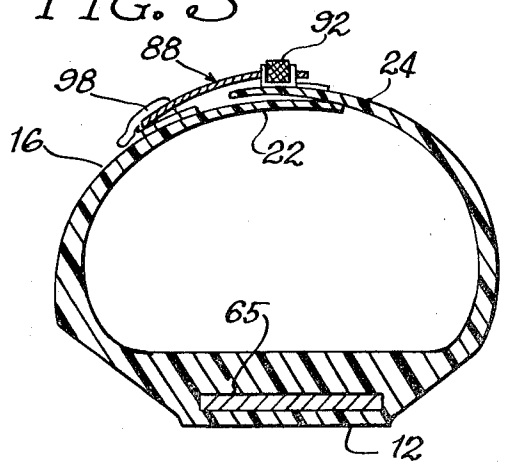


FIG. 4

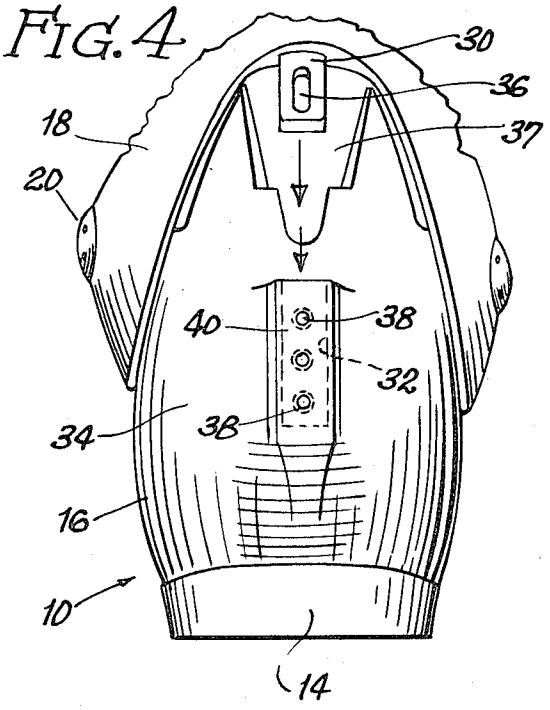


FIG. 5

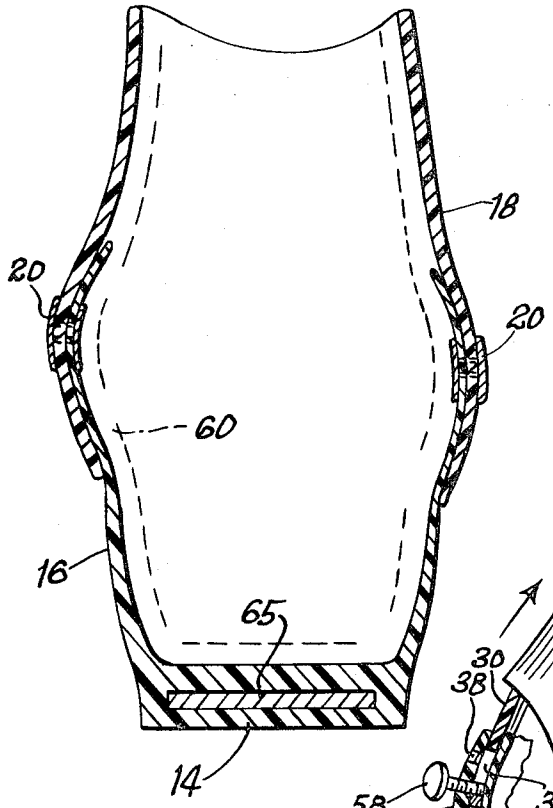
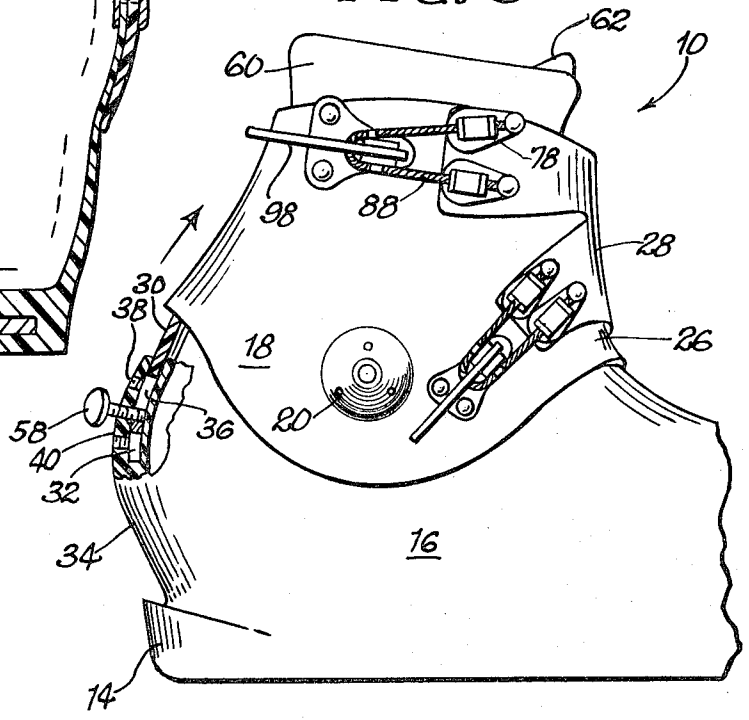


FIG. 6



March 16, 1971 G. E. MORGAN 3,570,148

SKI BOOT CONSTRUCTION

Filed Aug. 21, 1969 3 Sheets-Sheet 3

FIG. 7

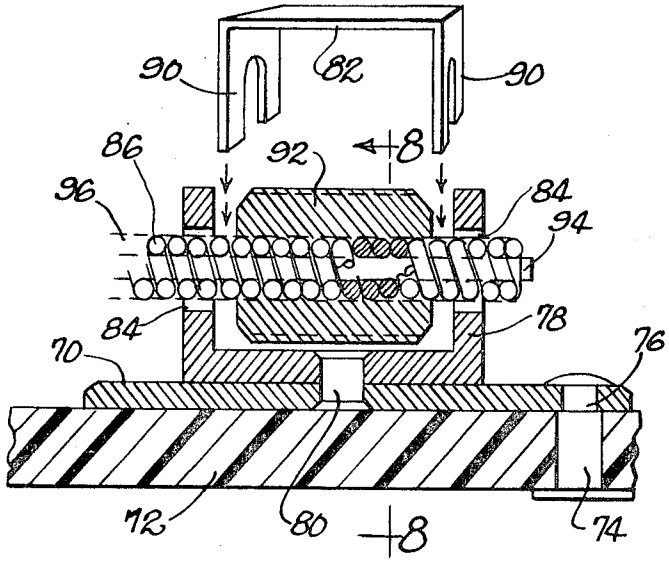


FIG. 8

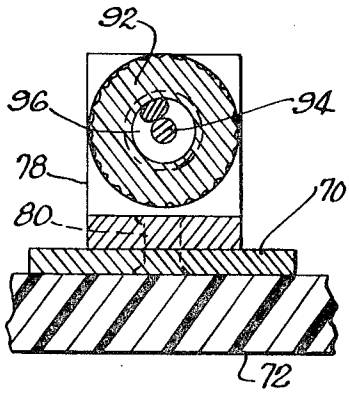
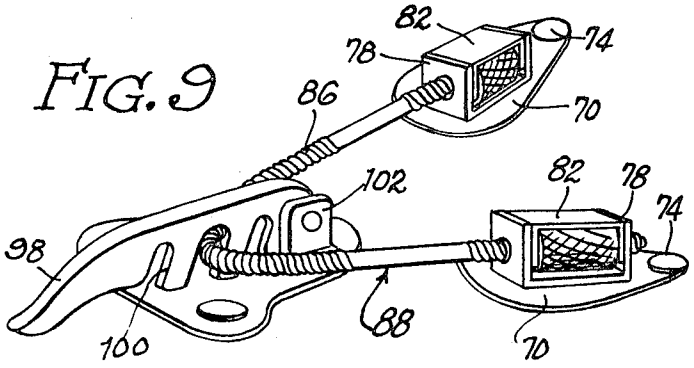


FIG. 9



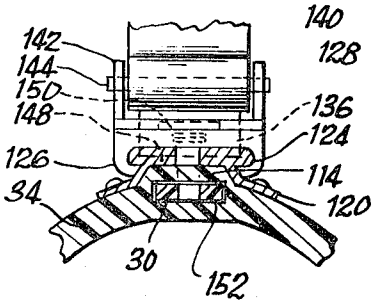


FIG. 10

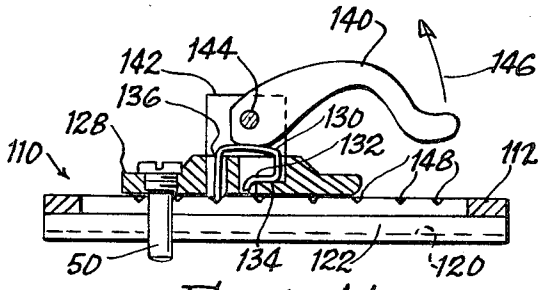


FIG. 11

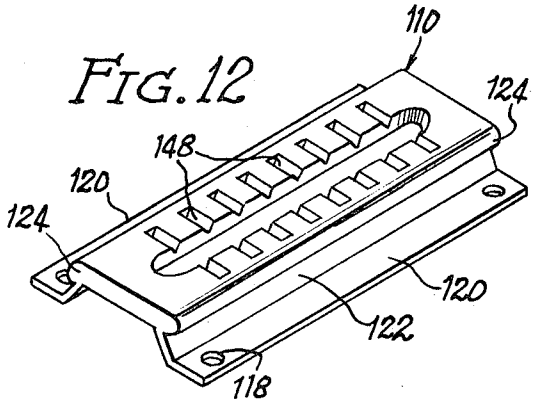


FIG. 12

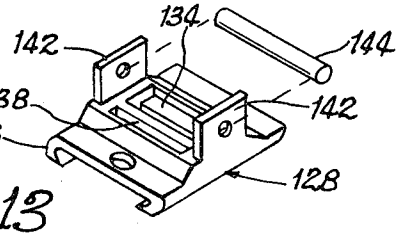


FIG. 13

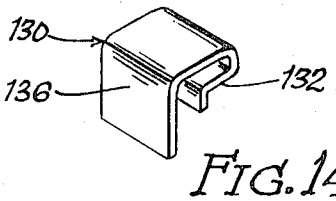


FIG. 14

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3,570,148

SKI BOOT CONSTRUCTION

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Int. Cl. A43b 23/00
U.S. Cl. 36—2.5 14 Claims

ABSTRACT OF THE DISCLOSURE

A ski boot having a body portion and a pivotally connected ankle section. The structure permits flexion and extension of the ankle with the movement taking place about two separate axes, one axis positioned on one side of the shoe corresponding with the location of the lateral malleolus bone and the other axis on the opposite side corresponding with the location of the medial malleolus bone. A limiting device is associated with the ankle section to determine the allowable extent of pivotal movement, and the limiting device is adjustable to provide the most beneficial conditions for beginners as well as more experienced skiers. The invention also provides securing means for tightening the boot around the foot, the securing means including a band having its opposed ends secured to one boot portion and a locking member for the loop of the band. The opposed ends of the band are adjustably attached so that tightening or loosening of the band can be accomplished after the loop is locked in place.

This invention relates to improvements in ski boots and more particularly to a ski boot construction which can be manufactured with maximum efficiency while still providing highly satisfactory performance characteristics.

Ski boot constructions are commonly produced as heavy, relatively awkward, and highly expensive structures. The weight, complexity and expense results because the boots are subjected to high stress conditions during use and, therefore, must be extremely durable to provide satisfactory use and protection for the skier.

Because of the nature of ski boots, it has been difficult to provide boots which are useful for a wide range of skiing ability. For example, beginning skiers find it extremely difficult to wear a boot which is rigid whereas experts desire a boot which provides very little freedom for pivoting about the ankle joint. Manufacturers, therefore, find it necessary to provide ski boots designed for particular classes of skiers, or skiers simply use boots which are not best suited for their skills.

In order to provide some economy in manufacturing ski boots, boots have been made without taking the best fitting contours into consideration. Latch mechanisms which have been used for the boots have also been unsatisfactory from the standpoint of providing a desirable degree of adjustment to provide the best fit.

It is a general object of this invention to provide a ski boot construction which combines certain unique features resulting in a ski boot which is substantially improved over prior constructions from the standpoint of ease of manufacture and use, and from the standpoint of versatility in that the boot can be adjusted for use by beginners as well as more experienced skiers.

It is a further object of this invention to provide a ski boot which can be efficiently manufactured while still having the most desirable contours for proper fit and which can be provided with latch means having a high degree of adjustability to also improve fitting characteristics.

These and other objects of this invention will appear hereinafter and for purposes of illustration, but not of limitation, a specific embodiment of the invention is shown in the accompanying drawings in which:

FIG. 1 is a side elevation of a ski boot characterized by the features of this invention;

FIG. 2 is a vertical sectional view of the ski boot;

FIG. 3 is a cross-sectional view taken about the line 3—3 of FIG. 1;

FIG. 4 is a fragmentary rear elevational view;

FIG. 5 is a cross-sectional view taken about the line 5—5 of FIG. 1;

FIG. 6 is a fragmentary side elevation partly cut away illustrating the ankle section in an extended position;

FIG. 7 is an enlarged fragmentary, sectional detailed view illustrating latch means utilized for the ski boot;

FIG. 8 is a cross-sectional view taken about the line 8—8 of FIG. 7;

FIG. 9 is a perspective view of the latch construction;

FIG. 10 is a fragmentary sectional view illustrating an alternative limiting device;

FIG. 11 is a sectional side elevational view of the limiting device; and,

FIG. 12 through 14 are perspective views illustrating components of the limiting device.

This invention generally relates to a ski boot having heel and sole portions and an associated upper portion. The upper portion includes a pivotally connected ankle section. In order to control the allowable movement of the ankle section, the invention contemplates the use of a limiting device. An adjusting means is provided as part of the limiting device so that the degree of allowable movement can be varied. In this manner, desirable freedom can be provided for a beginner while a suitably rigid arrangement is available for more experienced skiers.

The invention also contemplates a latching arrangement which can be used in conjunction with the specific ski boot described but which also finds utility with other ski boot constructions. The latching construction generally involves the use of a band having a loop portion for engagement with a holding means, such as a tooth, provided on one section of the boot. The ends of the band are located on an opposed section, and the positions of these ends can be adjusted to provide the correct amount of holding force.

The construction illustrated in the drawings comprises a ski boot **10** defining a sole portion **12** and a heel portion **14**. The upper portion of the shoe is divided into a main body **16** and an ankle section **18**.

The ankle section is pivotally connected to the body **16** by means of rivets **20**. The body section **16** includes flaps **22** and **24** which overlap to provide a closure. The

ankle section includes an inner flap **26** and an outer flip **28** which is divided into two sections **29** and **31**. It will be noted that the lower end of the flap **26** extends over the upper end of the flap **24** so that a seal is provided all along the front of the boot.

The ankle section **18** is provided with a downwardly extending tongue **30** which is received in a slot **32** defined by the back wall **34** of the body section **16**. In the embodiment of FIGS. 1 and 2, the tongue **30** defines an elongated opening **36**, and this opening is positioned opposite holes **38** defined in the wall section **40** of the back wall **34**. These holes are adapted to receive the end **42** of pin **44**. The pin is mounted in a bracket **46** which is attached to the body **16**. A spring **48** extends between the bracket and a shoulder **50** on the pin to normally urge the end **42** into the opening **36** defined by the tongue. The handle **52** of the pin is provided so that the pin can be pulled outwardly to release the pin from the opening **38** in which it is received.

As best shown in FIG. 4, the back wall **34** of the body section **16** defines a substantially V-shaped cut-out portion **37**. This cut-out portion is provided to accommodate the tendency of this section of the back wall to squeeze together in response to forward motion of the tibia-fibula "shin."

The bracket **46** is attached to the body **16** by means of opposed arms **54** which extend around the sides of the body. The arms may be riveted to the body at **56** to provide a pivotal connection whereby the pin **44** can be moved into engagement with a different hole **38**. The position of the pin **44** determines the degree of allowable movement of the ankle section. Thus, the location of the pin in the lower hole **38** would substantially lock the tongue **30**, and thereby restrict movement of the ankle section. The upper hole **38** will provide a degree of freedom corresponding with the length of the opening **36** in the tongue. An intermediate position is provided for the pin **44**, and it will be appreciated that the number of positions for adjustment as well as the size of the opening **36** can be varied.

In the embodiment shown in FIG. 6, the holes **38** are threaded, and a threaded pin **58** is provided. The extent of allowable movement is then controlled depending upon which of the threaded holes **38** is employed.

A preferred arrangement for a limiting device is shown in FIGS. 10 through 14. This limiting device includes a mounting bracket **110** having a central portion **112** dimensioned to fit snugly against the enlarged portion **114** defined by the back wall **34** of the boot. Openings **118** are defined by the flanges **120** provided on the legs **122** of the bracket. These openings provide means for securing the bracket to the boot.

The central portion **112** of the bracket defines outwardly extending shoulders **124** which are received in the grooves defined by the arms **126** of sliding bracket **128**. The bracket **128** carries a spring **130** having an inturned portion **132** which rests in the seat **134** defined by the bracket. A downwardly extending leg **136** of the spring extends through a slot **138**. The end of the leg **136**, therefore, extends into contact with the upper surface of the central portion **112** defined by the stationary bracket **110**.

A locking handle **140** is pivotally connected to the upstanding arms **142** of the movable bracket **128** by means of a pin **144**. As best shown in FIG. 11, the handle defines a cam surface in the area of the spring **130** and in the position shown, the leg **136** is being forced downwardly. By raising the handle in the direction of the arrow **146**, the pressure on the spring will be gradually relieved. The central portion **112** of the bracket **110** defines a plurality of V-shaped grooves **148** which receive the end of the leg **136** for locking the sliding bracket in position relative to the stationary bracket.

The movable bracket **128** carries a pin **150** which is adapted to extend into the opening **36** defined by the tongue **30**. In this embodiment, the tongue **30** extends into the opening **152** defined by the enlarged portion **114** in the back wall of the boot.

In the preferred form of the invention, the body **16** comprises a single molded piece of polyurethane. The molding operation can be efficiently carried out, particularly since the flaps **22** and **24** can be integrally molded. The ankle section **18** including the flaps **26** and **28** and tongue **30** can also be molded as a single piece with material such as polyurethane. The assembly operation for these two pieces merely involves the attachment of the latch hardware, the rivets **20** for achieving pivoting, and the pin mechanism.

The interior contours of the molded pieces **16** and **18** can be determined by considering the natural foot contours. Thus, the design of these pieces permits efficient production without sacrificing the natural interior contours. The entire interior may be lined with a cushion **60** having a tongue portion **62** attached at **64**. This cushion is also designed so that the natural shape of the foot will be accommodated.

The boot design also takes into consideration the malleolus or ankle bone position since the pivot axis for the ankle section **18** substantially corresponds with this bone position. This is particularly apparent when considering FIGS. 5 and 6. It will be noted in this connection that the pivot axis is different on the opposite sides of the boot. The rivet **20** on the outside of the boot is positioned in accordance with the position of the lateral malleolus while the rivet **20** on the inside is positioned in accordance with the position of the medial malleolus. These positions can be calculated for a given boot size in accordance with known anatomical standards.

Although the material employed for the boot is relatively stiff, it is desirable to provide additional stiffening means **65** in the sole of the boot. This stiffening means may consist of a piece of wood, metal or plastic molded integrally with the boot and dimensioned to extend adjacent the exterior surfaces on the molded part.

Because of the thickness of the sole **12** and the relative stiffness of polyurethane, particularly if the stiffener **65** is utilized, bending of the boot in the top or vamp area **66** cannot be easily achieved. In a modified form of the invention, the sole **12** defines a radius bottom as shown at **68**. This provides a rocker affect which is desirable particularly because of the stiffness of the shoe and to provide proper functioning of the safety bindings. Thus, if the shoe sole were flat, pivoting movement relative to the ski would take place at the front edge and, this fulcrum point is not satisfactory for achieving release of the bindings at a proper stress level.

FIGS. 7 through 9 illustrate an improved latch construction employed for securing the flaps **24** and **28** relative to the shoe body when these flaps are in overlapping relationship with the underlying flaps **22** and **26**. The latching mechanisms are particularly useful with the boot construction of this invention; however, these mechanisms have definite utility with respect to boot construction of other designs.

The latch arrangement comprises a plate **70** which is riveted to a shoe section **72** comprising a portion of one of the flaps **24** or **28**. The rivet **74** includes a reduced diameter portion **76** which permits pivotal movement of the plate **70**.

Holding brackets are formed by means of U-shaped members **78** secured by the rivets **80** to plates **70**. Corresponding U-shaped members **82** are adapted to be received within the walls of the members **78**. Openings **84** are defined by the walls of the member **78** for receiving the ends **86** of securing bands **88**. The bifurcated side walls **90** of the U-shaped member **82** provide openings permitting location of this member within the member **78**. A weld or other suitable securing arrangement may be provided for holding the members **78** and **82** together.

The bracket arrangement provides open side walls whereby nuts **92** fitted around the ends **86** of the bands may be rotated with the fingers. In the embodiment illustrated, the bands are formed by means of a centrally located wire **94** and a coil **96** extending along the length of the wire. The outer periphery of the cable provides a thread for interfitting with the internal threads of the nuts **92**.

The loop provided by the bands **88** is adapted to be held by means of a lever **98**. The lever defines teeth **100** which are engaged by the loop in the band. After engagement with the loop, the lever is pivoted about the mounting **102** thereby locking the loop in position. The nuts **92** can be rotated for fine adjustment of the band prior to pivoting of the lever to the locked position. This provides a highly suitable arrangement for achieving a snug and comfortable attachment of the flaps on each boot. Thereafter, the wearer adjusts the limiting device with the position usually depending upon skiing experience. Thus, a beginner usually requires a larger degree of freedom, and this can be accomplished by inserting the pin **44** or **58** in the upper hole or by eliminating use of the pin altogether whereby the tongue will be free to move in the slot **32**. In the case of a more experienced skier, an intermediate or lower hole would be utilized.

Irrespective of the amount of pivoting allowable, the pivoting action will take place about the axis of the rivet **20** which provides a natural pivot position from the standpoint of the ankle joint of the wearer. In addition to the control provided for pivotal movement, the construction provides a high degree of lateral stability. The use of molded polyurethane and the design of the overlapping portions of the body **16** and ankle section **18** are important in this regard.

It will be understood that various changes and modifications may be made in the above described construction which provide the characteristics of this invention without departing from the spirit thereof particularly as defined in the following claims.

That which is claimed is:

1. A ski boot including a sole and heel portion and an upper portion, said upper portion including an ankle section and a foot section, means pivotally connecting said ankle section to said foot section, and a movement limiting device comprising means extending from one of said sections into overlapping relationship with the other section, stop means associated with said other section for engaging said extending means whereby said ankle section is free to pivot in unrestrained fashion until said extending means engages said stop means, and including means for adjusting the position of said stop means to thereby vary the allowable extent of pivotal movement whereby the limiting device can be set to provide substantial freedom of movement or to substantially reduce the capacity for movement.

2. A ski boot in accordance with claim **1** wherein the pivot axis of said ankle section is aligned to substantially correspond with the position of the ankle bone when the ski boot is worn.

3. A ski boot in accordance with claim **1** comprising a main body formed of a first single molded piece, said first molded piece including said sole and heel portion and part of said upper portion, said ankle section comprising a second single molded piece completing the upper portion of the boot.

4. A ski boot in accordance with claim **3** wherein the top area of said main body includes integrally molded flaps adapted to be bent into overlapping relationship, said ankle section also including integrally molded flaps adapted to be bent into overlapping relationship, and including adjustable securing means for the respective flaps.

5. A ski boot in accordance with claim **1** wherein said limiting device comprises a tongue extending downwardly from said ankle section, a receiving area for said tongue defined by the adjacent upper portion, said tongue being movable relative to said receiving area; and adjustable means for limiting the extent of movement of said tongue relative to the receiving area.

6. A ski boot in accordance with claim **5** wherein said tongue extends downwardly from the back of said ankle section, said receiving area being defined in the back wall of the heel portion of the boot.

7. A ski boot in accordance with claim **6** wherein said tongue defines an elongated opening, said receiving area comprising a slot defined between opposing wall portions in the back of the boot, and pin means associated with the wall portions and adapted to extend into the elongated opening of the tongue whereby engagement of the pin by the tongue portion at the end of said opening will limit the allowable extent of the withdrawal of the tongue from said slot.

8. A ski boot in accordance with claim **7** including a plurality of separate openings defined in the back of said boot for receiving said pin, the extent of allowable withdrawal of the tongue from the slot being dependent upon which opening receives the pin.

9. A ski boot in accordance with claim **7** including a stationary bracket attached to the back wall of said upper portion, a movable bracket supporting said pin attached to said stationary bracket, and resilient means carried by said movable bracket for engagement with said stationary bracket to hold the movable bracket in a selected position relative to the stationary bracket, the extent of allowable withdrawal of the tongue from the slot being dependent upon the selected position of said movable bracket.

10. A ski boot including a sole and heel portion and an upper portion, the sole of the boot defining a curvilinear bottom surface tapered upwardly from an intermediate position toward the opposed front and back ends of the boot, said upper portion including a pivotally connected ankle section, a movement limiting device asociated with said upper portion for determining the extent of allowable pivotal movement of said ankle section, and means associated with said limiting device for adjusting the allowable extent of pivotal movement whereby the limiting device can be set to provide substantial freedom of movement or to substantially reduce the capacity for movement.

11. A ski boot in accordance with claim **14** including a stiffener embedded in the sole of the boot and extending substantially along the length thereof.

12. A ski boot construction comprising a main body portion including a sole and heel and a section of an upper, and an ankle section connected to said main body portion as a continuation of said upper, means pivotally connecting said ankle section to said main body portion, said connecting means comprising a first element defining a first pivot axis on that portion of the boot which is located in a position substantially corresponding with the lateral malleolus bone of the wearer when the boot is worn, and a second element defining a second pivot axis on that portion of the boot which is located in a position substantially corresponding with the medial malleolus bone of the wearer when the boot is worn, said first pivot axis being located in a horizontal plane positioned vertically below a horizontal plane including said second pivot axis.

13. A ski boot in accordance with claim **12** wherein said main body portion comprises a single molded piece, and wherein said ankle section comprises a second single molded piece, and including a movement limiting device associated with said ankle section and with the upper of said main body portion for determining the extent of allowable pivotal movement of said ankle section relative to said body portion.

14. A ski boot including a sole and heel portion and an upper portion, said upper portion including a pivot-

ally connected ankle section, a movement limiting device associated with said upper portion for determining the extent of allowable pivotal movement of said ankle section, and means associated with said limiting device for adjusting the allowable extent of pivotal movement whereby the limiting device can be set to provide substantial freedom of movement or to substantially reduce the capacity for movement, said limiting device comprising a tongue extending downwardly from said ankle section, a receiving area for said tongue defined by the adjacent upper portion, said tongue being movable relative to said receiving area, and adjustable means for limiting the extent of movement of said tongue relative to the receiving area.

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PATRICK D. LAWSON, Primary Examiner

U.S. Cl. X.R.

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