United States Patent [19]

Neumann

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[54] **APPARATUS FOR DETERMINING THE BIAS OF THE SOLE OF A SKI BOOT**

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[21] Appl. No.: **140,885**

[52] **U.S. Cl.** .....**33/3 A,** 33/174 D

[51] **Int. Cl.** **A43d 1/00**

[58] **Field of Search** .....33/174 D, 3 R, 3 A, 33/3 B, 3 C

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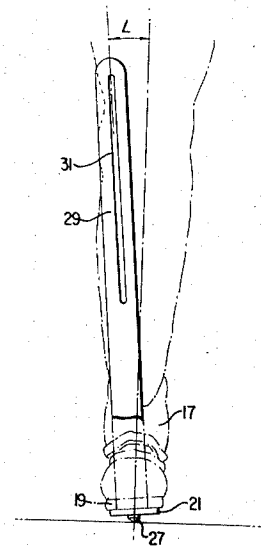
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Primary Examiner—Leonard Forman
Assistant Examiner—Dennis A. Dearing
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[57] **ABSTRACT**

A device for determining the bias or angle between the bottom of the sole of a ski boot and the wearer's knee. A flat base plate includes nub extensions centrally located on the underside and a rigid wand extending upwardly from one end thereof. When the wearer places the boot on the base plate, any bias will be indicated by the angle between the longitudinal centerline of the wand and the wearer's knee. Auxiliary clamping means may be added to the wand to check the accuracy of the subsequent correction of the boot sole.

9 Claims, 8 Drawing Figures



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SHEET 1 OF 2

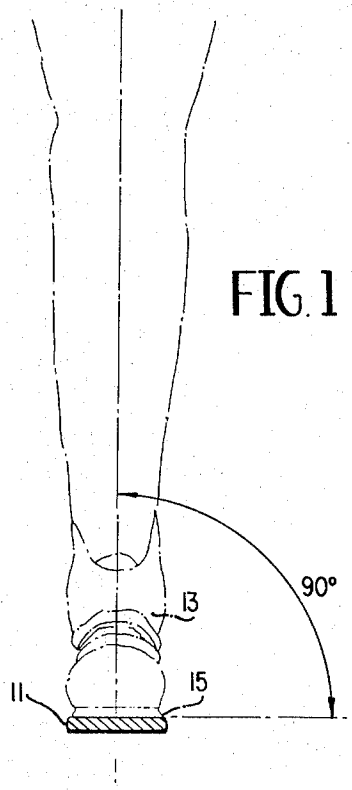


FIG. 1

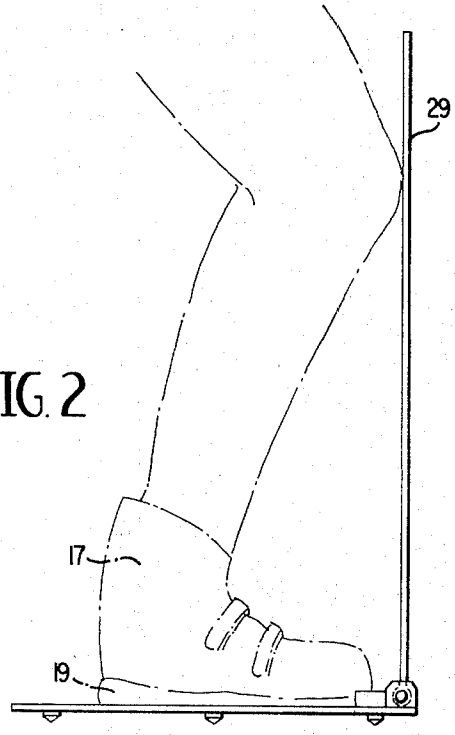


FIG. 2

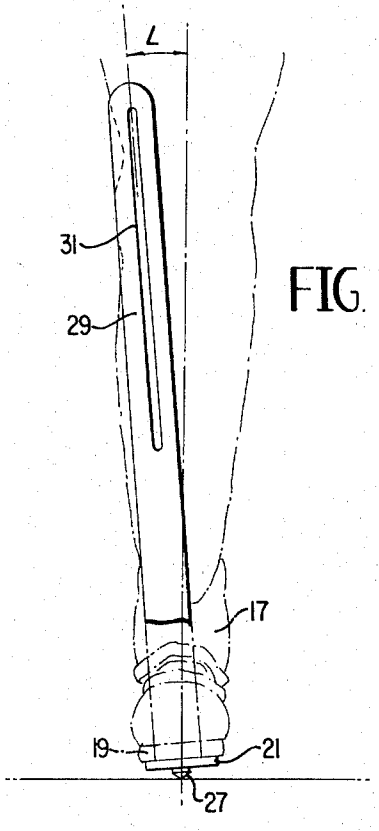


FIG. 3

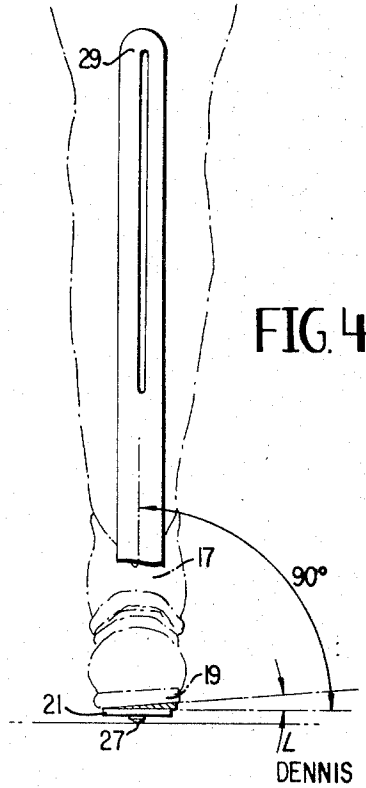


FIG. 4

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FIG. 5

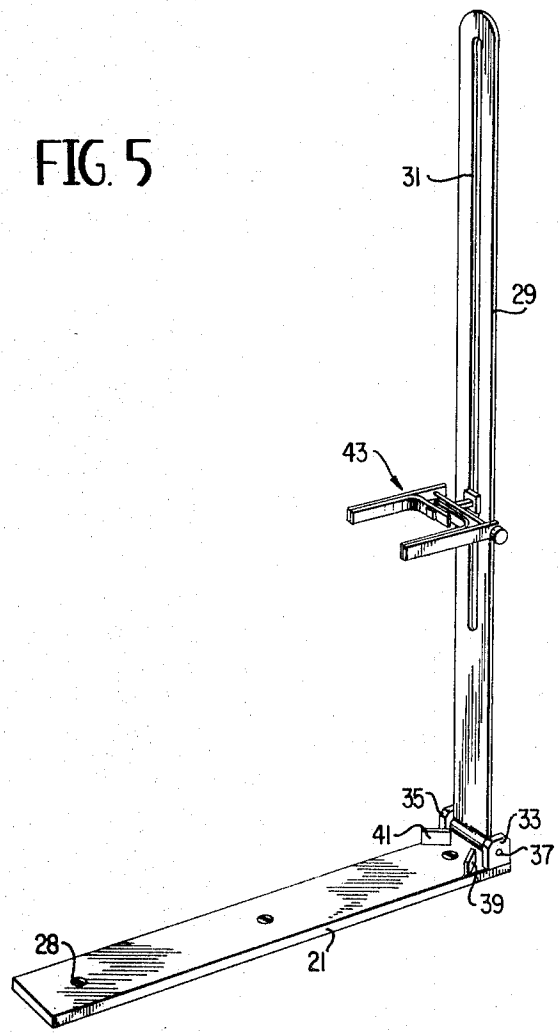
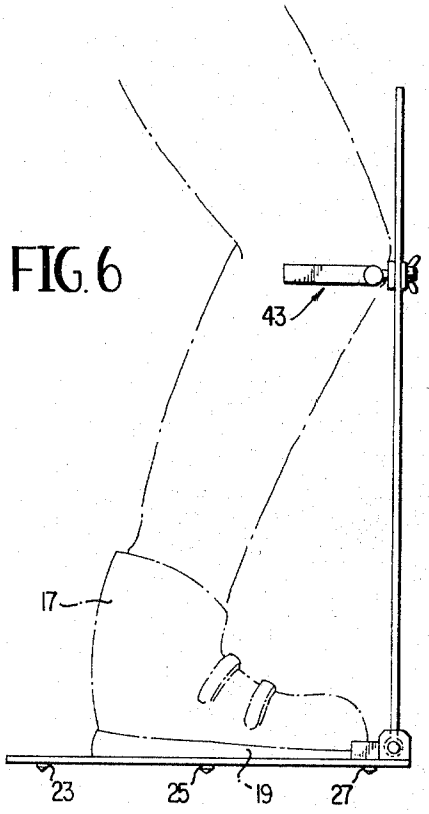


FIG. 6



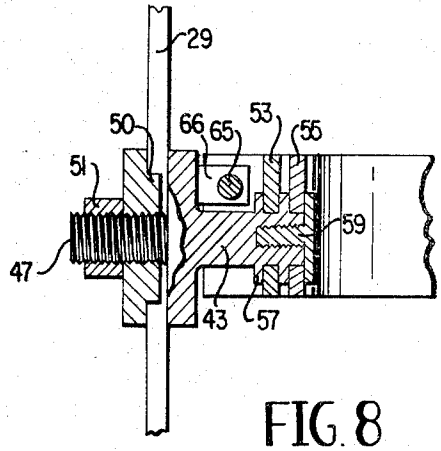


FIG. 8

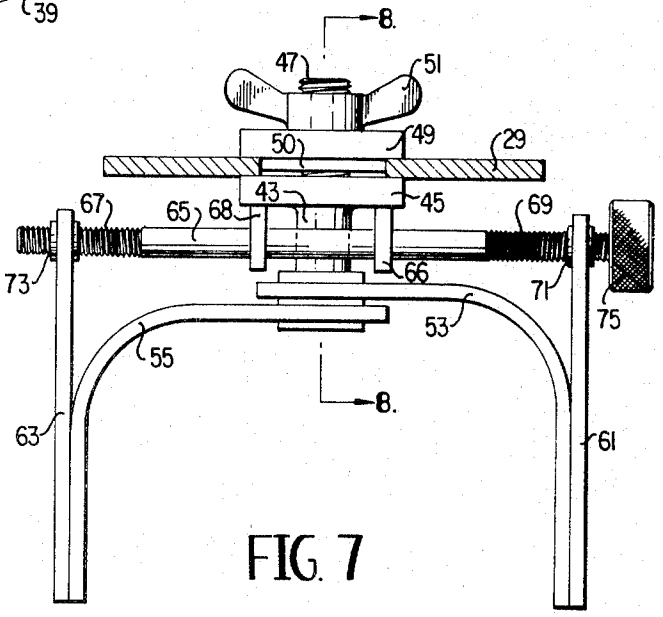


FIG. 7

APPARATUS FOR DETERMINING THE BIAS OF THE SOLE OF A SKI BOOT

This application relates generally to ski boots and more particularly to means for measuring the bias of the sole of a ski boot.

Most of the ski boots worn today are manufactured on a relatively large scale and, therefore, are not precision made with respect to the person wearing them or with respect to the sole of the shoe as compared to the rest of the boot. Ideally speaking, if a boot were manufactured and made specifically and with precision for one person, the sole of the boot would have a lateral surface which would be exactly perpendicular to the wearer's knee. In this condition, neither edge of the ski is laterally tilted so that in making any maneuvers or turns, the skier starts from a perfectly horizontal position of the ski and may move either edge as desired.

The fact that the average ski boot does not fit these exact requirements has been recognized in the past and is the subject matter of a device for correcting this problem, which device is illustrated in U. S. Pat. No. 3,375,586 issued to Thomas B. Kennedy. While this device does serve to measure an angle of interest, it is fairly complicated and fairly expensive to manufacture. Further, this device does not normally measure relative to the knee. Therefore, the only time it would provide the angle of interest in the present invention would be if the knee of the person happened to be located exactly vertically above the foot.

Accordingly, it is an object of this invention to provide apparatus which will measure the bias of the sole of a ski boot relative to the position of the wearer's knee.

A further object of the invention is to provide a device for measuring the bias angle as discussed above which device is simple to manufacture and economically available for use.

These and other objects of the invention will become apparent from the following descriptions when taken in conjunction with the drawings wherein

FIGS. **1–4** are illustrative of the purpose of the device and the corrective measures taken with respect to a particular skier's leg and ski boot;

FIG. **5** is a perspective view of the device used together with an auxiliary piece of equipment;

FIG. **6** shows the use of the auxiliary equipment with respect to the person being tested;

FIG. **7** is a plan view of the auxiliary as generally shown in FIG. **5**; and

FIG. **8** is a sectional view taken along lines **8—8** of FIG. **7**.

In the following description, the term "bias" is used to designate the angle between the bottom of the sole of the ski boot and the wearer's knee which angle, if perfect, would be 90° with a zero degree bias.

Broadly speaking, the invention comprises a rigid plate member having a wand extending upwardly at one end thereof. Extension means located substantially centrally and longitudinally are secured to the inside of the plate opposite to said wand. When the boot is worn and placed on the plate, any lateral bias in the sole of the boot will be indicated by the angle between the longitudinal center line of the wand and the wearer's knee.

Turning now more specifically to the drawings, there is illustrated in FIG. **1** a leg including a ski boot having a sole **15**, with the bottom of the sole resting on a ski **11**. In the description of FIG. **1**, the angle between the sole and the knee is 90° and there is a zero degree bias. Such a condition is that which is most desirable for the best skiing techniques.

Before discussing the views shown in FIGS. **2**, **3** and **4**, the apparatus itself will be discussed. Such apparatus is shown in FIGS. **5–8** with FIG. **5** showing the basic device which may be used with or without the auxiliary apparatus. The device comprises essentially a rigid plate member **21** which extends substantially horizontally when placed on any surface. At least one extension is secured to the bottom of plate member **21** and is centrally located relative thereto. The illustrative embodiment of the extension is shown as nubs **23**, **25** and **27** which may be secured to the lower part of the plate member by any means such as screws **28** or the like.

Extending upwardly from one end of the plate member **21** is a wand **29** made of rigid material and having a longitudinal slot **31** therein. As shown, two upstanding finger members **33** and **35** are secured at either edge of the forward end of the plate member **21** and the wand **29** is hinged therebetween by a means of a pin **37** for reasons to be described hereinafter.

Additionally, in order that the wearer may center his boot longitudinally along the rigid plate member **21**, there is provided a guide means consisting of arms **39** and **41** which may be secured to the plate member by means such as welding.

Returning now to FIGS. **2**, **3** and **4**, there is illustrated the method of using the device of the present invention. FIG. **2** shows the boot **17** in place with sole member **19** firmly placed within the guide means. Since the most critical time for a zero degree bias is when the skier is driving forward into a turn, the guide means is preferably placed so that the skier may bend his knee to the wand **29** as shown in FIG. **2**. The wand is hinged at its lower end in order to additionally determine if the skier's boot hinges straight when the knee is moved forward and back. If the boot does not hinge straight, then the bias will not remain the same in both positions. Therefore, for more critical or professional evaluation, the hinged wand will also indicate if the ski boot hinges properly. However, for purely recreational skiing, correction for the knee in its forward position should be sufficient.

Additionally, for a true measurement, the wand should be so hinged that the longitudinal centerline thereof lies in the same plane as the longitudinal centerline of the plate member **21**.

FIG. **3** discloses a boot which is improperly biased at the bottom of the sole thereof. Since the boot **17** holds the skier's ankle firmly in place and does not allow it to bend laterally, when he places his foot on the plate **21** any bias on the sole will cause the plate to tilt the degree of bias that exists. As shown in FIG. **3**, the plate rocks on the nubs **23**, **25** and **27** and creates an angle L between the center of the wand **29** and the center of the skier's knee.

One of the preferred means of correcting this angle is to use prepared wedges **19** which may be added or subtracted by trial and error until the position of the knee with respect to the wand is as shown in FIG. **4**. One of the reasons for the longitudinal slot is to allow the person adjusting the boot to estimate more closely when

the wand is located at the desired position with respect to the knee.

It will be appreciated, of course, that some highly complicated optical devices that are well-known today for measuring angles could be used in conjunction with the present invention. With such instruments one could view the position as shown in FIG. 3 and obtain a very accurate measurement of the angle L, which angle is shown also in FIG. 4, and which determines the ultimate type, size and angle of wedge to be used to correct the bias. However, it has been found that a little experience soon allows a person to choose either the size of wedge or the number of wedges to be used in order to correct the bias.

It should also be understood that it would be possible to cut off a portion of the sole of the boot on one side rather than adding the wedges on the other side so as to accomplish the same effect.

The wedges themselves may be added to the boot or added to the ski according to the desires of the individual skier. Any type of wedge can be used. They may be prepared simply either by cutting a piece of wood or plastic diagonally along the length thereof or molding wedges of different angular degrees.

Auxiliary equipment shown in FIGS. 5–8 may be used in order to determine the correctness of the adjustment with respect to the knee of the skier without regard to a line of sight type of device. In this situation, the wand **29** is pivoted away from the rigid plate **21**, and the auxiliary device which has a U-shaped configuration is moved vertically until it aligns with the height of the skier's knee. The device is then moved toward the skier's knee and if it fits exactly, the proper correction has been made to provide the correct relationship between the bottom of the boot and the wearer's knee.

Any type of device may be used for this auxiliary equipment **43**. There is shown a device which mechanically is similar to that used on a skate when it is attached to the sole of a shoe or boot. The details of this device are shown in FIGS. **7** and **8**.

A plate **45** terminates at one end of a shaft **43**. Plate **45** is of a dimension such that it extends beyond the edges of the longitudinal slot **31**. Extending outwardly from plate **45** is an exteriorly threaded bolt **47** which may be integral with plate **45**. A further plate **49** fits over threaded bolt **47** and abuts against the wand **29** in a manner similar to that of plate **45**. However, plate **49** has an extension **50** which dimension is such that it fits nearly exactly within the longitudinal slot **31** so as to guide the device when its being moved in a vertical direction. A wing nut **51** may be provided in order to clamp the device at a position vertically on wand **29**.

The apparatus for encompassing the skier's knee consists basically of a U-shaped device provided by curved plates **53** and **55**. The terminal end of shaft **43** is provided with a securing bolt **59**. This bolt together with the terminal end of shaft **43** provide two slots in which the inner slotted ends of curved plates **53** and **55** may be moved in a direction parallel to the flat face of wand **29**.

Two substantially flat plates **61** and **63** are secured to the outer terminal ends of curved plates **53** and **55** by means such as welding.

A rod **65** has two externally threaded portions **67** and **69** at its terminal ends with the threads being in a reversely threaded direction. Rod **65** is centrally positioned by means of bearing plates **66** and **68**. The outer ends of flat plate **61** and **63** are internally threaded so as to mate with the threaded portions **69** and **67** respectively. Accordingly, and in a well-known manner, when knurled knob **75** is turned in one direction, the plates **61** **63** and curved plates **53** and **55** will move closer together and when turned in the other direction will move apart. This, of course, is to adjust the device for varying widths of the skier's knee.

From the above description and drawings it will be quite obvious that the present invention provides an extremely simple device for making a measurement and therefore allowing a correction of the bias of the sole of a skier's boot. It is to be understood that the description and drawings are illustrative only since equivalent single components of the device may be substituted without changing the scope of the invention as set forth in the following claims.

I claim:

1. A device for measuring the lateral bias of a ski boot, while being worn, relative to the knee position comprising

an elongated rigid plate member having an upper planar surface, said upper surface being of sufficient length to substantially subtend the sole of a ski boot placed longitudinally thereof;

a wand extending substantially at right angles from said planar surface and secured to one end of said upper surface, said wand being of at least a length approximate to that of the knee to foot leg portion of a ski boot wearer;

extension means secured to the lower surface of said plate member for supporting said plate member along its longitudinal axis, said plate member being pivotable about said longitudinal axis in response to the lateral bias of a ski boot aligned longitudinally of said plate member so as to measure said lateral bias as indicated by the angle between the pivoted position of the wand and a line extending from the knee to the longitudinal axis created by said extension means.

2. The device of claim **1** further comprising

means for centering said boot longitudinally along said plate member and substantially perpendicular to said wand.

3. The device of claim **1** wherein said means for securing said wand to said plate member comprises a hinge whereby said wand may be angularly moved with respect to said plate member.

4. The device of claim **3** wherein the longitudinal centerline of said wand lies in the same plane as the longitudinal centerline of said rigid plate member.

5. The device of claim **3** further comprising

adjustable means movably secured to said wand for aligning said wand with said knee.

6. The device of claim **4** wherein said adjustable means comprises

a U-shaped member adjustable vertically along said wand and laterally so as to vary the distance between the legs of said U-shaped member.

7. The device of claim **1** wherein said extension means comprises a plurality of nubs spaced along the centerline of said plate member.

8. The device of claim 1 wherein said wand comprises

a rigid plate having a longitudinal center slot located therein.

9. The device of claim 2 wherein said means for centering said boot comprises

a rigid guide secured to said plate including two arms extending angularly outwardly from said wand.

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