United States Patent

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[54] WALKING METHOD AND APPARATUS FOR SKI BOOTS

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[52] **U.S. Cl.** ..... **36/7.5,** 36/2.5 AL

[51] **Int. Cl.** **A43b 3/10**

[58] **Field of Search** ..... 36/2.5 R, 2.5 AL, 7.5

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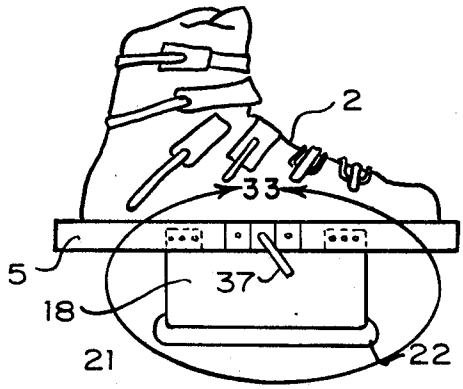
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[57] **ABSTRACT**

A walking method and apparatus for ski boots is disclosed wherein a walking member is detachably affixed to the sole of the ski boot. The walking member has a sole portion for engaging the walking surface and an upper portion for supporting and being affixed to the sole of the ski boot. The walking member depends from the sole of the ski boot and is shaped to provide a forward rocking motion for the ski boot during the user's normal stride. The point of engagement of the sole of the walking member with the walking surface is generally confined to a region below the ski boot and between the ball of the foot and the ankle to relieve walking stresses on the ankle of the user.

7 Claims, 8 Drawing Figures



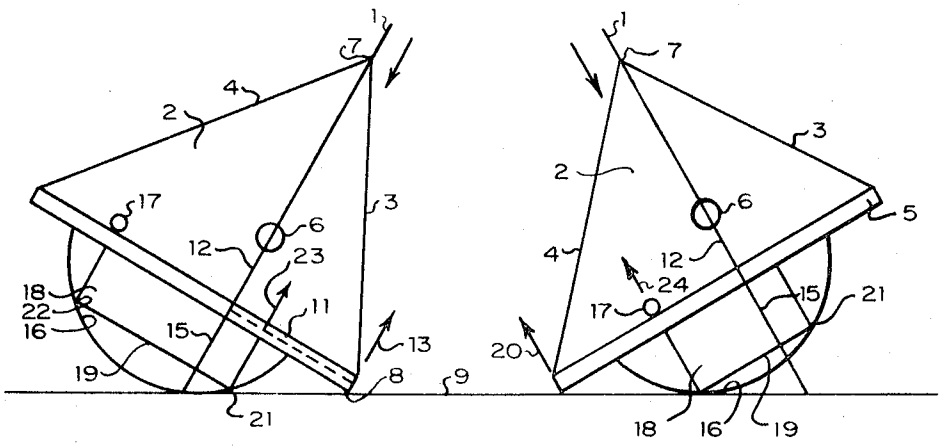


Figure 1

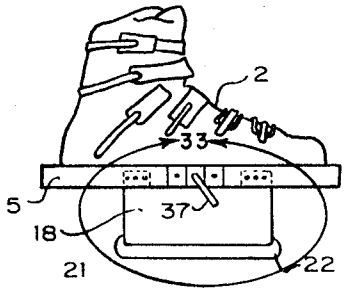


Figure 2

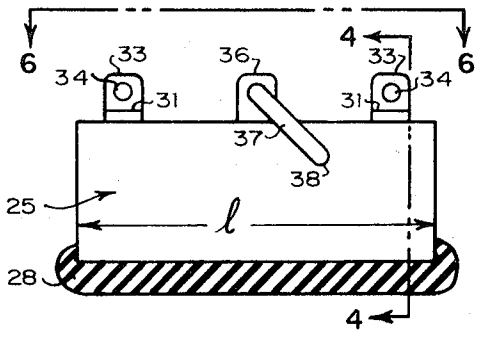


Figure 3

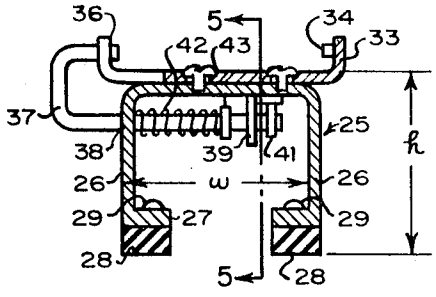


Figure 4

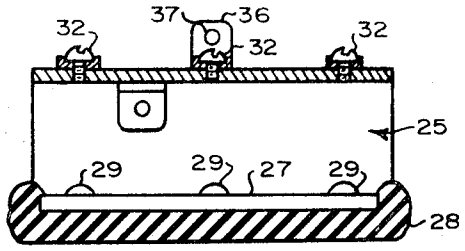


Figure 5

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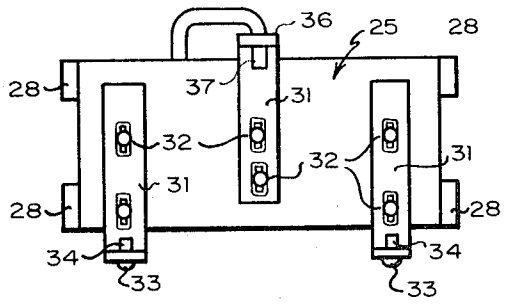


Figure 6

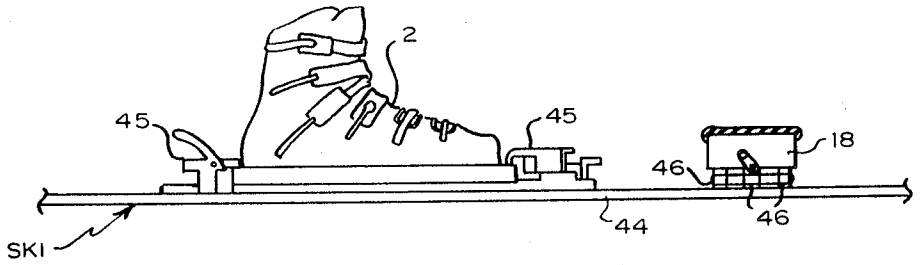


Figure 7

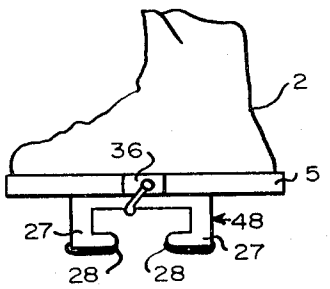


Figure 8

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WALKING METHOD AND APPARATUS FOR SKI BOOTS

DESCRIPTION OF THE PRIOR ART

Heretofore, walking blocks and other walking members have been employed as toys for the amusement of children. Such blocks have been designed to generally elevate the feet by a substantial amount and have been provided with noise-making devices, lights and the like for the further amusement of the children. Examples of such prior walking devices are disclosed in U.S. Pat. No. 2,317,020 issued Apr. 20, 1943, and U.S. Pat. No. 2,242,748 issued May 20, 1941. In these prior walking block devices, the blocks were worn with oxfords or other type of normal foot gear which readily permit a bending of the ankle such that torques generated by the foot gear are not transmitted to the ankle.

Ski boots, on the other hand, are characterized by an inflexible sole and a generally inflexible ankle support such that the ankle is rigidly supported in a fixed position relative to the sole. This is a great aid in skiing since the skier can transmit torques from his leg through the relatively rigid boots to the skis for accurately controlling the action of the skis. However, this rigid ski boot structure makes walking extremely difficult and painful. This comes about because during the normal stride of the user, as the foot is planted and the weight shifts to that foot, the sole is inclined at an angle to the walking surface such that the heel takes the weight of the walker. The length of the rigid sole from a point below the ankle to the heel constitutes a lever arm for exerting torque through the inflexible boot to the leg. At the end of the stride as the walker pushes forward with his toe, the toe portion of the boot is taking the forward pushing force. In this case a relatively long lever arm from the toe to a point below the ankle exerts torque in the opposite direction against the leg. The leg muscles resist the torque forces but in the process, the user's leg muscles are strained producing an uncomfortable feeling. These undesired walking stresses can be relieved somewhat by unfastening the ski boot at the ankle to permit flexing of the ankle. However, this latter action only partially decreases the discomfort to the wearer.

SUMMARY OF THE PRESENT INVENTION

The principal object of the present invention is the provision of an improved walking method and apparatus for ski boots.

One feature of the present invention is the provision of a walking structure for attachment to the sole of a ski boot to depend below the sole for engaging the walking surface, such walking structure being dimensioned and shaped for providing a forward rocking motion of the ski boot about a point or points of engagement with the walking surface, which point or points of engagement lie intermediate the ends of the ski boot for reducing the torque transferred via the ski boot to the leg of the user during a normal walking stride.

Another feature of the present invention is the same as the preceding feature wherein the point or points of engagement of the walker with the walking surface are on or near a line interconnecting a normal projection of the ball and ankle of the user's foot onto the ground.

Another feature of the present invention is the same as any one or more of the preceding features including the provision on the walking structure of two axially spaced points of support for simultaneous engagement with the walking surface when the user is standing stationary, whereby a user can stand stationary with feet together without having to balance against the rocking motion provided by the walking structure when the user is walking.

Another feature of the present invention is the same as any one or more of the preceding features including means for detachably affixing the walker structure to the ski boot for walking and/or to the ski for storage while skiing.

Another feature of the present invention is the same as any one or more of the preceding features including the provision of an elastic tread disposed on the sole of the walking structure for engagement with the walking surface to prevent slipping.

Other features and advantages of the present invention will become apparent upon a perusal of the following specification taken in connection with the accompanying drawings wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic line diagram of a ski boot as worn by a user at the ends of a normal stride and depicting the torque on the ankle of the user produced by a ski boot with and without provision of the present invention,

FIG. 2 is a side elevational view of the ski boot with the walking structure of the present invention attached for use,

FIG. 3 is an enlarged view of a portion of the structure of FIG. 2 delineated by line 3—3 showing the walker detached from the ski boot,

FIG. 4 is a sectional view of the structure of FIG. 3 taken along line 4—4 in the direction of the arrows,

FIG. 5 is a sectional view of the structure of FIG. 4 taken along line 5—5 in the direction of the arrows,

FIG. 6 is a view of the structure of FIG. 3 taken along line 6—6 in the direction of the arrows and turned 180° in the clockwise direction,

FIG. 7 is a side elevational view of a ski boot attached to a ski with the walking structure of the present invention attached to the ski for carrying same, and

FIG. 8 is a side elevational view similar to that of FIG. 2 depicting an alternative walker structure of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIG. 1, there is shown in schematic line diagram form a ski boot 2 as worn by a user and the forces exerted on the lower leg as a result of walking. More specifically, the lower portion of the leg is indicated by 1. The ski boot 2 is affixed to the leg 1 via a pair of rigid brace structures 3 and 4 interconnecting the heel and toe portion, respectively, of the sole 5 of the boot 2. The rigid supports 3 and 4 are built into the ski boot and rigidly support the lower portion of the leg 1 relative to the ankle joint 6 at a position 7 above the ankle joint 6.

When the user places his foot forward to begin a forward stride, the heel portion 8 of the sole 5 contacts the walking surface 9 and as weight is transferred to that foot a torque is exerted on the ankle bone at 7 due to the lever arm 11 having a length along the sole 5 from the heel 8 to a point corresponding to a projection of the leg bone 1 onto the rigid sole 5, as indicated by 12. Thus a torque is developed on the leg bone 1 at 7 corresponding to the product of the level arm 11 times the perpendicular force, indicated by arrow 13. This torque must be resisted by the flesh between the boot and bone structure.

At the completion of the forward stride, just before the foot is lifted to begin a new stride, the boot 2 is tilted with the toe downward and the heel lifted as shown in FIG. 1. In this position, a torque is generated in the opposite direction to that generated when the stride is begun. More particularly, the lever arm is now the distance from the toe of the boot to a point below the ankle where the extension of the leg bone 1 intersects the sole 5. Due to this relatively long lever arm, a relatively large torque is generated in the clockwise direction on the leg bone at 7.

These undesired torques exerted on the leg at 7 can be completely eliminated, in the limit, by placing a walking member below the instep of the boot at a position corresponding to an extension of leg 1 and as indicated by line 15. Such a walking member would provide a point of line contact with the walking surface 9, such line contact extending transversely of the boot 2. The walking member 15 would have a length sufficiently long from the sole of the boot 2 to the walking surface 9 such that neither the heel nor the toe of the boot came in contact with the walking surface during a normal stride.

While such a walking member **15** serves to relieve torque on the leg **1** during walking, it has the disadvantage that only a relatively small amount of surface area of the walking member **15** is in contact with the walking surface **9** such that relatively high pressure per square inch is exerted on the walking surface. While this is suitable for walking on relatively hard surfaces, such as roads and the like, it is not particularly suitable for walking on relatively soft surfaces, such as snow, since the walking member **15** will merely sink into the walking surface **9**, thereby degrading the desired performance of the walking member **15**.

Thus, in a preferred embodiment, the walking member should provide a substantial surface area for contacting the walking surface **9** during a normal stride. A relatively large number of different configurations for the walking member would satisfy the above requirement of increased surface area in contact with the walking surface **9** during a normal stride. However, the point or points of contact between the walking member and the walking surface **9** are preferably kept as close as possible to the extension of the leg bone **1** to the walking surface in order to reduce torque on the leg at **7**.

One configuration for the walking member is a block having a curved sole portion for engaging the walking surface as indicated by curved line **16**. The curved block **16** provides a moving point of contact between the sole of the block and the walking surface **9**, such point of contact moving from a position slightly forward of the heel to a position near the ball of the foot **17**. When walking in soft snow, the curved walking surface would sink a slight distance into the snow sufficient to provide a substantial surface in contact with the walking surface **9**. The problem with such a curved sole for the walking block **16** is that the block has no stable stationary position such that when the user is standing still with his feet together he must continually balance on the curved blocks **16** to counteract the tendency for the blocks **16** to rock either forward or backward.

Therefore, in a preferred embodiment of the present invention, the walking block structure has a generally box-like shape as indicated by walking block **18**. The block **18** has an upper portion fixedly attached to the sole **5** and a lower flat portion **19** for engaging the walking surface **9** thereby providing stability when the user is standing stationary. The rear corner or heel portion **21** of the walking block **18** is disposed approximately below the ankle joint **6**. The leading or toe edge **22** of the walking block **18** is disposed substantially below the ball **17** of the foot. In this manner, the counter clockwise torque exerted on the leg **1**, as the foot is planted moving in the forward direction, is substantially reduced because the lever arm for the force exerted on the boot **2** is substantially shorter than for the boot alone, as indicated by arrow **23**. Also, when the toe is tipped downwardly at the end of the stride the torque producing lever arm is reduced to a distance along the sole **5** corresponding to that from the ball **17** of the foot to a vertical extension of the leg bone **1**, as indicated by arrow **24**. This is to be compared to the lever arm from the toe of the boot to the vertical extension of the leg bone **1** for the boot taken alone, as shown by arrow **20**. In addition, by providing spaced corners or ridges **21** and **22** of contact with the walking surface **9** the stride tends to level out compared to the stride obtained by the use of the curved walking block **16** or ridge walking block **15** of greater height than the box-like block **18**. The height of the box-like block **18** is dimensioned such that the heel and toe corners **21** and **22** are approximately in the same plane as the heel and toe of the boot **2** when the boot **2** is inclined to the horizontal walking surface **9** at the beginning and end of a normal stride. This provides the minimum height for the block **18** without excessive contact between the heel and toe of the boot **2** and the walking surface.

Referring now to FIGS. **2–6**, the box-like walking member **18** of the present invention is shown in greater detail. The walking member **18** includes a main body portion **25** formed by a metallic channel member, as of steel or aluminum, disposed with the bottom of the channel facing upwardly and with the sides **26** of the channel depending toward the walking surface **9**. The free edges of the sidewalls **26** of the channel include inwardly directed lip portions **27** to which elastic tread members **28** are affixed, as by rivets **29**.

Three bracket members **31** are affixed to the upper surface of the channel **25** via screws **32**. The clearance holes in the channel **25** are elongated in the transverse direction to accommodate a transverse adjustment of the individual brackets **31**. The two end brackets include upstanding ear portions **33** disposed at the side of the channel **25**. Each ear **33** includes a horizontally inwardly directed pin **34** for engaging a horizontal bore in the sole **5** of the boot **2**. The center bracket also includes an upstanding ear **36** which is apertured to receive a slidable pin **37** therein. Ear **36** is dimensioned to be disposed adjacent the sole **5** of the boot and the pin **37** is arranged to be in alignment with a horizontal bore in the side of the sole **5** opposite the two bores to receive pins **34** or in cleats affixed to the side of the sole of the boot.

Pin **37** is bent into a generally J-shape with the long leg of the J extending through an aperture **38** in the leg **26** of the channel **25** to a region inside of the channel **25**. An apertured bracket **39** extends from the base of the channel with the aperture in alignment with pin **37** to receive the pin slidable therethrough. A collar-shaped stop **41** is carried on the end of the pin **37** which projects through the apertured bracket **39** to prevent the pin **37** from being pulled out of engagement with the aperture in the upper bracket **36**. A spring **42** surrounds the pin **37** and is compressed between one wall **26** of the channel **25** and a retaining ring **43** affixed to the pin **37** for spring biasing the pin **37** through the apertured ear **36**.

In a typical example, the walking member **18** has a length *l* sufficient to extend from a position slightly behind the ankle joint **6** to a position directly below the ball **17** of the foot and has a width w substantially equal to the width of the ski boot **2** and a height h from the sole **28** of the walking member **18** to the sole **5** of the ski boot **2** of approximately 1⅝ inches. The elastic tread member **28**, as of rubber, serves to prevent slipping on the walking surface **9** and is confined to a width in engagement with the walking surface of approximately 1 inch such that the pressure on the tread **28** is increased, relative to a tread which might cover the entire bottom surface **19**, for crushing snow which might otherwise tend to accumulate on the tread.

Referring now to FIG. **7**, there is shown the ski boot **2** mounted on a ski **44** via conventional bindings **45**. The walking member **18**, when not in use, such as when skiing, is conveniently mounted to the ski **44** via the intermediary of a mounting bracket **46** having transversely adjustable upstanding ears apertured to receive pins **34** and **37**. To mount the walking block to the ski, the walking block is merely inverted with ears **33** and **36** projecting downwardly in alignment with ears of bracket **46**, affixed to the ski **44**, and pins **34** and **37** are inserted into holes in the mounting bracket **46**.

Referring now to FIG. **8**, there is shown an alternative walking member **48** formed by a channel member having the leg portions of the channel extending crosswise of the sole **5** with the foot portions **27** of the channel **25** extending inwardly from the ends of the walking member **48** toward the center of the walking member. Brackets are affixed to the upper surface of the base of the channel for detachably affixing the walker **48** to the ski boot **5**, in the manner as previously described with regard to the walker **18** of FIGS. **2–6**.

Since many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. In a walker for ski boots, body means having a bottom sole portion for engaging a walking surface and an upper portion for engaging the sole of the ski boot for supporting the

weight of the user, said sole of said body means having a toe portion to engage the walking surface and disposed such as to be positioned below and generally in the region of the ball of the foot of the user and said sole having a heel portion to engage the walking surface and disposed generally in the region below the ankle of the user, said toe and heel portions depending downwardly from the sole of the ski boot by relative amounts such that said body when supporting the ski boot in the horizontal position has both said toe and heel portions of said sole of said walker body in supportive engagement with the horizontal walking surface to prevent rocking of the ski boot when the user is standing stationary, and wherein said toe and heel sole portions of said body means depend downwardly by an extent such that when said walker body is inclined at an angle to the horizontal walking surface corresponding to the forward-most position of the user's stride, the heel portion of the sole of said walker body and the heel portion of the ski boot are in approximately the same horizontal plane, and when said walker body is inclined at an angle to a horizontal walking surface corresponding to the rearwardmost position of the user's stride, the toe portion of the sole of said walker body and the toe portion of the ski boot are in approximately the same horizontal plane, whereby said walker body substantially reduces walking torque transmitted to the ankle of the user.

2. The apparatus of claim 1 including strapless means for detachably affixing said walker body to a ski boot for walking.

3. The apparatus of claim 2 wherein said means for affixing said walker body means to the ski boot comprises horizontally directed pin means on opposite sides of said body and carried from said walker body for engaging horizontally directed bores in the sole of the ski boot or structure affixed to the sole of the ski boot on opposite sides of the ski boot.

4. The apparatus of claim 3 wherein said pin means on one side of said walker body is spring biased to engage a corresponding bore in the sole of or in the structure affixed to the sole of the ski boot.

5. The apparatus of claim 1 including an elastic tread means disposed on said sole of said walker body for engagement with the walking surface.

6. In a walking apparatus for use with ski boots to relieve walking stress on the users ankle, walking means for attachment to the sole of the ski boot to depend below the sole of the ski boot for engaging the walking surface to support the ski boot and user for walking and standing, said walking means being dimensioned and shaped for providing during a normal stride a forward rocking motion of the ski boot about a point or points of engagement with the walking surface, which point or points of engagement lie intermediate the ends of the ski boot for reducing the torque transferred via the ski boot to the ankle of the user during a normal walking stride, said walking means including a connecting structure disposed facing the sole of the ski boot, said structure including upwardly extending side portions to extend adjacent the side edges of the sole of the ski boot, and strapless means for interconnecting the side portions of said connecting structure with the sole of the ski boot for detachably attaching said walking means to the ski boot.

7. The apparatus of claim 6 wherein said means for detachably affixing said walking means to the ski boot for walking also includes means for detachably attaching said walking means to the upper surface of a ski for storage while the ski is in normal use for skiing.

* * * * *