United States Patent [19]

Davis

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[54] **RIGID BOOT CONSTRUCTION WITH SELF-CLEANING SOLE**

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[52] **U.S. Cl.** ..... **36/2.5 AL**
[51] **Int. Cl.** **A43b 00/00**
[58] **Field of Search** ..... 36/2.5 R, 2.5 AL, 28, 29

[56] **References Cited**

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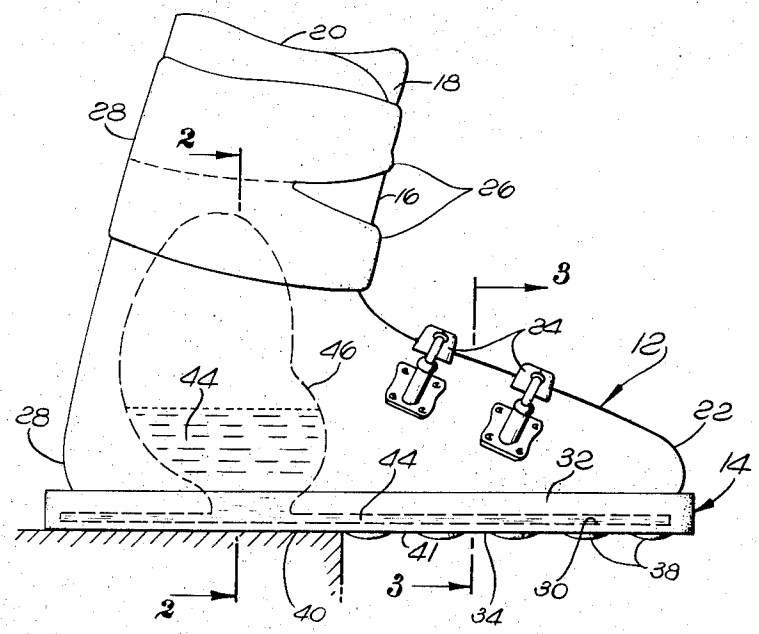
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Attorney, Agent, or Firm—Nilsson, Robbins, Bissell, Dalgarn & Berliner

[57] **ABSTRACT**

A shoe or boot construction is disclosed incorporating a rigid sole (as for wear while skiing) and possessing a self-cleaning capability. Structurally, the sole incorporates external flexible-wall areas or spaces along with means for flexing these areas to removed foreign matter, e.g. ice or snow. As disclosed, flexible-wall spaces are provided on the bottom of the sole and are backed by an elongate flat cavity that functions as a fluid reservoir. As the wearer of the boot moves about, varying pressures are applied to the fluid reservoir which result in flexure of the spaces to remove snow and ice. Springs are also incorporated to accomplish more reliable flexure and furthermore as disclosed, a fluid bladder is coupled to the fluid reservoir within the sole that may be impacted to develop a fluid-pressure shock for additionally distorting the flexible sole sections and thereby removing foreign matter. Various operating fluids may be employed in the construction as disclosed, including silicone liquid.

9 Claims, 3 Drawing Figures



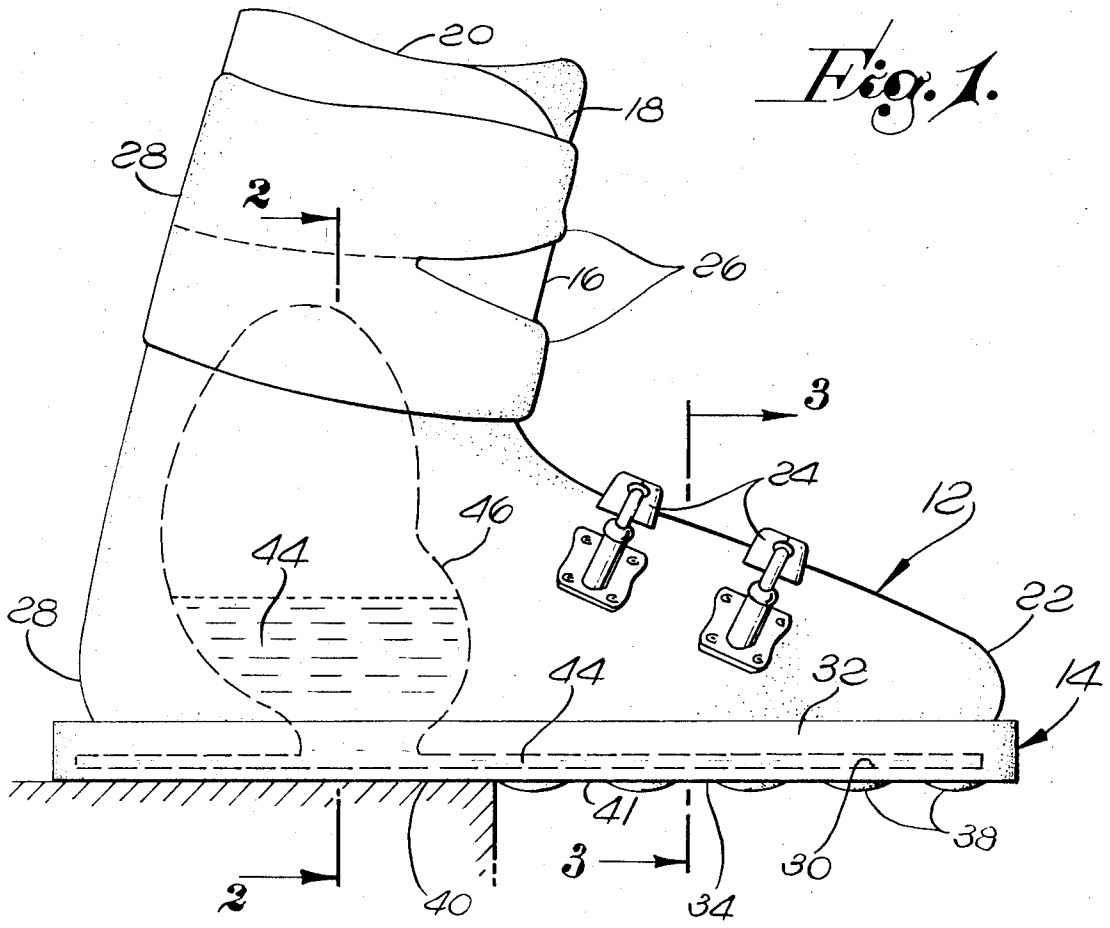


Fig. 1.

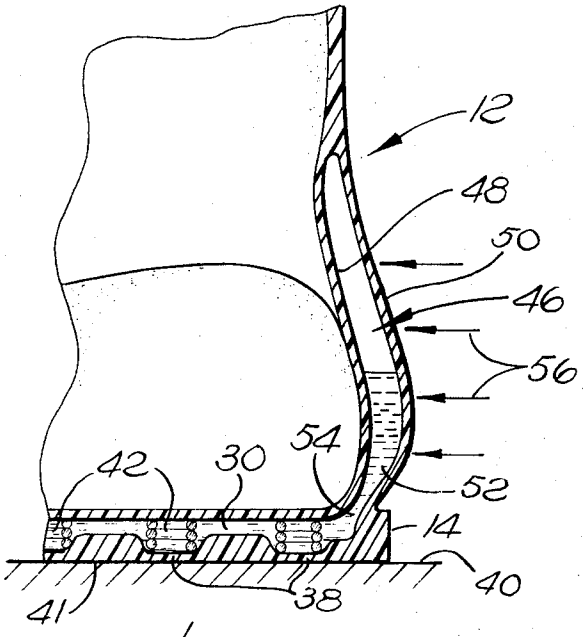


Fig. 2.

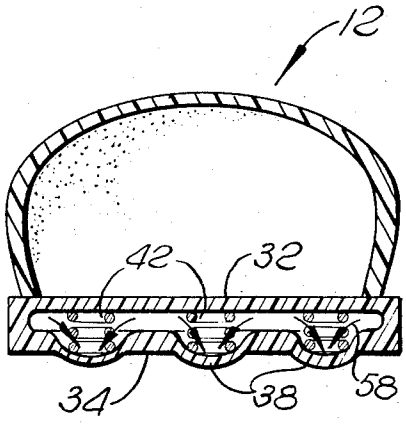


Fig. 3.

RIGID BOOT CONSTRUCTION WITH SELF-CLEANING SOLE

BACKGROUND AND SUMMARY OF THE INVENTION

Recent years have seen considerable improvement in skiing equipment generally and particularly with regard to ski boots. Generally, several considerations are involved including: comfort for the wearer, effectiveness in mating with bindings for coupling the wearer's foot to the ski and safety for the wearer. Within the purview of these considerations, it is now generally considered advisable for ski boots to incorporate substantially-rigid soles. That is, generally in preferred embodiments, the soles of the boots are relatively inflexible, taking the form of a rigid platform. As a consequence, although boots have been substantially improved with such structure, an annoying and sometimes-dangerous secondary characteristic is somewhat inherent in rigid-sole boots. Specifically, rigid boot soles tend to accumulate a layer of ice and/or snow as the wearer moves about prior to attaching skis to the boots. Subsequently, at the time when the skis are to be engaged, the layer of snow should be removed. However, that operation tends to be inconvenient, annoying, and on occasion painful. The forzen snow may adhere tenaciously to a boot and lacking cleaning tools, bare hands are most effective.

In view of the inconvenience and trouble that may be encountered in attempting to remove snow from a ski boot, a minimal job is frequently performed. Some forms of ski bindings will receive and engage a boot to the ski with a layer of snow therebetween. However, such a configuration is usually quite dangerous. As a consequence of these considerations, a need exists for a boot that incorporates structure for conveniently and easily removing any snow or ice that may become caked upon the sole of the boot.

In general, the present invention contemplates the removal of layers of foreign matter by providing flexible sections in one wall of the boot sole along with means for movably distorting such sections so as to break off layered substance. Generally, the most pertinent prior structures known to the present inventor are disclosed in patents that are directed to boots incorporating means to relieve vacuum or suction forces that are otherwise developed when the wearer walks through mud. Specifically, such U.S. Pats. are: No. 2,402,334 (Marks); 2,708,320 (Hilton); and No. 3,339,289 (Kesselman). Generally, these patents are directed to distinctly different structures from that set forth herein and are employed for a distinctly-different purpose.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, which constitute a part of this specification, an exemplary embodiment demonstrating various objectives and features hereof is set forth as follows:

FIG. 1 is a side elevation of a boot incorporating the principles of the present invention;

FIG. 2 is a sectional view taken along line 2—2 of FIG. 1; and

FIG. 3 is a sectional view taken along line 3—3 of FIG. 1.

DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENT

As required, a detailed illustrative embodiment of the invention is disclosed herein which is deemed to be the best embodiment presently contemplated. However, it is to be understood that the embodiment merely exemplifies the invention which may take many different forms that are radically different from the specific illustrative embodiment as disclosed. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims defining the scope and content of the present invention.

Referring initially to FIG. 1, a ski boot is illustrated generally including an upper portion 12 to which a lower portion or sole 14 is integrally affixed. The upper portion 12 includes a high collar 16 for enclosing the wearer's ankle and lower leg. A tongue 18 extends from the upper rim 20 of the collar 16 downward toward the tip 22, generally terminating below the throat (not shown) of the boot. From the boot throat, the closing flaps of the boot are held by locking mechanisms 24, similar forms of which engage the end straps 26 of an ankle wrap 28 to close and support the collar 16. Generally, these details are somewhat ancillary to the boot embodying the present invention and may well be the subject of extreme modification.

The sole 14 generally comprises a rigid platform extending between (and beyond) the tip 22 and the rear or quarter 28 of the boot. The sole 14 (as well as the upper portion 12) may comprise various synthetics or plastics as well as certain natural materials as are in current use for ski boots. However, it is to be understood that the sole 14 is substantially rigid to the extent that forces applicable thereto by muscle motions acting through the foot of the wearer do not result in any substantial bending or distortion of the whole platform configuration.

The interior of the sole 14 is hollow and in that regard it defines an elongate, flat space or cavity 30. Consequently, the sole 14 is divided into an upper sole platform 32 and an external sole wall 34. At spaced-apart locations, the external sole wall 34 defines areas or sections 38 (FIGS. 2 and 3) of reduced thickness. Essentially, the reduced thickness of the sections 38 affords these sections flexibility. In that regard, the material comprising the exterior sole wall 34 must be somewhat flexibly deformable so that the sections 38 may be deformed between the configurations illustrated respectively in FIGS. 2 and 3. For example, rubber-like synthetics may be employed.

Considering the flexing deformation in somewhat greater detail, the boot depicted in FIG. 1 is illustrated with the sole 14 positioned to partially abut a flat surface 40. That is, the rear portion of the external sole wall 34 is supported by engagement with the surface 40 while the forward portion of the external sole wall 34 is exposed. Consequently, the sections 38 (FIG. 2) abutting the surface 40 are urged to a position so that the bottom surface 41 of the sole wall 34 is substantially flat. In distinction to the supported state of the rear sole portion, the forward portion of the sole 34 is exposed, permitting the sections 38 to be externally flexed to protrude from the plane of the surface 40.

The flexure of the sections 38 between different positions serves to remove snow and occurs as a result of

a combination of forces as developed in the illustrative embodiment. Specifically, coil springs **42** (FIGS. **2** and **3**) are fixed above each of the sections **38** to extend normal to the sole **14.** Also, the cavity **30** contains a fluid **44,** having a relatively low freezing point which serves as a force-transfer medium to accomplish flexure of the sections **38.** Generally, the fluid **44** along with the springs **42** will rsult in some forces being applied to the sections **38** simply as a consequence of movements by the person wearing the boot. To accomplish the application of substantial forces, a bladder **46** (FIG. **1**) is defined in the upper portion **12** of the boot to receive forces that are applied by impact. The bladder **46** defines a generally-flat internal space between walls **48** and **50** (FIG. **2**) of the upper portion **12.** The lower end **52** (FIG. **2**) of the bladder is connected through a passage **54** to the cavity **30.**

The boot as set forth above with reference to the figures may be constructed by using a variety of techniques and processes. For example, the upper portion **12** may be formed by well known techniques in the plastic arts, e.g., injection molding, with similar techniques being employed to form the platform **32.** The external sole wall **34** may be separately formed utilizing similar techniques. Subsequently, the springs **42** along with the fluid **44** may be placed in the cavity **30** after which the external sole wall **34** is welded or otherwise affixed to the platform **32** to accomplish an integral boot as illustrated with the springs **42** somewhat compressed. Of course, subsequent production may include the placement of foam (not shown) or other liner materials inside the boot along with other structures as well known in the prior art.

In using the boot, the wearer simply inserts his foot and snaps the locking mechanisms **24** to a closed position. As he moves about on snow-covered ground, the surface **41** is prevented from accumulating the usual layer of show. Rather, the various forces applied to the fluid **44** by foot movements in combination with forces provided by the springs **38** tend to cause the sections **38** of the external sole **34** to repeatedly flex between the configurations illustrated in FIGS. **2** and **3** thereby breaking and removing any layer of snow that would otherwise accumulate. As a consequence, in most situations the wearer of the boot may conveniently affix a ski to the boot without preliminarily clearing snow and/or ice from the sole **14.** In addition to the aspect of convenience, the danger of engaging a ski binding with a layer of snow under the boot is substantially reduced.

Under certain conditions some forms of snow tend to be particularly cohesive and, therefore, have a strong tendency to accumulate on a boot. Additionally, in the interests of safety, it may be advisable to forcefully actuate the sections **38** to a flexed position before engagement with a binding. Immediately prior to placing the boot into a ski binding (not shown) the wearer may strike the bladder **46** either with his hand or any convenient article to apply a force as indicated by force lines (FIG. **2**). As a consequence, a high pressure surge is developed within the fluid **44** with the result that pressure forces as represented by the arrows **58** (FIG. **3**) accomplish a substantial shock flexure of the sections **38.** Such deformation occurring with the wearer's boot elevated from the ground generally has the effect of removing even the most tenacious layer of snow or ice. Consequently, the boot is clean to be received within the ski binding.

Recapitulating, in the boot as illustratively described, the sections **38** of the external sole wall **34** receive various forces for flexure to remove foreign matter, as a layer of snow. In the illustrative embodiment the forces are applied by the springs **42,** displacement of the fluid **44,** and pressurization of the fluid **44** by impacting the bladder **46.** It is to be recognized that in other embodiments of the invention, distortion forces may be supplied by a single means; or any of a variety of such means may be employed in combination to accomplish the desired flexure. Consequently, the scope of the invention should be determined on the basis of the claims set forth below with reference to the illustrative embodiment merely as a basis for supporting the claims.

What is claimed is:

1. A construction for rigid-sole ski boots comprising:

a boot upper for lovering the upper portion of the foot;

a rigid boot sole adapted for use with a ski, said sole being affixed to said upper for covering the lower portion of the foot, and including a rigid platform sole and a flexible external wall means defining a space therebetween; and

means for developing variable forces between said platform sole and said external wall means for flexing at least portions of said external wall to clear foreign matter from said sole.

2. A construction for boots according to claim **1** wherein said means for developing comprises resilient means for forcefully distorting said external wall means upon said boot being lifted from a contact surface.

3. A construction according to claim **1** wherein said means for developing includes spring means for forcefully engaging said external wall mens.

4. A construction according to claim **1** wherein said means for developing includes fluid means for varying the pressure on said external wall during use of said boot.

5. A construction according to claim **1** wherein said means for developing includes bladder means defined in said boot upper and means connecting said bladder means to said external wall.

6. A boot construction according to claim **1** further including a liquid force-transfer medium disposed in said space.

7. A boot construction according to claim **6** further including bladder mean defined in said boot upper and means connecting said bladder means to said external wall.

8. A boot construction according to **7** wherein further said upper includes a high ankle-covering portion.

9. A boot construction according to claim **8** further including spring means for forcefully engaging said external wall means.

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