# United States Patent [19]

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[54] **SKI BOOT CONSTRUCTION AND METHOD**


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

[58] **Field of Search**.....36/2.5 R, 2.5 AL, 7.1, 7.3, 36/4



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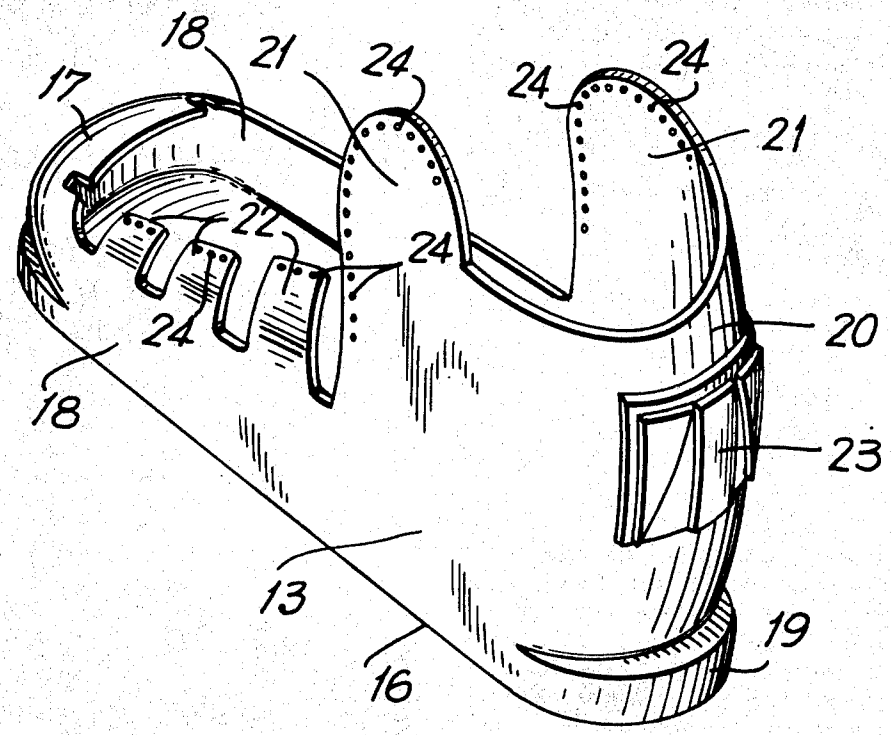
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[57] **ABSTRACT**

A boot especially suitable for the construction of ski boots in which an inner molded shell is formed of a stiff or rigid material for providing rigidity at selected locations and an outer shell is molded about the inner shell with the outer shell comprised of a dissimiliar material having generally flexible and preferably abrasion resistance characteristics to provide flexibility at selected locations and also provide an exterior surface capable of resisting surface wear and abrasion. The invention is concerned with the boot construction as well as the method of forming the same.


**8 Claims, 6 Drawing Figures**



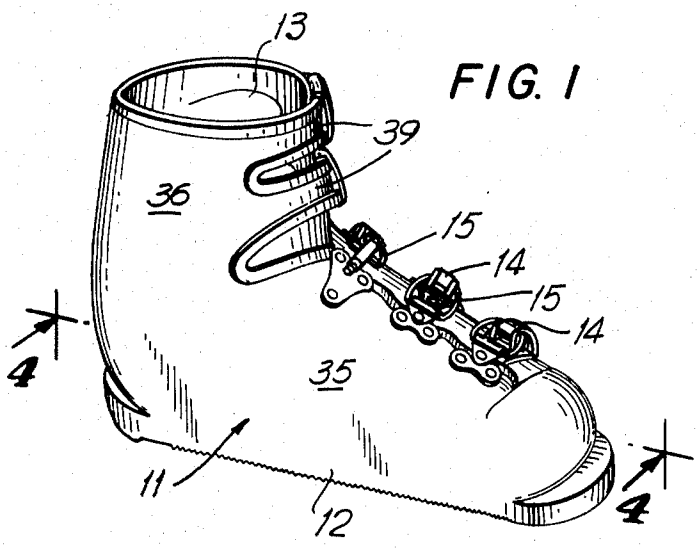



FIG. 1

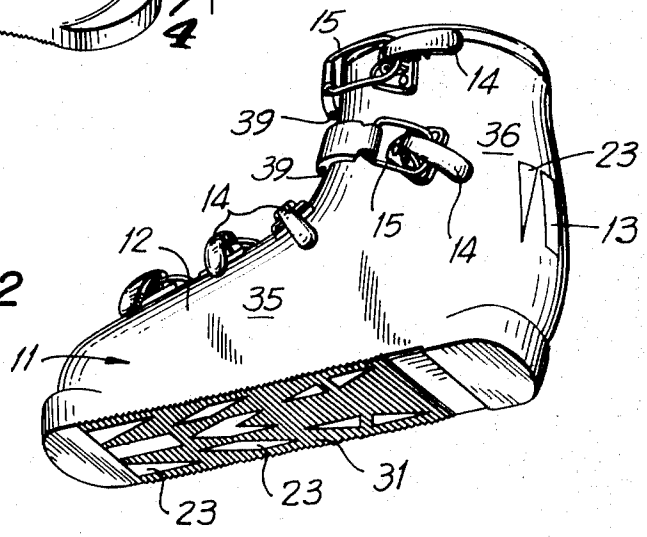



FIG. 2

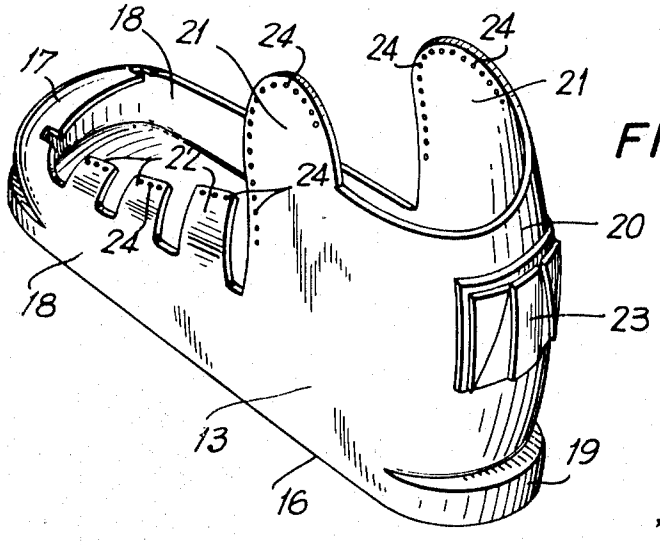



FIG. 3

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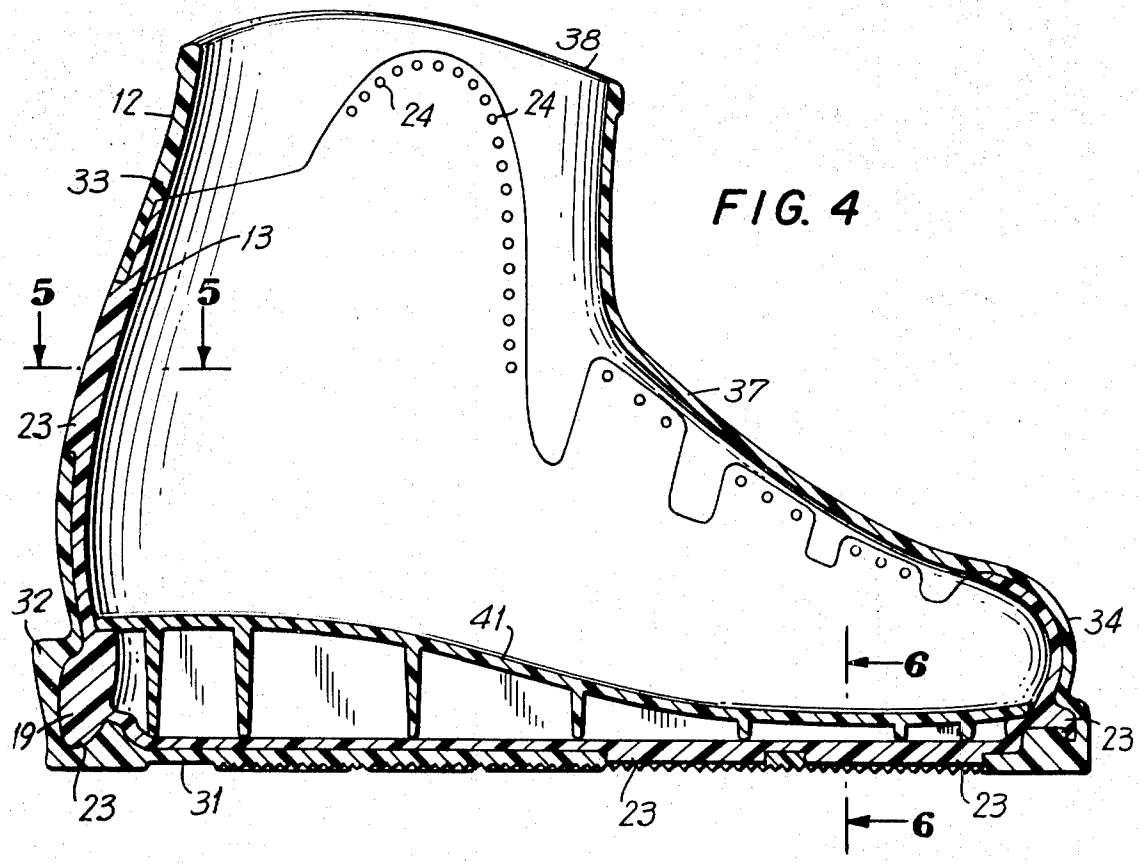



FIG. 4

FIG. 5

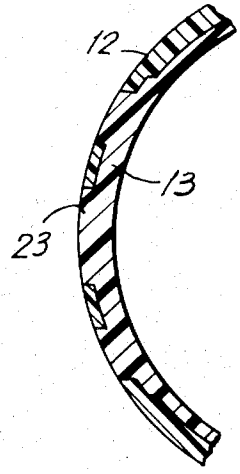
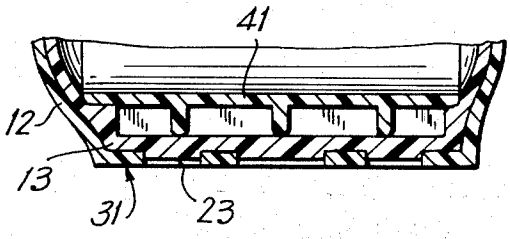



FIG. 6




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# SKI BOOT CONSTRUCTION AND METHOD

## BACKGROUND OF THE INVENTION

This invention relates generally to an improved boot construction and method of fabricating boots especially suitable to be used as the outer boot portion of ski boots. In recent years, a revolution in the ski boot industry has taken place and ski boots which formerly were constructed of leather have increasingly substituted plastic for the leather, especially in the fabrication of the outer shell. The primary function of a ski boot is to provide proper support for the foot of the wearer and especially a measure of lateral rigidity so that movements of the foot and ankle of the wearer are transmitted without lost motion through the boot to the ski which is mounted on the boot by means of a binding.

It is also a requirement of the boot that it have sufficient flexibility to permit the boot to be opened so the boot may be put on and taken off, to permit the boot to be flexed to close tightly about the foot of the wearer and to permit a measure of flexibility in the forward direction to permit the wearer to flex his ankles while skiing.

As aforenoted, boots or boot shells fabricated of plastic material are becoming increasingly popular. However, the stiffness and rigidity characteristics required for proper support oppose the flexing characteristics also required of the boot and, prior to applicants invention, boot shells have been formed of a material which strikes a balance between the requisite rigidity and flexibility. Where rigidity is required with a material of moderate flexibility, sections of the boot or boot shell have had imparted thereto a greater thickness in an attempt to impart increased rigidity to selected areas.

## SUMMARY OF THE INVENTION

Generally speaking, in accordance with the invention, a boot or, more accurately, a boot shell is fabricated of inner and outer shell portions, preferably by the method of first molding the inner shell portion and thereafter molding the outer shell portion about the inner shell portion for providing means, in addition to any chemical interlock that may take place, to mechanically interlock the inner and outer shell portions.

By utilizing inner and outer shell portions, different materials may be selected having different stiffness, rigidity, flexibility and wear resistance characteristics. The inner shell portion having greater rigidity is so arranged as to provide rigidity where required while the outer shell portion, in addition to providing scuff and wear resistance, will impart a measure of flexibility as required for boots of this type.

Accordingly, it is the object of this invention to provide a boot of improved construction.

Another object of the invention is to provide a boot formed of multiple shell elements resulting in an improved boot having an increased range of characteristics.

A further object of the invention is to provide an improved method of fabricating a boot and especially a ski boot.

Still other objects and advantages of the invention will, in part, be obvious and will in part be apparent from the specification.



The invention accordingly comprises the several steps and the relation of one or more of such steps with respect to each of the others, and the article possessing the features, properties, and the relation of elements, which are exemplified in the following detailed disclosure, and the scope of the invention will be indicated in the claims.

## BRIEF DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the invention, reference is had to the following description taken in connection with the accompanying drawings, in which:

FIG. 1 is a front perspective view of a ski boot shell constructed in accordance with a preferred embodiment of the instant invention;

FIG. 2 is a rear perspective view thereof;

FIG. 3 is a rear perspective view of the inner shell portion of the boot shell of FIGS. 1 and 2;

FIG. 4 is a sectional view taken along line 4—4 of FIG. 1;

FIG. 5 is a partial sectional view taken along line 5—5 of FIG. 4;

FIG. 6 is a partial sectional view taken along line 6—6 of FIG. 4.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

This invention is concerned with what is generally known as the outer shell of a ski boot. The outer shell is that which forms the outside of the boot, provides the strength and regidity required of a ski boot and carries the closures, generally in the form of buckles for properly securing the boot on the foot of the wearer. The outer shell, as is known to those skilled within the art, is provided with an inner liner having appropriate padding and contours to generally conform to the wearer's foot for proper fitment. Leather, fleece, foam plastic and other suitable materials have been used to form the liner of the ski boot. In addition, current interest is in custom fitting ski boots by introducing foam plastic into a space between the outer shell of the boot and a liner. A chemical reaction takes place to fill the space between the shell and the liner, thereby conforming in a supporting manner the liner to the shape of the wearer's foot. A one form of liner in use is a bladder secured within the outer shell of the boot with the foamable materials being injected into the bladder while the boot is on the wearer's foot. Another form of liner is a plastic sock which the wearer dons and places into the outer shell after the foamable material has been poured into the outer shell. The foamable material foams within the outer shell filling the void between the outer shell and the sock on the wearer's foot. As this art is in a substantial state of flux at this time, many changes and improvements may hereafter be made, including the possibility of a monoboot system in which the boot, prior to custom fitment, does not distinguish between left and right. Regardless of the inner boot used in preformed sizes or the custom fitting technique desired, the outer shell of the instant invention is equally adaptable and well suited for any and all techniques. The description hereafter will be directed to the outer shell of the boot as it is the outer shell with which the invention is concerned. Thus, for simplicity, the drawings have wholly omitted the inner or foot conforming shell.

FIGS. 1 and 2 generally show an outer shell 11 constructed in accordance with the teachings of this invention. The outer shell consists of an outer shell portion 12 and an inner shell portion 13 as will hereafter be described in greater detail. Outer shell 11 opens at the front generally along the instep and front of the ankle and is closed by a plurality of buckles 14 and bails 15.

Referring to FIGS. 3 and 4, inner shell portion 13 is the inner element and is formed first by any suitable molding technique such as injection molding. The inner shell portion imparts the strength, stiffness and rigidity to the boot shell. A material having good rigidity and stiffness is selected for inner shell portion of 13 and a material such as expanded Acrylonitrile Butadiene-Styrene (ABS) has proven especially satisfactory. The inner rigid shell portion 13 is designed to provide stiffness and rigidity at selected locations. Referring particularly to FIG. 3, inner shell 13 includes a sole 16, a toe box 17, vamps 18, a heel 19, a back 20 and ankle covering portions 21. In addition, inner shell portion 13 includes reinforcement tongues 22 for imparting greater strength to the boot shell at areas of hardware attachment. At selected areas of the exterior portion of inner shell portion 13 there are also provided a plurality of projections 23 whose use will be hereafter described. Also at selected locations are provided a plurality of through apertures 24 whose use will likewise be hereafter described.

In the molding of inner shell portion 13, a form or core is placed in a mold cavity and, in using the technique of injection molding, the ABS is injected into the mold cavity to form the inner shell portion. The foot form core with the inner shell portion molded thereabout is then transferred to a second mold defining a mold cavity and outer shell portion 12 is formed thereabout, as by injection molding.

The outer shell portion 12 is preferably formed of a plastic material having good flexibility and high abrasion resistance characteristics. It has been found that polyurethane is particularly suitable for the outer shell portion. Also, polyethylene or an ionomer which may be lighter and less expensive than polyurethane are also satisfactory materials for outer shell portion 12.

As seen in FIGS. 1, 2 and 4, outer shell portion 12 includes a sole 31, a heel 32, a back 33, a toe 34, vamps 35, ankle covering portions 36, an instep 37, an ankle encircling portion 38, and straps 39. Straps 39 have connected thereto bails 15 for releasable closing of the straps by means of buckles 14.

In molding outer shell portion 12 about inner shell portion 13, a bonding is effectuated with additional means being provided for a mechanical interlock or bond between the inner and outer shell portions at various spaced locations. For example, apertures 24 through inner shell portion 13 permit entry during molding of the outer shell portion material to provide a secure mechanical interlock between the inner and outer shell portions in the areas of the ankle covering portions. Additionally, the projections identified as 23 at the back, toe and sole locations result in a flow of the outer shell portion material about the projections for additional mechanical interlocks. It is noted from FIG. 4 that the projections 23 at the heel and toe areas include undercuts which increase the strength of the mechanical interlock.

Except for those portions of projections 23 that may extend through outer shell portion 12, the entire outside of the boot is formed of the material used to mold outer shell portion 12. By using materials of two different colors and/or textures, the projections can be utilized to impart a highly attractive and distinguishable external appearance. Thus, the high abrasion resistance of the outer shell portion material, such as polyurethane, provides a boot outer shell that will maintain its attractive appearance during use. Furthermore, the flexibility of the outer shell portion material in the areas of the instep 37 and ankle encircling portions 38 provides an outer shell which may be spread apart by means of flexing to permit the boot to be donned and removed by the wearer. Also, the flexibility of the instep portion 37 and the forward portion of the ankle encircling portions 38 permit the wearer to flex forwardly when skiing, while lateral rigidity is assured by the relatively rigid inner shell portion 13.

It is also noted with reference to FIG. 3 that one or more tongues 22 may be provided with apertures 24 for effectuating a mechanical interlock during molding of outer shell portion 12. Furthermore, after outer shell 12 has been completely molded, buckles 14 are riveted through the outer shell for secure attachment of the buckles to the outer shell. By provision of tongues 22, the rivets will pass through the tongues of inner shell portion 13 resulting in secure attachment of the buckles as a result of the rivets passing through the relatively rigid ABS material. The two uppermost buckles as shown in FIG. 2 will also be riveted through the relatively rigid ABS material as a result of the high extension of ankle covering portions 21.

The ski boot is finished by adding a boot inner and a tongue after there has been mounted to the inside bottom of the boot a platform 41 which is preferably a separately molded component glued or welded into position.

While the molding technique has generally been mentioned as injection molding, it should be understood that any suitable molding techniques such as rotational molding or blow molding can be used. The invention is not limited to any particular molding technique.

A boot constructed as aforesaid will generally be of a lighter weight and of greater rigidity for the same density as a result of use of plastic materials better suited to perform the desired functions. For example, a polyurthene used throughout the outer shell would require a substantial increase in thickness at certain areas for the rigidity required. ABS would be unsatisfactory for a boot outer shell as its rigidity would prevent entry to the boot, would prevent proper flexing in the forward direction and would prevent proper conformity of the boot to the foot of the wearer when the boot is buckled up. Also ABS plastic does not have sufficient abrasion resistance characteristics to render it commercially acceptable as the exterior surface. However, by using the ABS as an inner shell portion, the rigidity characteristics at selected locations put the material to its best use.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in carrying out the above method

and in the construction set forth without departing from the spirit and scope of the invention it is intended that all matter contained in the above description and shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

What is claimed is:

1. An outer shell for a boot comprising a molded inner shell portion of a first material and a molded outer shell portion of a second material bonded to said inner portion, said inner shell portion defining at least a sole portion and ankle covering portions, said inner shell portion being generally open along the front thereof, said inner shell portion being formed of a generally rigid plastic material, said outer shell portion defining a sole, a toe portion, vamps, a heel, a back portion, ankle covering portions extending above said ankle covering portions of said inner shell portion, an instep, and ankle encircling portions, said outer shell portion being formed of a generally flexible plastic material.

2. An outer shell for a boot as claimed in claim 1 including means on said inner and outer shell portions for effecting a mechanical interlock between said inner and outer shell portions.

3. An outer shell for a boot as claimed in claim 2 wherein said mechanical interlock means includes a plurality of apertures in said inner shell portion and projections on said outer shell portion extending into said apertures.

4. An outer shell for a boot as claimed in claim 2 wherein said mechanically interlock means includes a plurality of projections on said inner shell portion extending at least partially into said outer shell portion.

5. An outer shell for a boot as claimed in claim 1 wherein said first material is expanded Acrylonitrile-Butadiene-Styrene.

6. An outer shell for a boot as claimed in claim 1 wherein said second material is polyurethane.

7. An outer shell for a boot as claimed in claim 1 wherein said inner shell portion further defines a toe portion, vamps, a heel, and a back portion, said inner shell portion being generally open along the front thereof upwardly from said toe portion and said back portion of said outer shell portion extending above said back portion of said inner shell portion.

8. An outer shell for a boot as claimed in claim 2 and further including projections on said vamps of said inner shell portion at least on one side thereof projecting into the generally open area of said inner shell portion.

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