

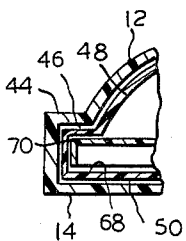
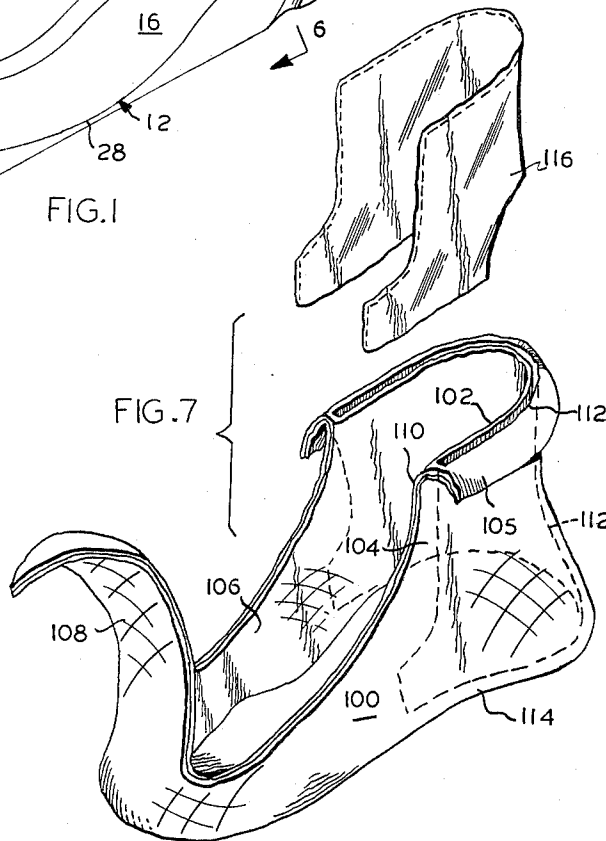
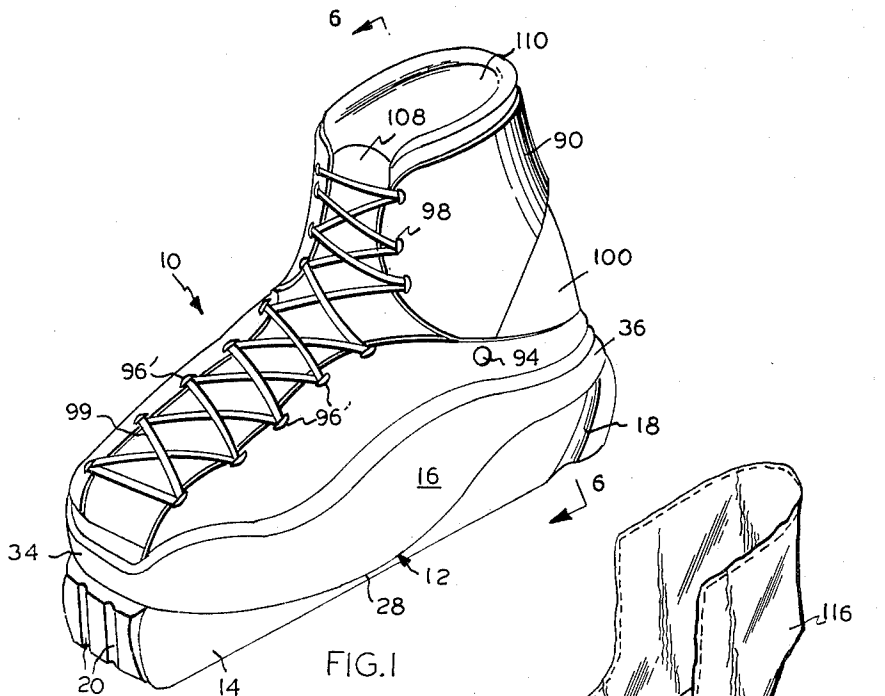
March 15, 1966

R. B. LANGE ET AL
SKI BOOT

3,239,952

Filed Feb. 24, 1965

4 Sheets-Sheet 1



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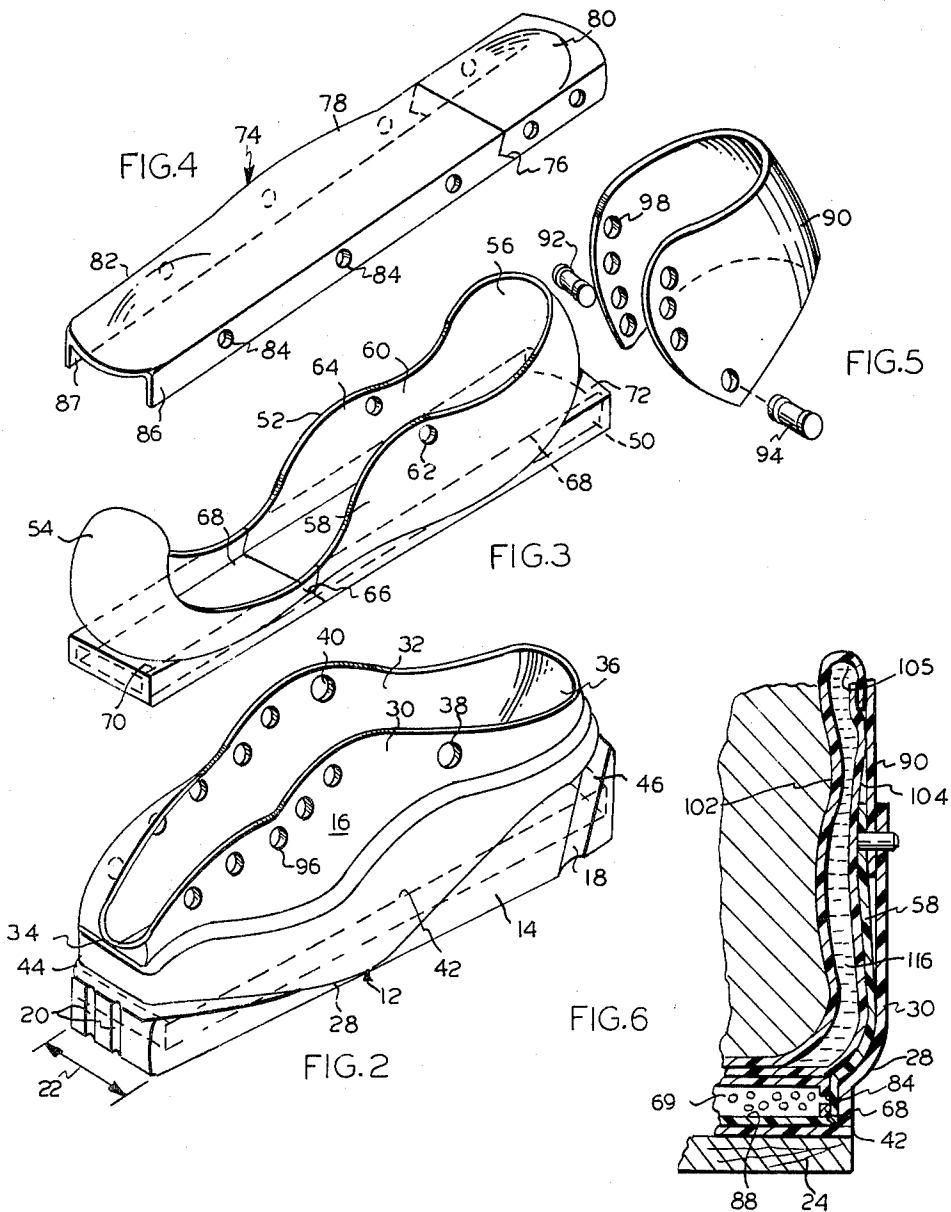
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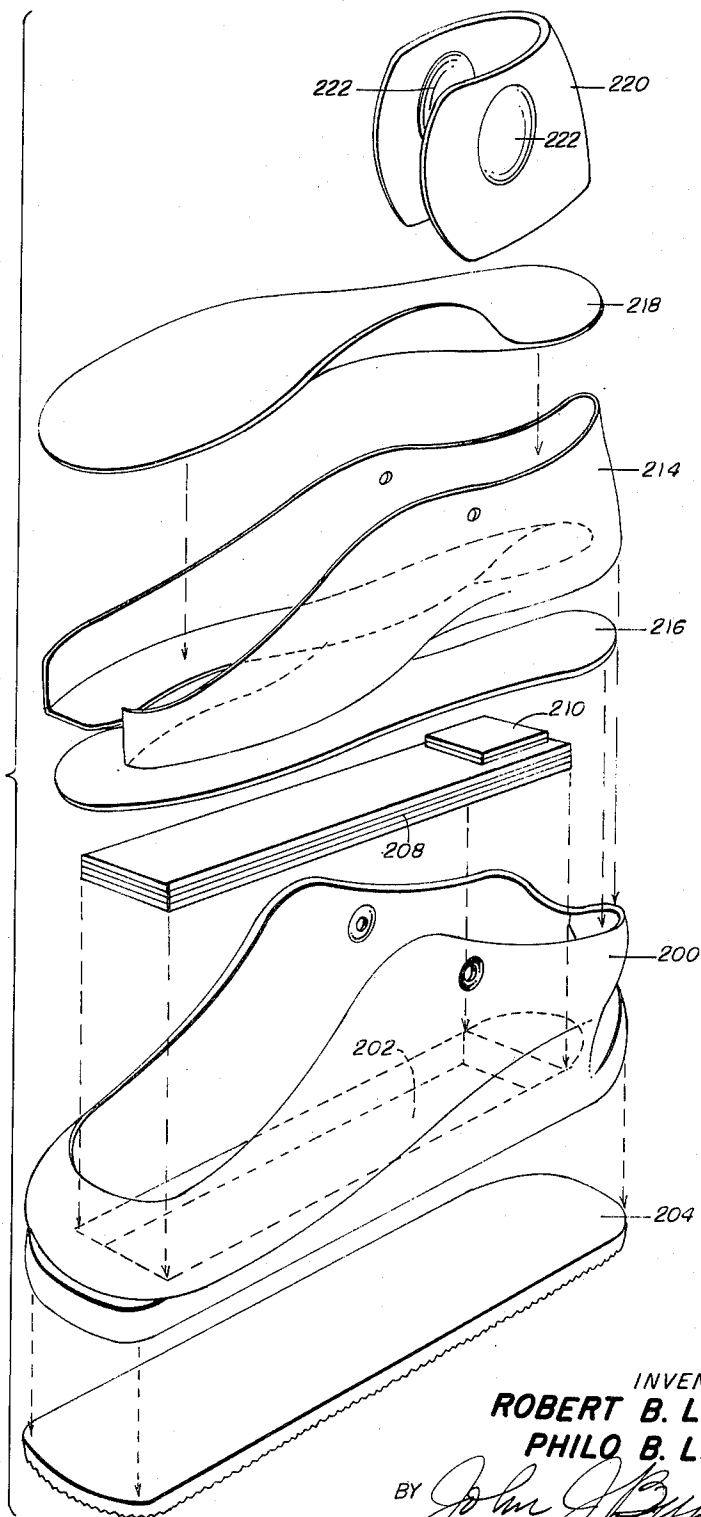
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FIG. 9



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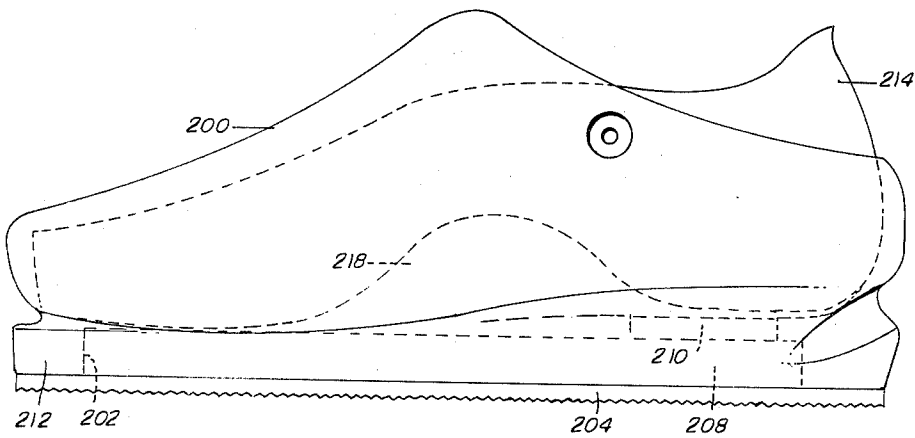


FIG. 10

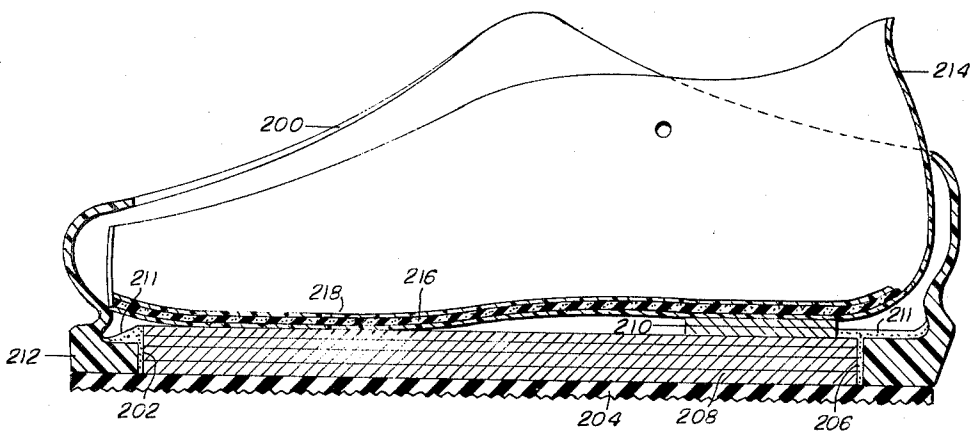


FIG. 11

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11 Claims. (Cl. 36—2.5)

This is a continuation-in-part of Serial No. 223,723, filed September 14, 1962, now abandoned.

This invention relates generally to a boot of novel construction, and relates more particularly to an athletic type boot used while skiing. Further, the invention relates to a method of obtaining excellent individual fitting of boots manufactured with high production techniques.

Of primary consideration in the design and fitting of a ski boot is the maintenance of the closest possible contact between the boot and the foot and ankle of the wearer consistent with comfort. In addition to purposes of providing warmth and protection to a wearer, a ski boot is an important link in the connection between the leg of a wearer and the ski.

While rapid advances have been made in the manufacture of skis and their boot binding apparatus, advances in boot construction have been limited. Since all equipment between a skier and his skis is each an important link in the transfer of body weight to the ground, a primary objective of this invention is to provide a boot which will take full advantage of the many advances in the ski binder art in contributing an almost unitary link between the leg and the ski.

The instant boot has as one of its principal objectives to substantially connect a wearer's foot and ankle with the boot so that the ski, when properly secured, will instantly respond to lateral and forward shiftings of weight and movement of a wearer. In the particular embodiment hereinafter disclosed, there is shown a ski boot construction, wherein the foot and ankle are maintained in lateral rigidity, although permitting a forward lean of the lower leg with respect to the boot.

A still further objective of this invention is to provide a ski boot having a longitudinally and laterally rigid sole and said sole having a lateral width substantially the same as that of the ski to which it is attached. The soles of prior art boots were so constructed that in many instances they extended beyond the lateral width of the ski. During turns and other maneuvers this resulted in the sole contacting the snow. Since maneuverability is best accomplished by the edge of the ski, it is an important objective of this invention to eliminate much of the "shoe plowing" that results from boots constructed prior to the advancements set forth by this invention.

Another important objective of this invention is to provide a boot which is formed solely of plastic, thus eliminating the troublesome necessity of water proofing, storing with shoe trees, dyeing, polishing, and the like.

Another important objective of the invention is to provide a ski boot in which the sole and the upper of an outer shell are integral and formed from a single mold whereby the binding mechanism secures the upper, as well as the sole, to the ski.

A still further objective of the invention is to provide a boot which is readily manufactured in all colors and hues, which will materially stimulate the enthusiasm of the present day popularity in ski costuming.

A still further objective of the invention is to provide a ski boot which includes a pivoting ankle gaiter that permits a forward flexing of the ankle joint without disturbing the lateral support given to the lower leg.

A most serious problem incurred during the fitting of a ready-made ski boot to the foot of a wearer, is the pronounced individual differences in the size, shape, and

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height of the ankle bone from the sole of the foot. Another very important object of the invention is to provide a boot having a pliable plastic sock-like liner formed with a pocket which receives an ankle pack about the lower leg. The ankle pack contains a liquid plastic which solidifies to a high-density foam-rubber consistency after being subjected to a proper catalyst. During fitting, the catalyst is added and the pack is placed within the pocket and the boot is firmly laced to the foot of a wearer. The plastic assumes the mold of a wearer's foot, thus insuring a perfect fit without the usual long and agonizing period of "breaking in." Therefore, a still further objective of this invention is to provide a boot which receives a form-fitting ankle pack in which a liquid plastic is received, said plastic being convertible to a strong sponge, rubber-like material molded to the individual contours of a wear's foot. In addition, the invention provides means to quickly and easily replace the pack.

In most skiing maneuvers, good technique demands that the skier's leg remain perpendicular to the plane of the ski insofar as a later or side-to-side movement is concerned. Equally important to good technique is that the lower leg be permitted to assume a forward lean while the sole of the foot is maintained in substantially full contact, or in parallel relationship, with the ski. The instant invention provides a boot of rigid, heavy-gauge plastic that prevents lateral sway, but provides a pivotal ankle gaiter to facilitate forward lean. The advantages gained through the use of such rigid materials are negated if perfect fit is not accomplished. Incorporated in combination with the rigid boot and pivoted gaiter of this invention is a form-fitting interior which makes their use possible.

A further objective of the invention is to provide a ski boot with a shaped, thermoplastic counter which is individually moulded to the shape of a user's bone structure. A still further objective of the invention is to provide a plastic boot with a thermoplastic gaiter which can be deformed to the exact contours of a user's ankle bone structure without subtracting from the strength and other purposes of the gaiter.

Another important objective of the invention is to provide a ski boot with a longitudinally rigid sole section which eliminates bending and twisting of the boot due to stresses developed during difficult skiing maneuvers.

A further objective of the invention is to provide a boot having a pocketed liner to receive a liquid pouch which contains a substance which sets to the contours of a wearer's foot and which can be readily exchanged when worn or improperly fitted.

Another important objective of the invention is to provide an athletic boot of the type described with a plastic pliable sock-like liner of a type which breathes such as that manufactured by the Du Pont de Nemours Company under the trademark Corfam.

These and other important objectives and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating a presently preferred embodiment thereof, and wherein:

FIGURE 1 is a perspective of the invention assembled and laced;

FIGURE 2 is a perspective of the outer slipper;

FIGURE 3 is a perspective of an inner slipper;

FIGURE 4 is a perspective of the inner sole;

FIGURE 5 is a perspective of the ankle gaiter;

FIGURE 6 is a partial cross-sectional view along the line 6—6 of FIGURE 1;

FIGURE 7 is an exploded perspective view of the liner and its plastic insert;

FIGURE 8 is a partial cross-section of the toe section along the line 8—8 of FIGURE 1;

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FIGURE 9 is a exploded perspective view of an embodiment of the invention shown in FIGURES 1-8;

FIGURE 10 is a side elevation view of the assembled construction of FIGURE 9; and

FIGURE 11 is a longitudinal cross-sectional view of the embodiment of FIGURES 9 and 10.

Referring now to the drawings wherein like numerals indicate like elements, the numeral 10 indicates the boot combination of this invention. A rigid outer slipper unit 12 molded of heavy-gauge plastic, of substantial rigidity, is comprised generally of an outer sole 14 and an outer upper 16. The unit is an integral one-piece mold and its upper is formed generally to the configuration of a wearer's foot. The sole 14 is rectangular and is formed with a binding groove 18 at the heel and a plurality of positioning slots 20 at the toe. The groove and slots each cooperate with binding accessories which are well known to persons familiar with skiing equipment. The sole 14 has a lateral width 22 which approximates the width of a ski 24 to which it is attached. Along portions of its length, the foot receiving upper extends laterally beyond the sole as indicated by the numeral 28. The upper 16 is comprised of sides 30 and 32, which extend longitudinally between outer toe section 34 and the outer heel section 36. Sides 30 and 32 are highest at their approximate mid-sections where they are apertured at 38 and 40. Note that sole 14 is formed with a longitudinal trough-shaped sole recess 42 extending generally throughout its longitudinal and lateral length, and end portions of which are partially covered by inwardly directed overhangs 44 and 46.

A semi-rigid plastic counter or inner slipper 48, which more closely conforms to a wearer's foot, is adapted for close reception within the outer slipper 12 and maintains the foot in engagement with the sole of the boot. The inner slipper is formed with an inner sole 50, an inner upper 52, an upstanding rigid toe receiving cavity 54, and a heel receiving cavity 56. The inner upper 52 includes first and second sides 58 and 60 which have upwardly extending mid-sections 62 and 64 generally co-extensive with the mid section of outer sides 30 and 32 when the inner and outer slippers are assembled.

The mid-sections are apertured at 62 and 64 for alignment with openings 38 and 40 of the inner slipper when the inner slipper is placed into slipper 12. The inner slipper is laterally separated at 66 such that the front and rear sections of sole 60 thereof may respectively be inserted angularly under overhangs 44 and 46 and then snapped into recess 42. The sole 50 is recessed at 68 and has an outer periphery of the same dimensions as the inner dimensions of recess 42. The sole recess 68 is overlapped respectively at its front and rear by toe overhang 70 and heel overhang 74.

A rigid inner sole 74 formed of fiberglass or the like has an inverted U-shaped cross section and is cut or separated along its length at 76 such that the toe and heel ends thereof may respectively be angularly inserted under flanges 70 and 72 and snapped into recess 68. The upper surface of the inner sole is formed with a shank 78 and slight heel and ball depressions 80 and 82.

A plurality of openings 84 are formed along the longitudinal length of the depending legs 86 and 87 of the inner sole for purposes hereinafter described. When outer slipper 12 and the inner slipper 52 are assembled, the openings 38 and 40 are respectively aligned with the openings 62 and 64. The inner sole is snapped into the recess 68 and holes are drilled through the bottoms of soles 14 and 50 and a thermosetting epoxy resin 69 is forced under pressure into the chamber 88 formed by the recess 68 and the inner sole 74. Portions of the resin enter the apertures 84 and seep between the side walls of sole 50 and the legs 86 and 87. After hardening, the epoxy binds together these elements (outer slipper, inner slipper, and sole 74) and provides a filling to which screws or other devices may be inserted. Various binding apparatuses are sometimes secured to a boot in this manner.

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The inverted U-shaped molded fiberglass inner sole 74, and its mating upright U-shaped soles 14 and 50 have the same resistance to bending and twisting as do similar channel-beam constructions. Therefore, the boot is equipped with a comparatively light sole with substantial twist and bend resistant properties.

An ankle gaiter 90 which substantially surrounds a wearer's leg from slightly below his ankle bone to approximately one inch above, is pivotally secured to the previously mentioned mid-section openings 38, 40, 62 and 64 by rivet-like pins 92 and 94. The connection itself can best be seen by referring to FIGURE 6. Holes 96, in outer slipper 12, to which fasteners 96' are added, and holes 98, on ankle member 90, to which fasteners 98' are added, are aligned in slipper 12 and holes 98 on ankle member 90 are aligned along the front tongue opening, and with laces 99, conveniently secure the boot to the leg and foot of a wearer.

Referring now to FIGURE 7, there is shown the sock-like member 100 of pliable plastic comprised of an inner liner 102 and an outer liner 104 which are hermetically sealed along their mating peripheries. The member is formed with a tongue opening 106 which is adapted to be closed by a padded tongue 108. Along the top of ankle opening 110, liners 102 and 104 are separated to form a pocket 112 which extends downwardly toward a sole portion 114. The pocket is for positioning a packet 116 which forms into the shape of a wearer's foot. The inner liner 102 (FIGURE 6) extends upwardly beyond the opening 110 and forms a turn-over closure flap 105, or as an alternative the outer layer 104 may extend beyond the opening, as shown in FIGURE 7.

A packet 116 of sealed polyethylene, Mylar or the like is filled with a liquid polymercaptan base synthetic resin. Black Tuffly, as marketed by the Perma-Flex Mold Co., of Columbus, Ohio, is suitable for the purposes hereinafter disclosed. Any substance capable of maintaining a mold and which quickly solidifies into a dense sponge-like consistency is suitable for these purposes. The resinous ingredients may be conveniently and separately stored within the packet.

After assembly of the rigid elements of the boot, a prospective wearer places his foot into the sock-like member 100, and the foot and member are positioned within the inner slipper 52. The plastic container 116 is squeezed, or the substances therein are otherwise agitated, until polymercaptan resins are thoroughly mixed. The packet is then formed to a substantially semi-circular configuration (FIGURE 7) and slipped into the pocket 112. Flap 105 is turned over to close opening 10 and the laces 99 are secured to the fasteners 96 and 98 in the conventional manner. The foot remains in this position for approximately twenty minutes until the resins have had the opportunity to cast into the configuration of the ankle bone and the surrounding area. The packet can easily be replaced with another when desired. Although the mold cooperates with the boot in use, it is not a permanent part thereof. There has been described a ski boot which, through the use of an outer slipper, a counter, and an ankle gaiter, each having substantial rigidity, provides lateral stability of a type heretofore not obtained in footwear of this type. The term rigidity as applied to the upper 12, the counter-upper 52, and the gaiter 90 does not imply absolute rigidity, but only that rigidity which would remain firm under most skiing stresses, but yielding somewhat when subjected to other than normal stresses. For instance, a firm hand grip can bend these members.

In order to take full advantage of this stability the upper gaiter is hinged to permit the desirable forward lean and there has also been provided a cooperating perfect fit assembly which takes full advantage of the two first mentioned advancements. In addition, the boot is susceptible of manufacture of all hues and colors which are easily maintained through the life of the boot. Also, there has been disclosed a boot having a twist resistant sole of

the exact width of the ski to which it is applied. Further, there has been disclosed a boot in which the upper itself is secured to the ski via conventional binding mechanism.

In the embodiment shown in FIGURES 9-11, the outer slipper 200 is formed with an open bottom 202. The bottom is closed by adhesively affixing a rubber gripping sole 204.

The sole 204 and the elongated sole depression 206 form a receptacle to receive a stiffening member 208. The member 208 is provided with a lift portion 210 disposed beneath a wearer's heel. The member 208 is of any lightweight, rigid material such as a $\frac{3}{8}$ ", 5-score plywood. The member is embedded in a layer of epoxy resin. The resin and member jointly form a sole section 212 fully resistant to longitudinal bending or twisting about sole length. By forming the counter independently of the sole, the split 66 in the counter of FIGURES 1-9 is unnecessary. The counter 214 of this embodiment is made of a normally rigid thermoplastic material closely following the contours of a wearer's foot. The counter 214 is shaped against the forming last and closely conforms to the shape thereof.

For one reason or another, many people develop painful calcium formations at the end of protruding foot and ankle bones commonly referred to as "bone spurs." Bone spurs have a high incidence among people who ski frequently. In conventional boots it is very difficult to relieve the pain caused by bone spurs except by placing further padding between the boot and the spur. It is relative movement between the bone spur and the boot which causes pain. With the thermoplastic counter, a depression to receive the spur is easily made by heating the counter and conforming it to the shape of the bone.

A layer of sponge rubber 216 is placed over the sole section 212 and the counter is placed within the outer slipper. A second sole layer of sponge rubber 218 is placed within the counter. The layers of sponge rubber protect the sole portion of the counter. The counter and the sponge layers may be glued to the principal sole section if desired.

The remainder of the boot is substantially the same as that disclosed in the FIGURES 1-9 embodiment, except for the gaiter 220. The gaiter 220 is formed of a normally rigid thermoplastic. A user with the proper apparatus can then form a depression such as 222 in accordance with his individual ankle bone structure. The gaiter can thus closely receive the ankle bone and substantially eliminate any relative movement therebetween.

In a general manner, while there has been disclosed in the above description, what is deemed to be the most practical and efficient embodiment of the invention, it should be well understood that the invention is not limited to such an embodiment as there might be changes made in the arrangement, disposition, and form of the parts without departing from the principle of the present invention as comprehended within the scope of the accompanying claims.

We claim:

1. An athletic boot comprising an outer slipper of substantial rigidity comprised of an elongated sole section and an upper, said sole section having an elongated recess throughout the length thereof, an inner slipper having a second elongated sole section receivable in said recess and a toe forming section, a heel forming section, and an inner upper partially coextensive with said first mentioned upper, a gaiter, means pivotally mounting said gaiter between said inner slipper and outer slipper, a liner having a foot section and a leg section receivable in said inner slipper, and said leg section having a pocket and a plastic insert receivable within said pocket.

2. An athletic boot comprising an outer slipper of substantial rigidity comprised of an elongated sole section and an upper, said sole section having a recess throughout the length thereof, an inner slipper having a second sole section receivable in said recess and a toe forming

section, a heel forming section, and an inner slipper upper substantially coextensive with said first mentioned upper, a gaiter, means mounting said gaiter to said first mentioned upper for pivotal movement about an axis transverse to the longitudinal axis of said boot, a liner having a foot section and a leg section, and said leg section having a pocket formed therein, and a plastic insert removably received within said pocket.

3. In a plastic ski boot having a rigid foot-receiving slipper conforming closely to the contours of the lower portion of the foot, an insulating lining of pliable material having a foot portion conforming closely to the inner contours of said slipper, and an upwardly extending leg portion, a gaiter of rigid plastic substantially surrounding said leg portion and pivotally connected to said slipper, said leg portion having a pocket generally coextensive with said gaiter, and a molding material in a said pocket of a type which can closely assume the irregular contours of the ankle portion of a wearer of said boot.

4. In combination with a ski having a lateral width at its boot receiving portion, a plastic ski boot including a rigid foot-receiving slipper conforming closely to the contours of the lower portion of the foot and a sole having a width substantially the same as said ski lateral width, an insulating lining of pliable material having a foot portion conforming closely to the inner contours of said foot receiving slipper, and an upwardly extending leg portion, a U-shaped gaiter of rigid plastic substantially surrounding said leg portion and pivotally connected to said slipper about an axis transverse to the longitudinal axis of said ski, said leg portion having a pocket generally coextensive with said gaiter, and a molding material in said pocket of a type which closely assumes the irregular contours of the ankle portion of a wearer of said boot.

5. In a plastic ski boot having a rigid foot-receiving slipper conforming closely to the contours of the lower portion of the foot, a rigid sole forming the bottom of said slipper, an insulating lining of pliable material having a foot portion conforming closely to the inner contours of said slipper, and an upwardly extending leg portion, a gaiter of rigid plastic substantially surrounding said leg portion and pivotally connected to said slipper, said leg portion having a pocket generally coextensive with said gaiter, and a liquid material for insertion into said pocket which molds itself into the form of the irregular chamber defined between the gaiter and a leg of a wearer.

6. An athletic boot comprising an outer slipper having an elongated sole section and an upper, said sole section having a recess throughout the length thereof, a two-piece inner slipper receivable in said recess and having a heel section and a toe section, a two-piece reinforcing member extending between said toe and heel sections, said inner slipper including an upper coextensive in part with said first-mentioned upper, a gaiter, means mounting said gaiter to said counter between said coextensive portions for pivotal movement about an axis transverse to the longitudinal axis of said boot, a sock liner having a foot section and a leg section, said leg section having an opening to a pocket substantially coextensive with the area encompassed by said gaiter, and a packet of molding material removably secured in said pocket.

7. A plastic athletic boot comprising an elongated foot receiving portion of substantial rigidity, an elongated sole integral with said foot portion having substantially straight parallel side walls defining a sole width, means between said side walls preventing a longitudinal twisting and lateral bending of said sole, said foot receiving portion having a lateral width greater than the lateral width of said sole at the line of juncture between said sole and said portion along the length of the athletic boot.

8. The athletic boot described in claim 7 wherein an ankle gaiter is pivotally mounted to said portion and a

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foot liner is received within said portion and said gaiter.

9. The athletic boot described in claim 8 wherein a molding material is received within said boot and securing means for positioning said molding material forms a part of said liner.

10. The combination recited in claim 7 wherein said means is a laminated sheet embedded in a resinous material.

11. The boot recited in claim 7 wherein a thermoplastic gaiter is pivotally mounted to said foot receiving portion.

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