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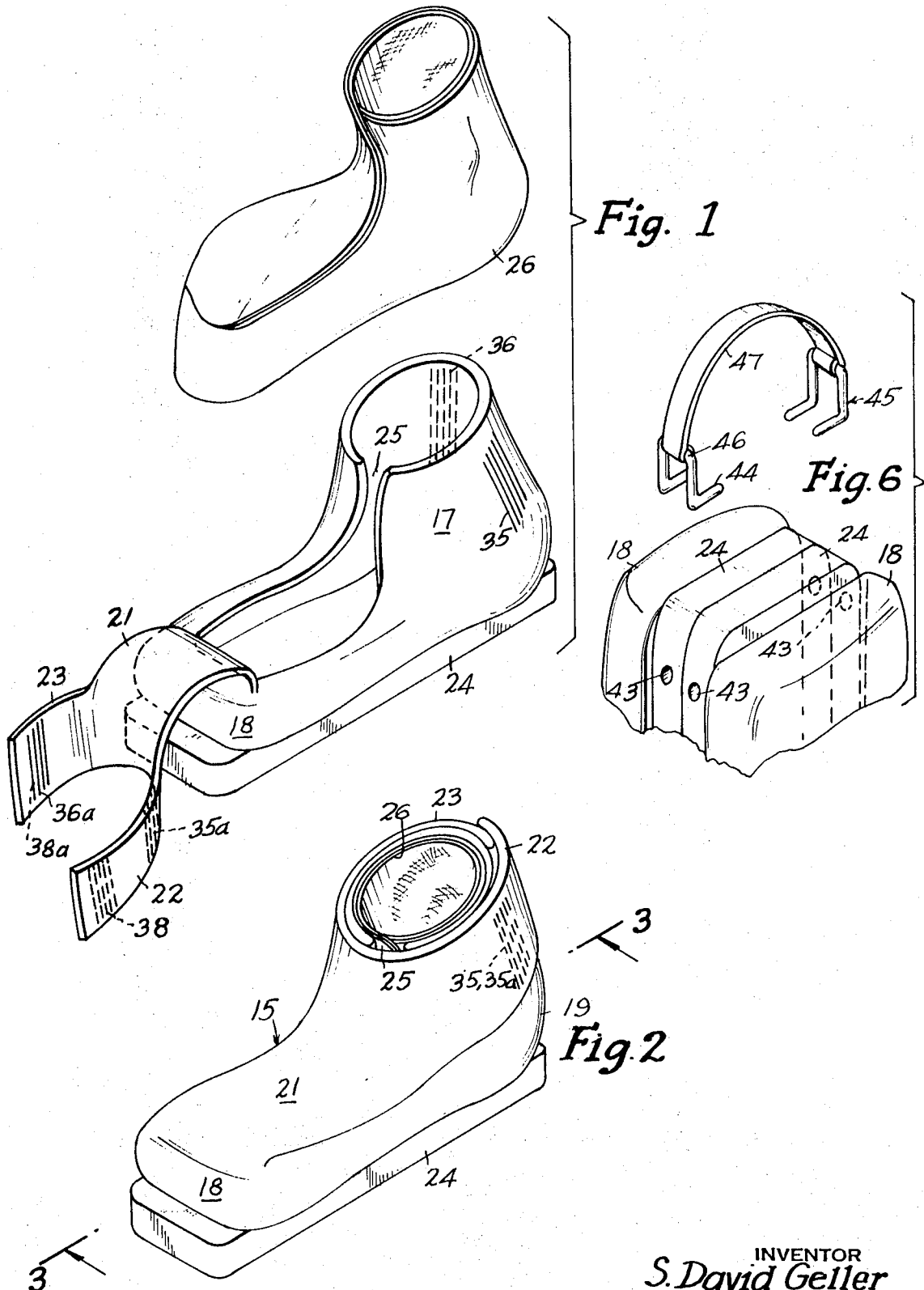
S. D. GELLER

3,613,271

RESHAPEABLE BOOT OR SHOE AND METHOD OF RESHAPING

Filed June 4, 1970

3 Sheets-Sheet 1



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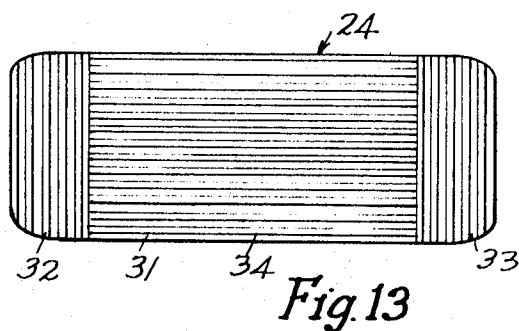
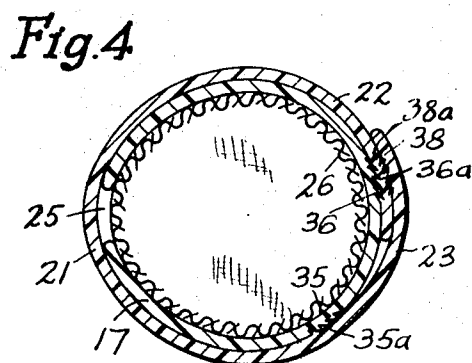
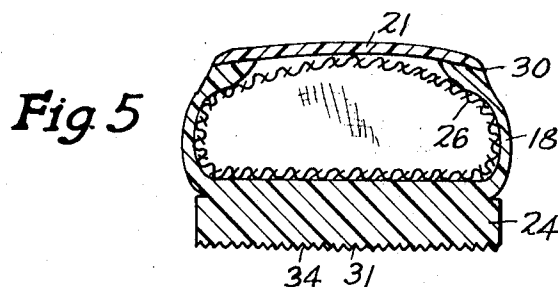
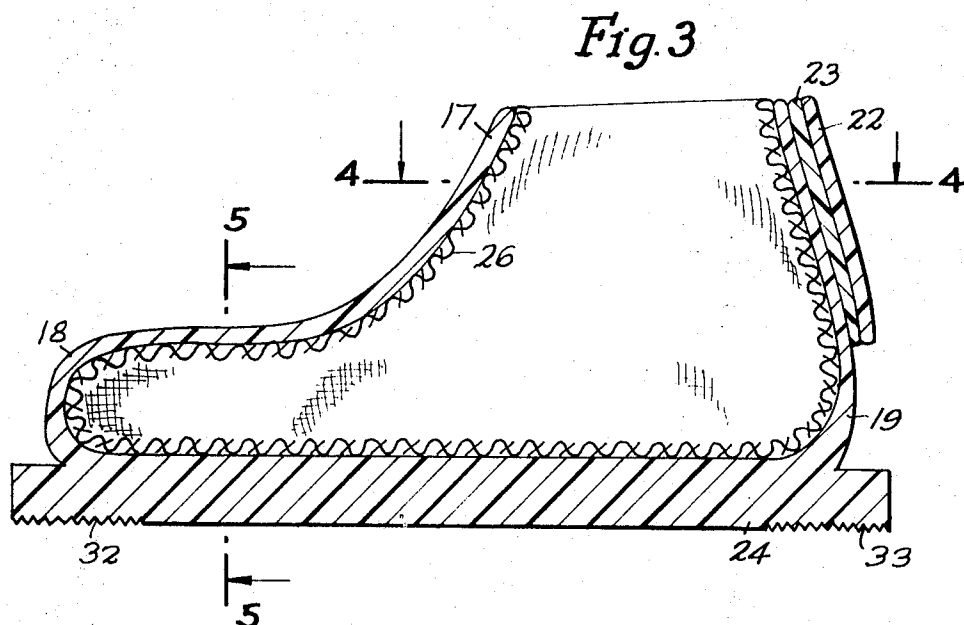
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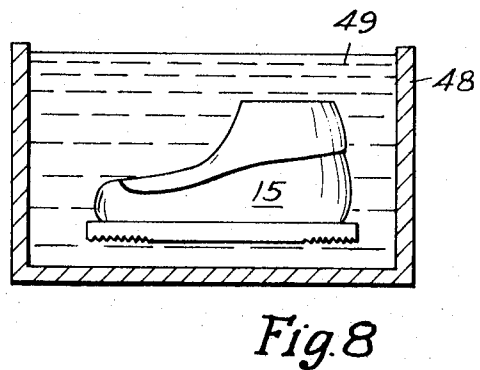
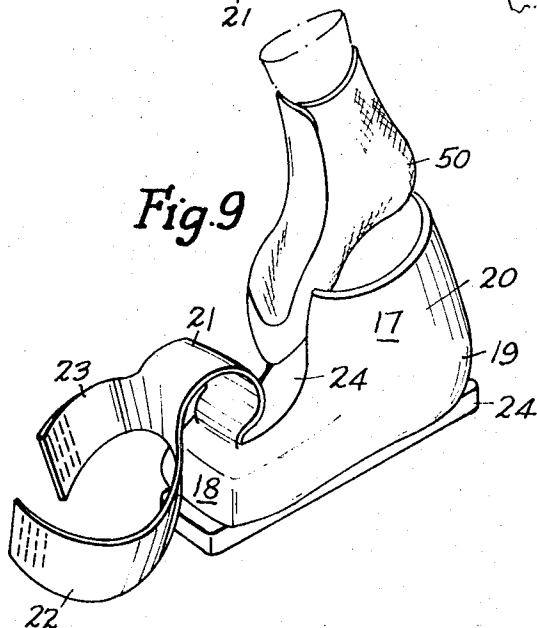
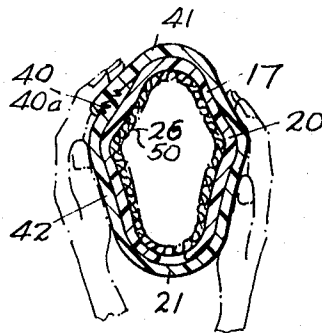
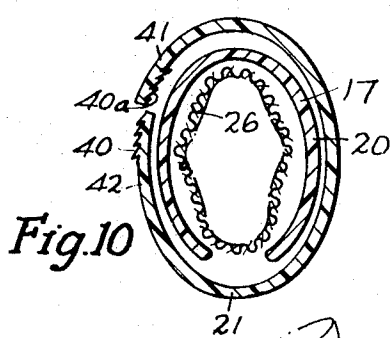
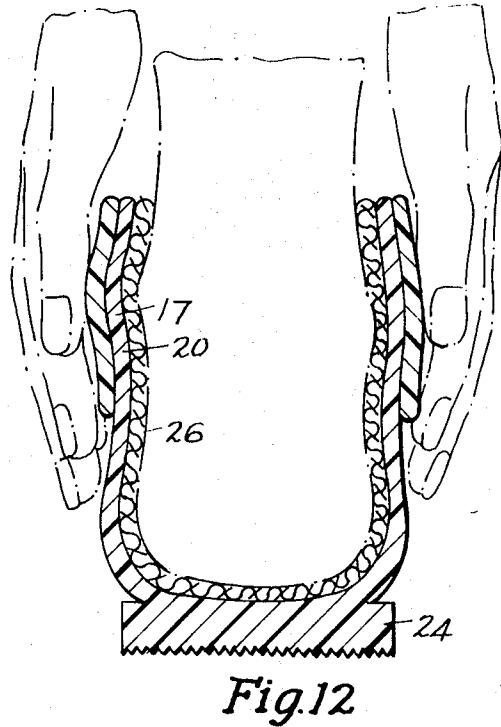
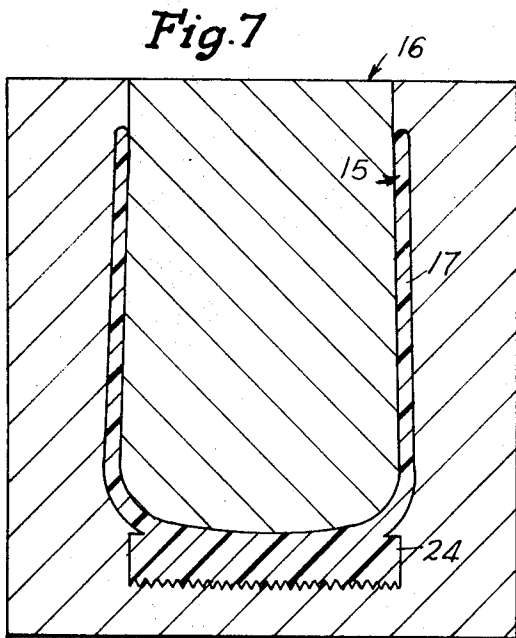
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RESHAPEABLE BOOT OR SHOE AND METHOD OF RESHAPING

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3 Sheets-Sheet 3



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3,613,271 RESHAPEABLE BOOT OR SHOE AND METHOD OF RESHAPING

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17 Claims

ABSTRACT OF THE DISCLOSURE

A boot or shoe for special use, such as orthopedic or sport use especially for skiing, is made of translucent thermoplastic material retaining its characteristics at very low temperatures but being soft and moldable when mildly heated. To reshape the preformed molded boot to an individual's foot, the boot is heated until softened. When the foot, protected by a sock is inserted, the foot expands the tight areas. The loose areas are manually pressed inwardly until the boot fits comfortably, after which the reshaped boot is allowed to cool and set and the foot is removed. The apparent color of the boot is changed by changing the inner boot, sock or sock lining to one of the desired color. Interdigitating fastening means are molded on two overlapping wrap-around side straps extending from a front tongue which covers a front opening in the boot.

This invention relates to footwear of the kind which must sustain greater than normal stresses or which must be accurately fitted to the individual, and includes orthopedic and special shoes and sport shoes such as ski boots.

The term "boot" herein is intended to mean any of the above mentioned shoes or boots. The essential requirements for boots for persons with flaccidity, or for sport boots such as those for hunters, mountain climbers, skaters and skiers are well known and include as good a fit to the foot as can possibly be attained, thereby to assure the needed support to guard against injury and to provide maneuvering control. Other desiderata, now rather ineffectively attained in available boots, are light weight, economy, easy and rapid attachment and detachment from the foot, long wear, and maintenance of size and shape under low temperatures and other adverse conditions.

Prior attempts to attain the requisite good fit of ski boots and the like to the individual require the services of experts either to make lasts duplicating the shape of the individual's foot, or to insert pads or moldable filling material between the foot and the boot or to apply heat and pressure to selected areas with or without changing the shape of the exterior surface of the boot. Such attempts have been more or less inefficient and lack the advantages of the present invention.

The aims of this invention are to provide a plastic boot or shoe, which when mildly heated and put on can readily be reshaped by the retailer or purchaser to fit the foot accurately; which is of light weight, low cost, quick and easy to put on and take off; which has dependable and quick locking fastening means; which remains sufficiently flexible and resilient at very low temperatures to serve its purpose; which may readily be reshaped not only on purchase but long after purchase thereof should

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changes in the shape or size of the foot occur or such changes occur in the boot after long use or subjection to high stresses; which offers the required support to the foot particularly against side bend of the ankles without sacrifice of flexibility and resilience under all normal conditions of use and which is translucent whereby the apparent color thereof may be changed at will merely by changing the sock, sock lining or inner boot to one of the desired color.

The above and other objects of the invention will become clear as the description progresses and from the drawings, in which

FIG. 1 is a perspective view of a ski boot to which the invention has been applied, showing the inner boot or sock lining removed and the boot opened.

FIG. 2 is a similar view of the same but showing the inner boot in place and the boot closed and fastened.

FIG. 3 is a vertical sectional view of the boot taken on the line 3—3 of FIG. 2.

FIG. 4 is a horizontal sectional view taken on the line 4—4 of FIG. 3 and showing an additional or precautionary fastener.

FIG. 5 is a vertical sectional view taken on the line 5—5 of FIG. 3, showing the front tongue and side straps of a different piece from the upper and attached thereto.

FIG. 6 is a fragmentary perspective view of the end portions of a pair of boots showing transverse holes therein for the reception of the pins of the carrier shown.

FIG. 7 is a vertical sectional view of a suggested simplified mold in which the boot may be molded showing the slightly enlarged shape of the preformed boot therein.

FIG. 8 is a vertical sectional view of a hot water container in which the molded boot is mildly heated and softened preparatory to reshaping.

FIG. 9 is a perspective view of the mold boot opened for the insertion of the sock-covered foot, or for the withdrawal of the foot after reshaping of the boot.

FIG. 10 is a horizontal sectional view of the molded boot as it appears partly closed around the foot and while it is still unfastened.

FIG. 11 is a similar sectional view of the lined boot showing in dash-dot lines the foot therein and hands manually reshaping the softened boot.

FIG. 12 is a vertical sectional view of the same showing another position of the hands during the reshaping.

FIG. 13 is a bottom plan view of the boot sole showing anti-slip serrations therein.

In the practical embodiment of the invention shown by way of example as applied especially to ski boots, the preformed boot 15 is formed in any suitable mold 16, FIG. 7, by blow molding, injection molding or other known process or in appropriate apparatus. The boot so molded should be approximately of, but slightly larger than, the final size and shape desired for the average foot. Said boot comprises the upper 17, extending from the toe portion 18 rearwardly and upwardly to encompass the heel portion 19 and to cover both ankles, the front tongue 21, the side straps 22 and 23 and the sole 24. The upper is open widely at the front to provide the insert opening 25 reaching from a point close to the toe portion 18 upwardly throughout the height of the boot.

The type of boot material used is an important feature of the invention. Such material is thermoplastic, is of adequate stiffness to give the requisite support to the foot

while being sufficiently flexible and resilient to respond to the maneuvering movements of the foot sensitively and retaining substantially all its original flexibility and resilience at very low temperatures, but becomes relatively limp, soft and moldable when heated to a temperature range of approximately 110° F. to about 140° F. depending on the proportions of the ingredients from which it is made. After being distorted at temperatures below said range, said thermoplastic material resumes its shape when the distorting stresses thereon are released.

The product termed "Alathon" Eva copolymer resin made by E. I. du Pont de Nemours & Co. Inc. of Wilmington, Del. is an ethylene-vinyl acetate copolymer and is well adapted for molding the boots and shoes here involved. Other resins such as polypropylene, polyvinyl chloride and polyethylene chloride are also useful for the purpose.

As has been indicated, the boot may be molded in a single piece together with the tongue, side extension straps, sole and the interlocking fastening means soon to be described. As seen in FIGS. 7, 9 and 12, the outer surface of the upper is convexly shaped where it joins the sole in a manner to expose the peripheral portion of the sole particularly at the arch, whereby access to the bottom part of the upper is permitted should it be desired to apply pressure thereto during the reshaping operation later to be described.

A suitable inner shoe, sock lining or three pairs of socks 26 which are the equivalent thereof may be used to line the interior surface of the boot in the usual manner. For rapid and dependable, though adjustable, closing of the boot upon the foot and for bracing and reinforcing the upper around the ankle area and to provide at least two thicknesses of material throughout the major part of said area, which is where the foot needs support most, the straps 22, 23 are made of substantial length and width though thinner than the upper. Preferably, the straps are passed around the back of the boot and have their end portions overlapping when pulled taut, thereby closing the tongue completely over the front opening 25 and pressing the upper firmly against the foot. Said tongue is also made somewhat thinner than the upper and as supple as the straps to assure proper overlapping of the opening and a tight closure at the front. While the tongue is preferably molded in one piece with the remainder of the boot, it will be seen from FIG. 5 that it may be made as a separate piece and then securely attached in any suitable manner to the toe portion 18 as shown at 30.

The under surface 31 of the relatively thick sole is molded with anti-slip ridges as 32, 33 and 34 therein, to aid the wearer in walking on slippery surfaces to and from a skiing area. The ridges 32 and 33 are arranged at the toe and heel portions respectively of the sole, are substantially parallel and extend transversely of the sole. The ridges 34 are arranged longitudinally between the separate the transverse sets of ridges.

Referring now to FIGS. 4, 11 and 12, additional relatively long and substantially upright ratchet-like serrations are there shown, each inclined on one side only, the serrations serving as the primary means to lock the wrapped around and tensioned straps 22, 23 to each other and to the upper thereby to close the boot firmly around the foot. In the form of the interdigitating fastening means shown in FIGS. 1, 2 and 4, two sets 35 and 36, each of a number of substantially parallel elongated ratchet-like serrations are made on the outer surface of the upper, one set being at one side near the back of the boot and the other set being on the other side, the serrations of one set being inclined oppositely to those of the other set to resist opening pull in opposite directions on the respective straps.

On the inner surface of the longer strap 22 are formed two sets 35a and 38 of serrations similar to and inclined in the same direction as the set 35. The inner surface of the strap 23 is provided with serrations 36a inclined in

the proper direction to interdigitate with the set 36. Similarly, on the outer surface of the shorter strap 23, is formed a single set 38a of serrations inclined to interdigitate and lock into the set 38.

It will be seen that the straps are locked into place by pulling thereon until the serrations on the inner surfaces thereof move past and override the set of serrations on the upper as far as possible without exerting excessive force which would unduly press upon the foot. When the pull is released, the straps remain tensioned because the serrations 35 enter the recesses between the serrations 35a, and the serrations 36a similarly engage the set 36. Tension on the straps prevents any separation thereof until the strap end accessible for that purpose is pulled deliberately away from the upper. Once the longer strap is freed, the shorter strap becomes loose and separates from the upper whereby the tongue is also released and may be turned down to expose the front opening for easy withdrawal of the foot.

The end portion of the longer strap 22, when carrying the serrations 38 constitutes an additional assurance of dependable interlocking of the fastening means by entering the serration recesses of the set 37a of the shorter strap. Both sets of serrations on the strap 22 must be freed before the boot can be opened. In this form of the fastening means, three thicknesses of material are supplied at the exterior posterior portion of the boot above the heel to give firm support and preventing injury due to possible side bending of the ankle when severely stressed.

In the form of the fastening means shown in FIGS. 10 and 11, the interlocking serrations 40 and 40a in the respective strap ends 41 and 42 are arranged beyond the exterior posterior portion of the boot and approximately around the ankle area where flexure of the boot forwardly during skiing exerts additional tension, besides the normal tension, on the straps and aids to maintain them in the interlocked position. To insure against careless adjustment of the interlocking fastening means and as an additional precaution against unforeseen loosening of said means in spite of the snug fit to the ankle and the resulting constant tension on said means which increases during skiing and never accidentally diminishes, additional safeguard fastening means for the straps may be provided, such as well known buckles, clasps, snap fasteners and the like, not shown, but which are customarily in use in the art.

For convenience in carrying the boots about, a number of transversely extending blind holes 43, FIG. 6, are made in the side edge of the toe and heel portions of the sole. Each hole receives one of the pins 44 of the wire member 45. Said member takes the form of two L-shaped parts in parallel and aligned spaced relation and joined by a resilient connecting web 46. A suitable strap 47 flexibly and reliably connects two such members 45. The pins 44 enter the holes 43 of a pair of boots arranged in sole-to-sole relation and with their connecting straps not only hold the boots against separation, but form a convenient carrier for the boots at the heels and toes.

As has been indicated, the boot is moldable in a single piece with or without the tongue 21 and its side straps, as may be found convenient or economical. In any case, after the preformed molded boot has been removed from the mold and the tongue with its side straps added if necessary, the boot is ready for reshaping to the individual's foot to a point upwardly past the ankle and around the entire foot except the sole, where such reshaping is not necessary. Part of the arch may be reached if necessary, owing to the convexity of the boot at that area and the exposure of the periphery of the sole thereat.

To reshape the boot, it need merely be heated in any suitable manner to its softening temperature, which preferably does not exceed 140° F., a temperature readily tolerated by the skin of the foot when protected by a sock. Heating may be done in an oven, by a hair drier

wherein temperature is controlled, or as shown in FIG. 8 in a quite simple manner as by immersing the boot in hot water 49 held in a container 48. When the boot softens enough to be shaped, while retaining its thickness of material unchanged and to be easily molded, it is removed from its warm bath, shaken to throw off the water and put on the foot of the wearer which is covered by a sock 50 (FIG. 9).

As the foot enters the boot, any tight areas present are expanded by the foot which acts as a last or mandrel for that purpose. The boot is then closed and fastened to give maximum support to the foot, whereupon the closed straps, tongue and upper are remolded by the hands (FIGS. 11 and 12) to close up any spaces which may be present between the covered foot and the interior of the boot with its lining, a step which is readily accomplished by the retailer or the wearer himself in view of the rather limp condition of the plastic material of the boot. Where available, a suitable pressure cuff operated by air under pressure may be used instead of the hands to exert pressure inwardly on the exterior surface of the boot for the reshaping operation.

After said operation has been satisfactorily completed, and the boot is comfortable on the foot without exerting excessive pressure which might be painful or harmful, the boot is permitted to cool to about room temperature and the plastic to set into its new shape, which is a matter of only a few minutes. The cooled boot is then removed and is ready for use. The plastic retains its original flexibility and shape as remolded under severely low temperatures and is not adversely affected by the heating and reshaping thereof. Should the boot become distorted after long use or the foot of the wearer change to an extent to make the boot uncomfortable, it may again be reshaped to the foot as often as needed, even by the wearer himself.

It will now be seen that there has hereby been provided a method for reshaping boots and shoes to attain a good and comfortable fit and good support for the individual's foot without the necessity for expert assistance, special apparatus or filling material, that plastic ski boots and special shoes made in accordance with the method disclosed can be provided with premolded or other fastening means, closures, anti-slip means, carrying devices and the like, that the apparent color of the boot may be changed at will, and that the various objects of the invention have been adequately attained.

While certain specific forms of the invention have herein been shown and described, various obvious changes may be made therein and are contemplated, without departing from the spirit of the invention defined by the appended claims.

I claim:

1. The method of making a boot having a front opening coverable by a tongue having fastenable side straps, comprising molding the boot including the upper thereof to a size and shape somewhat greater than the final size and shape and of thermoplastic material having and retaining at low temperatures the original flexibility and resilience thereof, said material being soft and limp sufficiently to permit the reshaping thereof when mildly heated, heating the molded boot to a softening temperature tolerable by the skin of the person when protected by a sock, inserting the foot to be fitted into the boot and applying pressure to the heated and softened boot at the areas thereof required to reshape the boot to fit the contours of the foot.

2. The boot making method of claim 1, the pressure applying step being applied to the outer surface of the boot and being directed toward the foot, and removing the thus fitted boot from the foot after the boot material has cooled sufficiently to set into its reshaped form.

3. The boot making method of claim 1, the boot material being a polyolefin comprising an ethylene-vinyl acetate copolymer.

4. The boot making method of claim 1, the reshaping of the boot being done while the boot material is at a temperature of between approximately 120° and 140° F. and the skin of the foot is protected by a sock.

5. The boot making method of claim 2, the boot material being forced outwardly by the foot at the areas too tight for the foot when the foot is inserted into the heated boot, and the areas which are too loose being pressed manually inwardly into fitting relation to the foot, the heated boot material being substantially non-resistant to the reshaping pressure and retaining the fitted shape thereof when cooled to and below room temperature.

6. The boot making method of claim 1, and molding a combined front tongue and side straps extending rearwardly from the tongue with integral molded ratchet-like serrations thereon adapted to interdigitate and thereby to cooperate in fastening the straps in place, the tongue and the straps being of material thinner than, and being reshaped together with, the upper during the reshaping step.

7. The boot making method of claim 1, those areas of the boot too tight to fit the foot being pressed outwardly by the foot into fitting relation thereto when the foot is inserted into the heated boot, and those areas too loose to fit the foot being pressed inwardly.

8. A molded boot of thermoplastic material sufficiently flexible and resilient for use at normal and low temperatures while softenable and readily changeable in shape at temperatures in the approximate range of about 120° to 140° F., said boot being adapted to be reshaped while on the foot of the wearer and while at a temperature in said range.

9. The boot of claim 8, the thermoplastic material being a polyolefin comprising ethylene-vinyl acetate copolymer.

10. The boot of claim 8, the boot having an upper providing an opening at the front of the boot, a tongue adapted to overlap said opening when the boot is fastened to a foot, side straps on said tongue adapted to be wrapped respectively in opposite directions around the ankle and back portions of the boot and fastening means comprising cooperating members on the respective straps to fasten said straps together under tension and to maintain said straps tensioned until said members are deliberately separated from each other.

11. The boot of claim 8, the boot material being translucent and a colored sock lining the boot and visible through said boot material and apparently coloring said material to the eye.

12. The boot of claim 10, the fastening means being adjustable and comprising interdigitating substantially upright and parallel rows of elongated serrations.

13. The boot of claim 10, the boot having a sole provided with transversely extending holes on both side edges of the toe and heel portions of the sole for the reception of carrying pins.

14. The boot of claim 10, a sole provided with two sets of closely spaced parallel ridges on the under surface thereof extending transversely of the sole, one set being at the toe portion of the sole, the other set being at the heel portion of the sole, and a third set of similar longitudinally arranged ridges separating the sets of transverse ridges.

15. The boot of claim 9 having a front opening, a tongue adapted to overlap and to close said opening when the boot is fastened to a foot, side straps on said tongue adapted to be wrapped around the ankle and back portions of the boot, said tongue and side straps being of material thinner than that of the upper, cooperating fastening means on each of the straps comprising a row of elongated upright parallel ratchet-like serrations inclined in the same direction on said straps and arranged to interdigitate and to lock into each other when the end portions of the straps are overlapped and tensioned.

16. The boot of claim 15, a colored sock lining the

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boot, the boot material being translucent ethylene-vinyl acetate copolymer and appearing colored when the sock is viewed therethrough, a sole on the boot having a transverse hole extending substantially parallel to the under surface of the sole into the heel and toe portion of each side edge of the sole, precautionary fastening means for the straps in addition to said serrations, and anti-slip longitudinal and transverse ridges on the under surface of the sole.

17. The boot of claim 8, the thermoplastic material being polyvinyl chloride.

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U.S. Cl. X.R.

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