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(54) **PROTECTIVE FOOT CAPSULE**

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Description

[0001] This invention relates to protective footwear.

[0002] This invention has particular but not exclusive application to workboots for use in firefighting and chemical spill applications, and for illustrative purposes reference will be made to such application. However, it is to be understood that this invention could be used in other applications, such as general purpose workboots and protective footwear.

[0003] In general, protective footwear for use in firefighting and chemical spill applications, and indeed for most industrial workboot applications, has been manufactured using traditional methods which were developed over time to accommodate the limitations of working with leather as the primary structural and protective material. The techniques used in manufacture have also generally been those that have developed retaining the basic construction principles of an age prior to the advent of sophisticated machinery and materials and have not generally deviated from such principles of construction even where the materials have not readily lent themselves to such methods.

[0004] In particular, boot production generally revolves around the generation of piecework components of the boot which are then formed up and assembled on a traditional last or bootmaker's anvil, to be then stitched together by skilled machinists. The traditional techniques accordingly suffer from the disadvantages of requiring a high level of machinist skill and time.

[0005] Where toe caps, heel guards and the like must be inserted in the workboot, these are generally incorporated as insert pieces interposed between layers of the traditional boot construction. Accordingly, such protective footwear in generally heavy out of all proportion to the degree of protection afforded by the insert.

[0006] US-A-3248810 discloses a "safety" shoe which is manufactured by injection moulding. Protective inserts are located on a last by means of studs and than material is injected around openings to fill free space left between the protective inserts and the mould.

[0007] GB-A-863944 discloses a boot or shoe which incorporates a metal stiffener or toe guard within material forming the toe of the boot or shoe and also a metal sole plate bonded between upper and lower layers of rubber or rubber-like material in the sole of the boot or shoe.

[0008] DE-A-2136522 discloses a protective boot which incorporates a protective heel, sole and toe portion all of which are separate. These portions are affixed and moulded into a sole portion to hold them together.

[0009] The present invention provides a protective footwear assembly having an outer sole, a footwear upper affixed to or integral with the outer sole and a protective insert member, the outer sole and the footwear upper arranged to encapsulate the protective insert member to form a protective footwear assembly, characterised in that the protective insert member comprises a flexible inner sole portion, a heel counter portion a toes cap portion, the inner sole portion being integrally formed with at least one of the heel counter portion and toes cap portion and the other one portion being affixed to the inner sole portion, or both the heel counter and toes cap portions being affixed to the inner sole portion, and an arch protector portion connected to the inner sole portion, such as to form a unitary capsule to protect the sole, heel and toes of a foot.

[0010] Where the footwear item is a boot, the sole portion and boot upper portion may each take any form consistent with the function of providing a suitable exterior of a protective work boot. In general, the precise form of the asembly of upper and sole will at least in part be dictated by the type of protection to be afforded. For example, for use in chemical spill work the upper and sole may be generally or specifically constructed or materials proof against the expected contaminants.

[0011] The protective insert member may take any form consistent with the function of providing some protection to the sole, heel, arch and toes of a wearer of the boot. Preferably, the protective insert member comprises a moulded polymeric sole portion having integrally formed therewith a heel counter portion, although it is also envisaged that the heel counter portion may be affixed to the sole portion by any suitable means such as interlocking complementary joining means. Preferably, the heel counter portion is of relatively rigid form compared with the sole portion such that the sole portion retains some flexibility whilst providing penetration resistance, thus promoting a natural and comfortable walking gait, whilst the heel counter provides maximum protection against impact and crushing.

[0012] The protective insert member further includes a toe cap, and an arch protector. The toe cap and arch protector may be relatively stiff compared to the sole portion in order to maximise impact resistance with a minimum of unnecessary bulk. The toe cap and/or arch protector may take any form consistent with the function of providing protection to the toe region and/or the arch region of a wearer's foot. Preferably, the toe cap and/or arch protector are moulded integrally with the sole and heel counter to provide an integral, full function protective insert member, providing for foot flexibility as well as penetration resistance and protection against side or rear impacts. Alternatively, the toe cap and arch protector may be affixed to the sole and heel counter moulding or assembly by any suitable means.

[0013] Preferably, the shapes of the arch protector and toe cap are selected so objects tend to roll off, the shapes of one or more of said arch protector portion and toe cap portion being preferably moulded such that their outer surfaces run away from their respective top centres. It has been found that this arrangement of the toe cap and arch protector substantially overcomes the disadvantages in this regard of standard boots, which generally only have toe caps. The toe caps used by the prior art are generally flat and often angled backwards

due to the spring of the shoe, providing no protection for the arch.

[0014] Preferably, the sole portion of the protective insert provides protection from penetration through the sole and heel and preferably provides, in conjunction with the toe cap and arch protector if desired, a protective capsule for the foot as a whole from objects impacting on the sides and top. For example, if the foot is caught under debris or if a person falls and is then hit, boots in accordance with the present invention may protect the foot against injury. Preferably, the area of the sole portion between the arch protector and the heel counter is arched to provide desirable support for the foot over the full width of the arch to assist with long term wearer comfort and support.

[0015] Preferably, the heel counter portion is angled inward towards the top, as does the heel of the foot, to provide better support and stability. The sole portion of the protective insert is preferably provided with a concave depression in the heel area to accept the heel in its natural shape.

[0016] Preferably, the relative shapes and hence the distance between the toe cap and arch protector are selected to allow the maximum amount of foot flexing at the ball of the foot whilst maintaining the minimum distance at the top between the two consistent with allowing for the maximum extension of the foot.

[0017] Where the heel counter portion is an integral part of protective insert it is preferred that the relative stiffnesses of the heel counter portion and sole portion are selected such that sideways forces are not transferred to the counter, a common defect of the prior art which leads to less foot support and tends to cause the counter to degenerate. In addition, where an arch protector is included, it is preferred that the insert member be fully integral to form a protective foot capsule since this reduces the number of components in the manufacturing process.

[0018] In kind with the preferred integral heel counter, it is preferred that the toe cap portion and arch protector portion of the protective insert be relatively rigid compared with the sole portion to provide resistance to crushing and impact whilst permitting flexing of the foot. The relatively stiff outer edges of the toe cap portion and arch protector portion may meet the more flexible sole portion, restricting the sole portion from flexing during impact in the region of the toe cap portion and arch protector portion, whilst maintaining the aforementioned flexibility between the relatively rigid portions. Preferably, the arch protector shape is selected to provide maximum width of the arch protector portion for as much of the height of the arch protector portion as possible to facilitate the free movement in and out of the boot, the widest part of the foot being generally forward of the protector with the angle of entry of the foot being generally higher during entry and exit than during wearing the boot.

[0019] The shape and configuration of the toe cap portion is preferably selected to yield a toe cap having the shape of a portion of an egg and is both relatively high off the foot at the rear of the toe cap and has no flat surfaces. The height of the preferred toe cap not only allows for objects to roll off the foot but enables the foot to bend fully without the upper rubbing against the top of the foot. The "egg" shape of the preferred toe cap greatly increases its ability to resist impacts and provides a more protective capsule for the toes than toe caps of the prior art.

[0020] Preferably, the inside of the boot in the region of the counter portion is padded with a suitable padding material such as a non-flammable cellular elastomer. Preferably, the elastomer is selected from those having a shore hardness of about 25 to provide an acceptable compromise between comfort and strength. Such padding fulfills not only the function of providing comfort and supportive feel for the heel, but also allows for heel abnormalities to be comfortably accommodated.

[0021] The foot contact area within the protective insert member may also be lined with a comfort promoting material. Preferably, the boot includes an internal lining sock of fine leather or other suitable material, and the space between the internal lining sock and the protective insert member is preferably padded with a non flammable polymeric foam such as an ester foam. Preferably, the foam is selected to have a density suitable for providing a firm, comfortable feel without putting any pressure on any foot abnormalities, such as bunions, spurs and the like.

[0022] Boots manufactured in accordance with the present invention may be provided with a footbed, with it being preferred to use a footbed of a similar type to that used in the mid soling of better quality sporting footwear. Preferably, the footbed is of a substantially non flammable closed cell foam polymeric material, providing a comfortable and supportive base for the foot. The depth of the sock liner together with its shape may be selected for supportive quality and to provide for orthotic adjustments where necessary.

[0023] The protective footwear in accordance with the present invention may be closed by any suitable means. Preferably, the protective footwear is closed by means of self adjusting, non flammable elastomer such as that having similar qualities to the elastic in elastic sided boots. The protective footwear may also be provided with a quick close/release attachment, preferably of the type useful to surround the ankle and the top of the protective footwear. The elastomeric adjustment allows for comfort of fit, the elasticity thereof also providing support whilst not overly reducing movement of the foot.

[0024] Preferably, protective footwear in accordance with the present invention are provided with ankle restraining means to provide ankle support whilst not totally eliminating for and aft movement of the foot, a movement which is important, particularly when driving. Desirably, the ankle support means also serves to help prevent the foot slamming against the toe cap, for exam-

ple, when going down hill. Preferably, the ankle support means takes the form of a flexible strap member angled from the base of the achilles tendon, across the ankle and over the instep. Preferably, similar support is provided for the lower leg by means of a supporting closure at the top of the boot which may also serve the purpose of providing closure against the trouser leg of the wearer.

[0025] The outer sole portion of the protective footwear, as stated, may take any suitable form, generally dictated by the use to which the footwear is put. However, it has now been determined that a particular type of outer sole is amenable for use in a wide variety of applications, such as fireman's boots for use in both chemical spill and firefighting applications. In the past, it has generally been necessary for firemen to maintain a plurality of specialized footwear for use in such diverse applications. Whilst a fire boot may not have the chemical resistance of a specialised chemical-spill boot, this has generally occurred because the soling of the chemical boot was unsuitable for use in a fireboot and accordingly it was not worth making the fire boot chemical resistant.

[0026] Preferably, the footwear sole portion includes

a flexible body having a lower ground engaging surface, and

a plurality of substantially transverse ridges provided on said ground engaging surface and defining a plurality of transverse depressions therebetween, wherein said ridges and depressions in combination provide a waveform profile to said ground engaging surface.

[0027] The flexible body of the boot sole may take any suitable form and is preferably of a fire and chemical resistant natural or synthetic resilient material. Preferably, the body member is an integral moulding of two parts, namely, a tough outer skin of heavy duty rubber providing abrasion and penetration resistance and an enclosed cellular layer allowing for considerable weight saving and improved shock absorption.

[0028] Preferably, the body is of a wedge shape, rather than the conventional sole and heel moulding to provide more even support. It has been found that the use of the wedge shape provides for lift at the toes is similar to sporting footwear as opposed to the rather gumboot-like action of conventional protective footwear.

[0029] The body may be provided with an upper peripheral extension to facilitate bonding or other attachment to a boot upper as well as providing additional protection from aggressive chemicals and abrasion. Preferably, the upper peripheral extension is angled inward from the periphery of the sole and is provided with an internal ridge, allowing the sole to engage a protective insert such as that hereinbefore described.

[0030] Preferably, the transverse depressions include a relatively large depression in the region of the instep of the sole, to provide enhanced ability to safely engage ladder rungs and the like. The depressions towards the toe and heel of the sole from the instep depression may be identical or may vary, with it being preferred that the sole be provided with progressively smaller depressions towards the toe and heel, providing for a gradation of sole flexibility away from the instep. Preferably, there is provided a relatively large ridge between depressions in the region of the ball of the foot of the wearer, the ridge and adjacent depressions forming a concave portion on either side of the ball of the foot, provide for enhanced foot flexibility with the minimum of movement of the outer sole, and a preferably longer convex portion under the ball of the foot to provide additional support.

[0031] The ground engaging surface may be smooth or may be provided with a textured surface to improve the grip of the sole. Preferably, the ground engaging surface is provided with a textured surface comprising generally transverse ripples or creping, the textured surface providing grip in both traction and braking. Preferably, the wave shape of the sole and the small ripples are selected such that walking shock is dissipated along the sole rather than directly upwards to the foot.

[0032] The wave shape of the preferred soles also allows stones, caked mud and the like to be released from the sole due to the normal walking action causing the sole to flex, periodically opening out the depressions.

[0033] Preferably, the ridges are also provided with a plurality of substantially longitudinal depressions cutting through the crests of the ridges between the transverse depressions, the wave shape, together with the longitudinal channels, allowing fluids to pass under the sole without around the sole and reduce the hydroplane effect.

[0034] The present invention further provides a protective footwear insert member including a toe cap portion, an inner sole portion, a heel counter portion, and an arch protector portion (26) characterised in that the inner sole portion is connected to the toe cap portion and the heel counter portion, the arch protector portion is connected to the inner sole portion, the insert member being an integrally formed structure or unitary structure assembled from discrete such portions, and which is provided separately from other components of a footwear assembly to form an independent protective capsule for the sole, heel, arch and toes of a foot, the insert member adapted to be placed within a footwear item comprising an outer sole and an upper to provide a protective footwear assembly.

[0035] The protective insert member of this aspect of the invention may have any of the features of the protective insert member discussed above in connection with the footwear assembly.

[0036] Protective footwear in accordance with the present invention is also amenable to significantly revised manufacturing techniques which are not available for application to many prior art protective boots.

[0037] Accordingly, in a further aspect, the present invention provides a method of manufacturing protective footwear, including the steps of:

providing a full footwear lining sock;
providing a footwear padding assembly;
providing a unitary protective insert member, which includes a flexible inner sole portion, a protective heel counter portion a toe cap portion, the flexible inner sole portion being integrally formed with at least one of the heel counter and toe cap portions and the other one portion being affixed to the inner sole portion, or both the heel counter and toe cap portion being affixed to the inner sole portion and an arch protector portion
connected to the inner sole portion, such as to form a unitary capsule to protect the sole, heel, arch and toes of a foot;
providing a footwear upper assembly;
providing an outer sole assembly;
placing said lining sock on a last;
installing said footwear padding assembly, protective insert, and footwear upper assembly on said lining sock, and affixing said outer sole assembly to said footwear upper assembly and said unitary protective insert member.

[0038] Preferably, the manufacturing process of the present invention utilises an air inflated last for ease of removal of the completed boot. Adhesive may be applied between each layer where desirable, and the upper region of the boot upper assembly and lining sock may be closed by any suitable upper closure means. The upper closure means may also secure the padding assembly to the boot outer and/or lining sock if desired.

[0039] In order that this invention may be more easily understood and put into practical effect, reference will now be made to the accompanying drawings which illustrate a preferred embodiment of the invention, wherein:-

FIG. 1 is a partial cross-section through an elastic sided workboot in accordance with the present invention;
FIG. 2 is a partial cross-section through a fire-fighting boot in accordance with the present invention;
FIG. 3 is a partial cross-section through a protective boot in accordance with the present invention;
FIG. 4 is a partial cross-section through a combat boot in accordance with the present invention; and
FIG. 5 is an inverted perspective view of a sole in accordance with the present invention.

[0040] In figures 1, 2 and 4 there are illustrated protective boots including a flexible outer sole 10 comprising a tough abrasion-resistent outer surface 11 of the material known as hypalon. Formed integrally with the outer surface 11 is an inner cellular sole core 12, of cellular material such as cellular-hypalon.

[0041] The flexible outer sole 10 is provided with transverse ridges 13 and transverse depressions 14, including a relatively large transverse depression 15 and a relatively broad transverse ridge under the ball of the foot at 16. The undersurface of the flexible outer sole 10 is provided with a plurality of small ripples 17 from heel to toe thereof.

[0042] As is best illustrated in Figure 5 the transverse ridges 13 are provided with longitudinally directed cut-outs 20 adapted to provide for and aft drainage beneath the sole.

[0043] About the periphery of the flexible outer sole 10 is provided an integral upstanding flange portion 21 having integrally formed therewith an internally directed locking bead 22.

[0044] A protective insert 23 is provided having an integrally moulded nylon inner sole 24 and heel counter 25 member. Affixed to the inner sole 24 is a polycarbonate arch protector 26 and a polycarbonate toe cap 27. The toe cap 27 is retained to the inner sole 24 by means of the lower surface 30 of the toe cap 27 underlying the forward end 31 of the inner sole 24 and being locked thereto by the snapping-in of a tongue 32 of the forward end 31 into a recess 33 provided in the toe cap 27.

[0045] Within the protective insert 23 is adhered a fabric-backed foam liner 34 to provide comfort to the wearer. Without the protective insert 23 is a leather boot outer 35 adapted to encapsulate the protective insert 23 and to provide the exterior surface of the boot upper. The toe cap 27, heel counter 25 and arch protector 26 are provided with recesses 36 adapted to receive the locking bead 22 of the flexible outer sole 10.

[0046] The leather outer skin 35 is cut away at 37 and the cut-away space filled in with an elasticised panel 38 adapted to comfortably grip the ankle of the wearer.

[0047] In the embodiment of figure 2 the leather outer skin 35 is replaced by a viton coated ballistic grade aramid fibre outer skin 40 to provide fire resistance to the boot. In this case, also, the fabric-backed foam liner 34 has been replaced by a soft leather lining sock 41. The fire-fighting boot of figure 2 also includes a cellular hypalon orthodically adjustable foot-bed 42 and a non-flammable ester foam lining 43.

[0048] Closure of the boot includes a gatherable insert panel 44 and rubber closing straps 45 adapted to draw the shin of the boot closer against the trouser leg of the user.

[0049] In the embodiment of figure 4, the outer skin 46 is of gortex-backed aramid fibre. The combat boot is further provided with a leather or like recovered perforated foam sock liner 47, a cellular hypalon heel cushioning 50 and a plurality of pump outlets 51 equipped with one-way valves not shown. The outlets 51 pass from a foam inner sole 52 to the outside of the boot, where necessary, piercing the protective insert 23 such as at 53.

[0050] In the embodiment of figure 3, the outer sole

and boot upper are provided as an integral PVC moulding 55.

[0051] In use, protective insert members in accordance with the present invention allow the maximum area for toe comfort, particularly the great toe, and stability for the foot during the push off phase.

[0052] With the exception of the tooling costs for manufacturing the protective frame and the sole; equipment required can be low technology and therefore low cost and production can therefore be increased or decreased, without great capital outlay or having expensive equipment lying idle, by increasing or decreasing staff levels.

[0053] Although accuracy in stitching may be important, neatness is not, as, with the exception of the rear seam of the boot, seams are not seen.

[0054] Expensive set up costs items, such as tooling and production of the protective frame and sole can be carried out in one site, state or country and shipped to the market area with the uppers and assembly being completed their using local materials and labour.

[0055] Footwear in accordance with the abovedescribed preferred embodiment of the present invention provide desirable shock absorption through the use of cellular elastomers. The sole design, the soft, non-restrictive lining, surrounded by foams, the heel padding, and a firm, comfortable, orthopaedically adjustable footbed provide a light protective boot and make the boot comfortable to wear. Protection is provided for the foot as a whole by the use of an integral protective insert for the foot, rather than just a toe cap and puncture resistant device.

[0056] Boots manufactured in accordance with the present invention allow for a variety of materials to be used for any or all of the units to cover varying safety standards such as Fire Brigade impact standards for firefighting boots and varying uses, such as combat boots and firefighting boots. The end result is that material choice, and consequently the price, can relate directly to the requirements of the end user. In addition it allows for a number of types of footwear to use the same basic components.

[0057] The protective insert members of the abovedescribed preferred embodiment retain the advantages of:-

minimal conduction of heat and electricity;
elastic recovery from the elastic limit of the material or disintegration if deformed beyond the elastic limit, that is, they do not take a new shape, resulting in the pressure being removed from the foot as soon as the object is removed as opposed to a steel toe cap which does change shape and may need to be cut away from the foot;
rust and deterioration resistance;
may be moulded to complex shapes allowing simpler "snap type assemblies, and
cheap to produce after initial tooling costs.

[0058] It will of course be realised that while the above has been given by way of illustrative example of this invention, all such and other modifications and variations thereto as would be apparent to persons skilled in the art are deemed to fall within the broad scope and ambit of this invention as defined in the Claims appended hereto.

Claims

1. A protective footwear assembly having an outer sole (10;55), a footwear upper (35;40;46;55) affixed to or integral with the outer sole (10;55), and a protective insert member (23), the outer sole (10;55) and the footwear upper (35;40;46;55) arranged to encapsulate the protective insert member (23) to form a protective footwear assembly, characterised in that the protective insert member (23) comprises a flexible inner sole portion (24), a heel counter portion (25), a toes cap portion (27), the inner sole portion (24) being integrally formed with at least one of the heel counter portion (25) and toes cap portion (27) and the other one portion (25;27) being affixed to the inner sole portion (24), or both the heal counter and toes cap portions (25;27) being affixed to the inner sole portion (24), and an arch protector portion (26) connected to the inner sole portion (24), such as to form a unitary capsule to protect the sole, heel and toes of a foot.

2. A protective footwear assembly in accordance with claim 1, characterised in that the arch protector portion (26) is integrally formed with the inner sole portion (24).

3. A protective footwear assembly in accordance with claim 1 or claim 2, characterised in that the inner sole portion (24) is flexible to enable a comfortable walking gait and resistance against penetration whilst the other portions (25;26;27) of the protective insert member (23) being relatively rigid compared with the inner sole portion (24) to provide impact protection.

4. A protective footwear assembly in accordance with any one of the preceding claims, characterised in that the shapes of one or more of the arch protector portion (26) and toe cap portion (27) are moulded such that their outer surfaces run away from a respective top centre.

5. A protective footwear assembly in accordance with any one of the preceding claims, characterised in that a locking bead (22) is provided protruding from an upstanding flange formed integrally with the outer sole (10;55), and on the toe cap, heel counter and arch protector portions (27;25;26) correspondingly shaped recesses (36) are provided for receiv-

ing and locking with the locking bead (22) to affix the insert member (23) to the outer sole (10;55).

6. A protective footwear assembly in accordance with any one of the preceding claims, further comprising a padding lining (34;41;47) arranged internally to the protective insert member (23).

7. A protective footwear assembly in accordance with claim 6, further comprising a foot bed (42) of a depth and/or shape selectable for supportive quality and/or orthotic adjustment, internal to the protective insert member (23).

8. A protective footwear assembly in accordance with any one of the preceding claims, wherein the outer sole (10;55) and footwear upper (34;40;46;55) are provided as an integral moulding (55).

9. A protective footwear assembly in accordance with any one of claims 1 to 7, characterised in that the footwear upper (25;40;46;55) is made from a material selected from the group consisting of leather, viton coated ballistic grade aramide fibre textile, gortex-backed aramide fibre textile and PVC.

10. A protective footwear assembly in accordance with any one of the preceding claims, wherein the inner sole portion (24) and the heel counter portion (25) are moulded from nylon.

11. A protective footwear assembly in accordance with any one of the preceding claims, characterised in that the arch protector portion (26) and the protective toe cap portion (27) are moulded from impact resistant polycarbonate.

12. A protective footwear insert member (23) including a toe cap portion (27), an inner sole portion (24), a heel counter portion (25), and an arch protector portion (26) characterised in that the inner sole portion (24) is connected to the toe cap portion (27) and the heel counter portion (25), the arch protector portion is connected to the inner sole portion (24), the insert member (23) being an integrally formed structure or unitary structure assembled from said discrete portions (24;25;26;27), and which is provided separately from other components of a footwear assembly to form an independent protective capsule for the sole, heel, arch and toes of a foot, the insert member (23) adapted to be placed within a footwear item comprising an outer sole (10;55) and an upper (35,40;46;55) to provide a protective footwear assembly.

13. A protective footwear insert member in accordance with claim 12 characterised in that the arch protector portion (26) is integrally formed with the inner sole portion (24).

14. A protective footwear insert member in accordance with any one of claims 12 or 13 characterised in that the inner sole portion (24) is flexible to enable a comfortable walking gait whilst providing resistance against penetration, the other portions (25;26;27) of the protective insert member (23) being relatively rigid compared with the inner sole portion (24) to provide impact protection.

15. A protective insert member in accordance with claim 14, wherein the shapes of one or more of said arch protector portion (26) and toe cap portion (27) are moulded such that their outer surfaces run away from a respective top centre.

16. A protective insert member in accordance with any one of claims 12 to 15, wherein the inner sole portion (24) and the heel counter portion (25) are moulded from nylon.

17. A protective footwear insert member (23) in accordance with any one of claims 12 to 16, wherein recesses (36) are provided for receiving and locking with a locking bead (22) protruding from an upstanding flange formed integrally with an outer sole (10;55), on an outer sole to be affixed to the protective insert member.

18. A protective insert member in accordance with any one of claims 12 to 17, characterised in that the arch protector portion (26) and the toe cap portion (27) are moulded from impact resistant polycarbonate.

19. A method of manufacturing protective footwear, including the steps of:

providing a full footwear lining sock;
providing a footwear padding assembly;
providing a unitary protective insert member, which includes a flexible inner sole portion (24), a protective heel counter portion (25), a toe cap portion (27), the flexible inner sole portion (24) being integrally formed with at least one of the heel counter and toe cap portions (25;27) and the other one portion (25;27) being affixed to the inner sole portion (24), or both the heel counter and toe cap portion (25;27) being affixed to the inner sole portion (24) and an arch protector portion (26) connected to the inner sole portion (24), such as to form a unitary capsule to protect the sole, heel, arch and toes of a foot;
providing a footwear upper assembly;
providing an outer sole assembly;
placing said lining sock on a last;

installing said footwear padding assembly, protective insert, and footwear upper assembly on said lining sock, and affixing said outer sole assembly to said footwear upper assembly and said unitary protective insert member.

20. A method in accordance with claim 23, wherein the protective insert member (23) provided is in accordance with anyone of claims 12 to 18.

Patentansprüche

1. Schutzschuhwerksanordnung mit einer Außensohle (10, 55), einem an der Außensohle (10; 55) befestigten oder mit dieser einstückig verbundenen Schuhwerk-Oberteil (35; 40; 46; 55) und einem schützenden Einsatzstück (23), wobei die Außensohle (10; 55) und das Schuhwerk-Öberteil (35; 40; 46; 55) derart ausgebildet sind, daß sie das schützende Einsatzstück (23) zur Bildung einer Schutzschuhwerksanordnung einkapseln,
dadurch gekennzeichnet,
daß das schützende Einsatzstück (23) ein elastisches Innensohlenteil (24), ein Fersenaufsatzteil (25) und ein Schuhspitzen-Kappenteil (27) aufweist, wobei das Innensohlenteil (24) mit mindestens einem Teil des Fersenaufsatzteils (25) und des Schuhspitzen-Kappenteils (27) einstückig ausgebildet ist und das andere Teil (25; 27) am Innensohlenteil (24) befestigt ist oder wobei das Fersenaufsatzteil (25) und das Schuhspitzen-Kappenteil (27) am Innensohlenteil (24) befestigt sind, und ferner ein mit dem Innensohlenteil (24) verbundenes Spannschützerteil (26) aufweist, so daß insgesamt eine einheitliche Kapsel zum Schutz der Sohle, der Ferse und der Zehen eines Fußes gebildet wird.

2. Schutzschuhwerksanordnung nach Anspruch 1,
dadurch gekennzeichnet,
daß das Spannschützerteil (26) mit dem Innensohlenteil (24) einstückig ausgebildet ist.

3. Schutzschuhwerksanordnung nach Anspruch 1 oder 2,
dadurch gekennzeichnet,
daß das Innensohlenteil (24) elastisch ausgebildet ist, so daß eine komfortable Gangart und ein gewisser Eindringwiderstand möglich sind, und daß die anderen Teile (25; 26; 27) des schützenden Einsatzstücks (23) im Vergleich zum Innensohlenteil (24) verhältnismäßig fest ausgebildet sind, um einen Stoßschutz zu bieten.

4. Schutzschuhwerksanordnung nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet,
daß die Formen eines Teils oder beider Teile des Spannschützerteils (26) und des Schuhspitzen-Kappenteils (27) derart gespritzt sind, daß ihre Außenflächen von einem betreffenden oberen Mittelteil ablaufen.

5. Schutzschuhwerksanordnung nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet,
daß eine verschließende Wulst (22) vorgesehen ist, die aus einem einstückig mit der Außensohle (10; 55) ausgebildeten, aufrechten Flansch herausragt, und das am Schuhspitzen-Kappenteil (27), Fersenaufsatzteil (25) und Spannschützerteil (26) entsprechend geformte Ausnehmungen (36) zur Aufnahme der und Verriegelung mit der verschließenden Wulst (22) vorgesehen sind um das Einsatzstück (23) an der Außensohle (10; 55) zu befestigen.

6. Schutzschuhwerksanordnung nach einem dar vorhergehenden Ansprüche, dadurch gekennzeichnet, daß eine Polsterfüllung (34; 41; 47) innen am schützenden Einsatzstück (23) angeordnet ist.

7. Schutzschuhwerksanordnung nach Anspruch 6,
dadurch gekennzeichnet,
daß sie ferner ein innen am schützenden Einsatzstück (23) angeordnetes Fußbett (42) mit einer derart wählbaren Tiefe und Form aufweist, daß es gestützt wird und/oder orthpädisch einstellbar ist.

8. Schutzschuhwerksanordnung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Außensohle (10; 55) und das Schuhwerk-Oberteil (34; 40; 46; 55) als einstückiges Spritzteil ausgebildet sind.

9. Schutzschuhwerksanordnung nach einem der Ansprüche 1 bis 7,
dadurch gekennzeichnet,
daß das Schuhwerk-Oberteil (34: 40; 46; 55) aus einem Material hergestellt ist, das aus der Gruppe gewählt ist, die aus Leder, vitonbeschichtetem, schlagsicheren Aramidfaserstoff, gortexverstärktem Aramidfaserstoff und PVC besteht.

10. Schutzschuhwerksanordnung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das Innensohlenteil (24) und das Fersenaufsatzteil (25) aus Nylon gespritzt sind.

11. Schutzschuhwerksanordnung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das Spannschützerteil (26) und das schützende Schuhspitzen-Kappenteil (27) aus einem stoßfesten Polykarbonat gespritzt sind.

12. Schützendes Einsatzstück (23) für ein Schuhwerk mit einem Schuhspitzen-Kappenteil (27), einem

Innensohlenteil (24), einem Fersenaufsatzteil (25) und einem Spannschützerteil (26),
dadurch gekennzeichnet,
daß das Innensohlenteil (24) mit dem Schuhspitzen-Kappenteil (27) und dem Fersenaufsatzteil (25) verbunden ist, daß das Spannschützerteil (26) mit dem Innensohlenteil (24) verbunden ist, daß das Einsatzstück (23) ein einstückiges Gebilde aus den genannten Einzelteilen (24; 25; 26; 27) ist und daß das Einsatzstück (23) getrennt von den anderen Komponenten der Schuhwerksanordnung vorgesehen ist und eine unabhängige Schutzkapsel für die Sohle, die Ferse, den Spann und die Zehen eines Fußes bidet, wobei des Einsetzstück (23) derart ausgebildet ist, daß es in einen Schuhwerksgegenstand eingesetzt werden kann, der eine Außensohle (10; 55) und ein Schuhwerk-Oberteil (35: 40; 46; 55) aufweist, so daß eine Schutzschuhwerksanordnung entsteht.

13. Schützendes Einsatzstück für ein Schuhwerk nach Anspruch 12,
dadurch gekennzeichnet,
daß das Spannschützerteil (26) mit dem Innensohlenteil (24) einstückig ausgebildet ist.

14. Schützendes Einsatzstück für ein Schuhwerk nach Anspruch 12 oder 13,
dadurch gekennzeichnet,
daß das Innensohlenteil (24) elastisch ausgebildet ist, so daß eine komfortable Gangart und ein gewisser Eindringwiderstand möglich sind, und daß die anderen Teile (25; 26; 27) des schützenden Einsatzstücks (23) im Vergleich zum Innensohlenteil (24) verhältnismäßig fest ausgebildet sind, um einen Stoßschutz zu bieten.

15. Schützendes Einsatzstück für ein Schuhwerk nach Anspruch 14,
dadurch gekennzeichnet,
daß die Formen eines Teils oder beider Teile das Spannschützerteils (26) und des Schuhspitzen-Kappenteils (27) derart gespritzt sind, daß ihre Außenflächen von einem betreffenden oberen Mittelteil ablaufen,

16. Schützendes Einsatzstück für ein Schuhwerk nach einem der Ansprüche 12 bis 15,
dadurch gekennzeichnet,
daß das Innensohlenteil (24) und das Fersenaufsatzteil (25) aus Nylon gespritzt sind.

17. Schützendes Einsatzstück für ein Schuhwerk nach einem der Ansprüche 12 bis 16,
dadurch gekennzeichnet,
daß es Ausnehmungen (36) zur Aufnehme einer und Verriegelung mit einer verschließenden Wulst (22) aufweist, die aus einem mit einer Außensohle (10; 55) einstückig ausgebildeten, aufrechten Flansch herausragt, und daß diese Ausnehmungen auf einer Außensohle vorgesehen sind, die am schützenden Einsatzstück befestigt werden soll.

18. Schützendes Einsatzstück für ein Schuhwerk nach einem der Ansprüche 12 bis 17,
dadurch gekennzeichnet,
daß das Spannschützerteil (26) und das schützende Schuhspitzen-Kappenteil (27) aus einem stoßfesten Polykarbonat gespritzt sind.

19. Verfahren zur Herstellung von schützendem Schuhwerk mit folgenden Verfahrensschritten:

- eine vollständige Schuhwerkshülle wird geschaffen,
- eine Schuhwerkspolsteranodnung wird geschaffen,
- ein einheitliches, schützendes Einsatzstück wird geschaffen, das ein elastisches Innensohleteil (24), ein Fersenaufsatzteil (25) und ein Schuhspitzen-Kappenteil (27) aufweist, wobei das Innensohlenteil (24) mit mindestens einem Teil des Fersenaufsatzteils (25) und des Schuhspitzen-Kappenteils (27) einstückig ausgebildet ist und das andere Teil (25; 27) am Innensohlenteil (24) befestigt ist oder wobei das Fersenaufsatzteil (25) und das Schuhspitzen-Kappenteil (27) am Innensohlenteil (24) befestigt sind, und ferner ein mit dem Innensohlenteil (24) verbundenes Spannschützerteil (26) aufweist, so daß insgesamt eine einheitliche Kapsel zum Schutz der Sohle, der Ferse und der Zehen eines Fußes gebildet wird,
- ein Schuhwerk-Oberteil-Anordnung wird geschaffen,
- eine Außensohlenanordnung wird geschaffen,
- die Schuhwerkshülle wird auf einen Schuhleisten gespannt,
- die Schuhwerkspolsteranordnung, das schützende Einsatzstück und die Schuhwerk-Oberteil-Anordnung wird in die Schuhwerkshülle eingesetzt, und die Außensohlenanordnung wird an der Schuhwerk-Oberteil-Anordnung und dem einheitlichen, schützenden Einsatzstück befestigt.

20. Verehren nach Anspruch 19,
dadurch gekennzeichnet,
daß das schützende Einsatzstück (23) nach einem der Ansprüche 12 bis 18 ausgebildet ist.

Revendications

1. Ensemble de chaussure de protection ayant une semelle extérieure (10; 55), une tige de chaussure (35; 40; 46; 55) fixé à la semelle extérieure (10; 55)

ou faisant corps avec celle-ci, et un élément rapporté de protection (23), la semelle extérieure (10; 55) et la tige de chaussure (35; 40; 46; 55) étant agencés pour encapsuler l'élément rapporté de protection (23) pour former un ensemble de chaussure de protection, caractérisé par le fait que l'élément rapporté de protection (23) comprend une partie semelle intérieure souple (24), une partie contrefort de talon (25), une partie bout dur (27), la partie semelle intérieure (24) faisant corps avec au moins l'une parmi la partie contrefort de talon (25) et la partie bout dur (27) et l'autre de ces parties (25; 27) étant fixée à la partie semelle intérieure (24), ou la partie contrefort de talon (25) et la partie bout dur (27) étant toutes les deux fixées à la partie semelle intérieure (24), et une partie protectrice de la voûte plantaire (26) jointe à la partie semelle intérieure (24), de façon à former une capsule unitaire pour la protection de la plante, du talon et des orteils d'un pied.

2. Ensemble de chaussure de protection selon la revendication 1, caractérisé par le fait que la partie protectrice de la voûte plantaire (26) fait corps avec la partie semelle intérieure (24).

3. Ensemble de chaussure de protection selon l'une des revendications 1 et 2, caractérisé par le fait que la partie semelle intérieure (24) est souple pour permettre une démarche confortable et une résistance à la pénétration, tandis que les autres parties (25; 26; 27) de l'élément rapporté de protection (23) sont relativement rigides comparativement à la partie semelle intérieure (24) pour fournir une protection contre les chocs.

4. Ensemble de chaussure de protection selon l'une des revendications précédentes, caractérisé par le fait que les formes de la partie protectrice de la voûte plantaire (26) ou de la partie bout dur (27) ou des deux sont moulées de façon que leurs surfaces extérieures fuient d'un centre supérieur respectif.

5. Ensemble de chaussure de protection selon l'une des revendications précédentes, caractérisé par le fait qu'il est prévu un cordon de blocage (22) qui fait saillie d'une bride montante faisant corps avec la semelle extérieure (10; 55), et sur la partie bout dur (27), la partie contrefort de talon (25) et la partie protectrice de la voûte plantaire (26) des creux de forme correspondante (36) sont prévus pour recevoir le cordon de blocage (22) et se verrouiller à celui-ci pour fixer l'élément rapporté (23) à la semelle extérieure (10; 55).

6. Ensemble de chaussure de protection selon l'une des revendications précédentes, comprenant en outre une garniture de rembourrage (34; 41; 47) placée à l'intérieur de l'élément rapporté de protection (23).

7. Ensemble de chaussure de protection selon la revendication 6, comprenant en outre une assise de pied (42) d'une épaisseur et/ou d'une forme pouvant être choisies pour la qualité de support et/ou l'ajustement orthotique, à l'intérieur de l'élément rapporté de protection (23).

8. Ensemble de chaussure de protection selon l'une des revendications précédentes, dans lequel la semelle extérieure (10; 55) et la tige de chaussure (35; 40; 46; 55) sont prévus sous forme de moulage d'une seule pièce (55).

9. Ensemble de chaussure de protection selon l'une des revendications 1 à 7, caractérisé par le fait que la tige de chaussure (35; 40; 46; 55) est fait d'une matière choisie dans le groupe constitué du cuir, du textile de fibres d'aramide de qualité balistique revêtu de viton, du textile de fibres d'aramide doublé de goretex et du PVC.

10. Ensemble de chaussure de protection selon l'une des revendications précédentes, dans lequel la partie semelle intérieure (24) et la partie contrefort de talon (25) sont moulées en nylon.

11. Ensemble de chaussure de protection selon l'une des revendications précédentes, caractérisé par le fait que la partie protectrice de la voûte plantaire (26) et la partie bout dur protectrice (27) sont moulées en polycarbonate résistant au choc.

12. Elément rapporté de chaussure de protection (23) comprenant une partie bout dur (27), une partie semelle intérieure (24), une partie contrefort de talon (25) et une partie protectrice de la voûte plantaire (26), caractérisé par le fait que la partie semelle intérieure (24) est jointe à la partie bout dur (27) et à la partie contrefort de talon (25), la partie protectrice de la voûte plantaire est jointe à la partie semelle intérieure (24), l'élément rapporté (23) étant un élément formé d'une seule pièce ou un élément unitaire formé par assemblage desdites parties discrètes (24; 25; 26; 27), et qui est prévu séparément d'autres éléments d'un ensemble de chaussure pour former une capsule protectrice indépendante pour la plante, le talon, la voûte plantaire et les orteils d'un pied, l'élément rapporté (23) étant propre à être placé dans une chaussure comprenant une semelle extérieure (10; 55) et une tige (35; 40; 46; 55) pour fournir un ensemble de chaussure de protection.

13. Elément rapporté de chaussure de protection selon la revendication 12, caractérisé par le fait que la

partie protectrice de la voûte plantaire (26) fait corps avec la partie semelle intérieure (24).

14. Elément rapporté de chaussure de protection selon l'une des revendications 12 et 13, caractérisé par le fait que la partie semelle intérieure (24) est souple pour permettre une démarche confortable tout en offrant une résistance à la pénétration, et les autres parties (25; 26; 27) de l'élément rapporté de protection (23) sont relativement rigides comparativement à la partie semelle intérieure (24) pour offrir une protection contre les chocs.

15. Elément rapporté de protection selon la revendication 14, dans lequel les formes de la partie protectrice de la voûte plantaire (26) ou de la partie bout dur (27) ou des deux sont moulées de façon que leurs surfaces extérieures fuient d'un centre supérieur respectif.

16. Elément rapporté de protection selon l'une des revendications 12 à 15, dans lequel la partie semelle intérieure (24) et la partie contrefort de talon (25) sont moulées en nylon.

17. Elément rapporté de chaussure de protection (23) selon l'une des revendications 12 à 16, dans lequel des creux (36) sont prévus pour recevoir un cordon de blocage (22) qui fait saillie d'une bride montante faisant corps avec une semelle extérieure (10; 55) et se verrouiller à celui-ci, sur une semelle extérieure destinée à être fixée à l'élément rapporté de protection.

18. Elément rapporté de protection selon l'une des revendications 12 à 17, caractérisé par le fait que la partie protectrice de la voûte plantaire (26) et la partie bout dur (27) sont moulées en polycarbonate résistant au choc.

19. Procédé de fabrication de chaussure de protection, comprenant les étapes dans lesquelles:

on prévoit une chaussette de chemisage de chaussure entière;
on prévoit un ensemble de rembourrage de chaussure;
on prévoit un élément rapporté de protection unitaire qui comprend une partie semelle intérieure souple (24), une partie contrefort de talon protectrice (25), une partie bout dur (27), la partie semelle intérieure souple (24) faisant corps avec au moins l'une de la partie contrefort de talon (25) et de la partie bout dur (27) et l'autre de ces parties (25; 27) étant fixée à la partie semelle intérieure (24), ou la partie contrefort de talon (25) et la partie bout dur (27) étant toutes les deux fixées à la partie semelle intérieure (24), et une partie protectrice de la voûte plantaire (26) jointe à la partie semelle intérieure (24), de façon à former une capsule unitaire pour la protection de la plante, du talon, de la voûte plantaire et des orteils d'un pied;
on prévoit un ensemble de tige de chaussure;
on prévoit un ensemble de semelle extérieure;
on place la chaussette de chemisage sur une forme;
on installe l'ensemble de rembourrage de chaussure, l'élément rapporté de protection et l'ensemble de tige de chaussure sur la chaussette de chemisage, et on fixe ledit ensemble de semelle extérieure audit ensemble de tige de chaussure et audit élément rapporté de protection unitaire.

20. Procédé selon la revendication 23, dans lequel l'élément rapporté de protection (23) prévu est conforme à l'une des revendications 12 à 18.

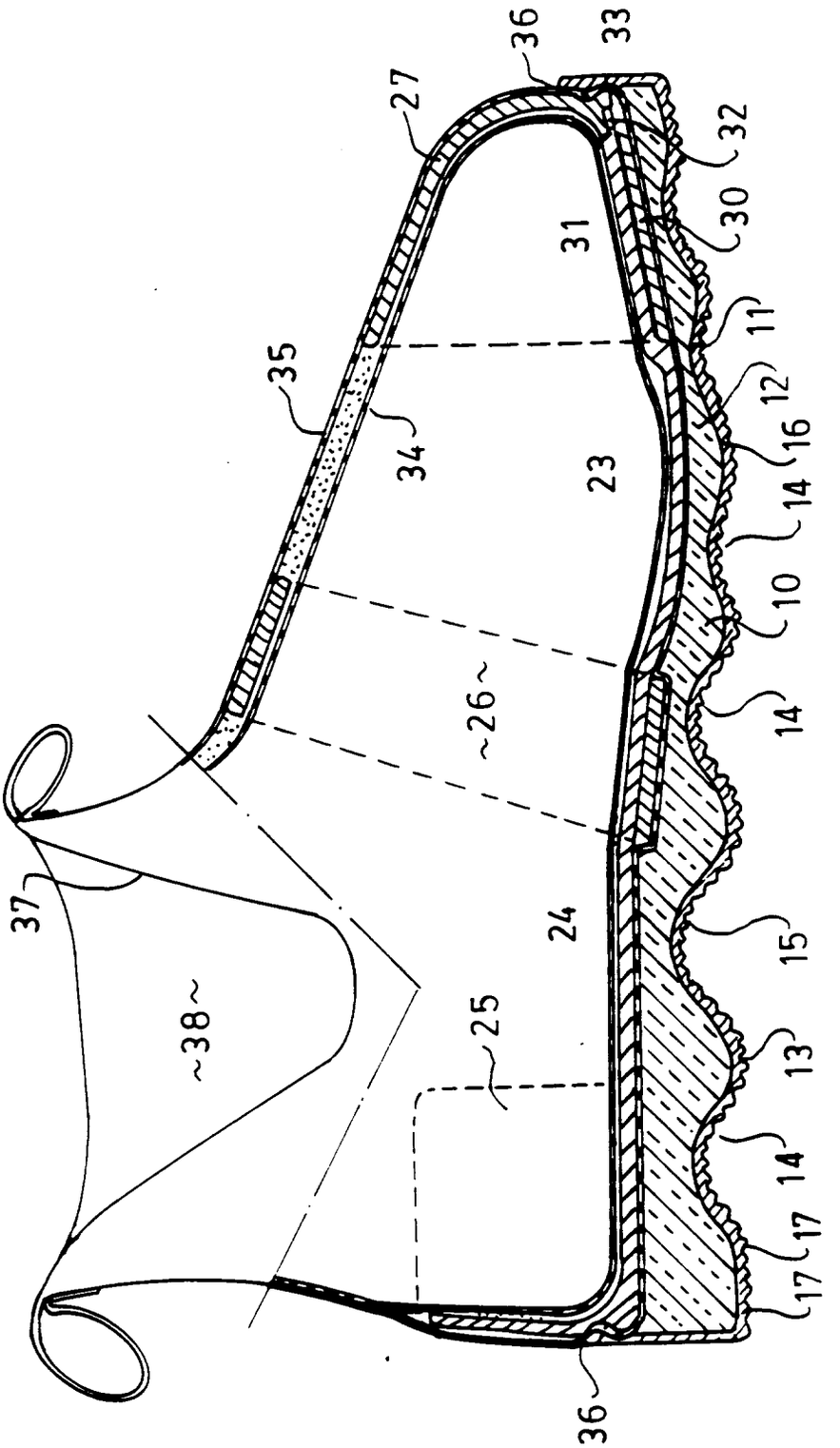
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FIG. 1

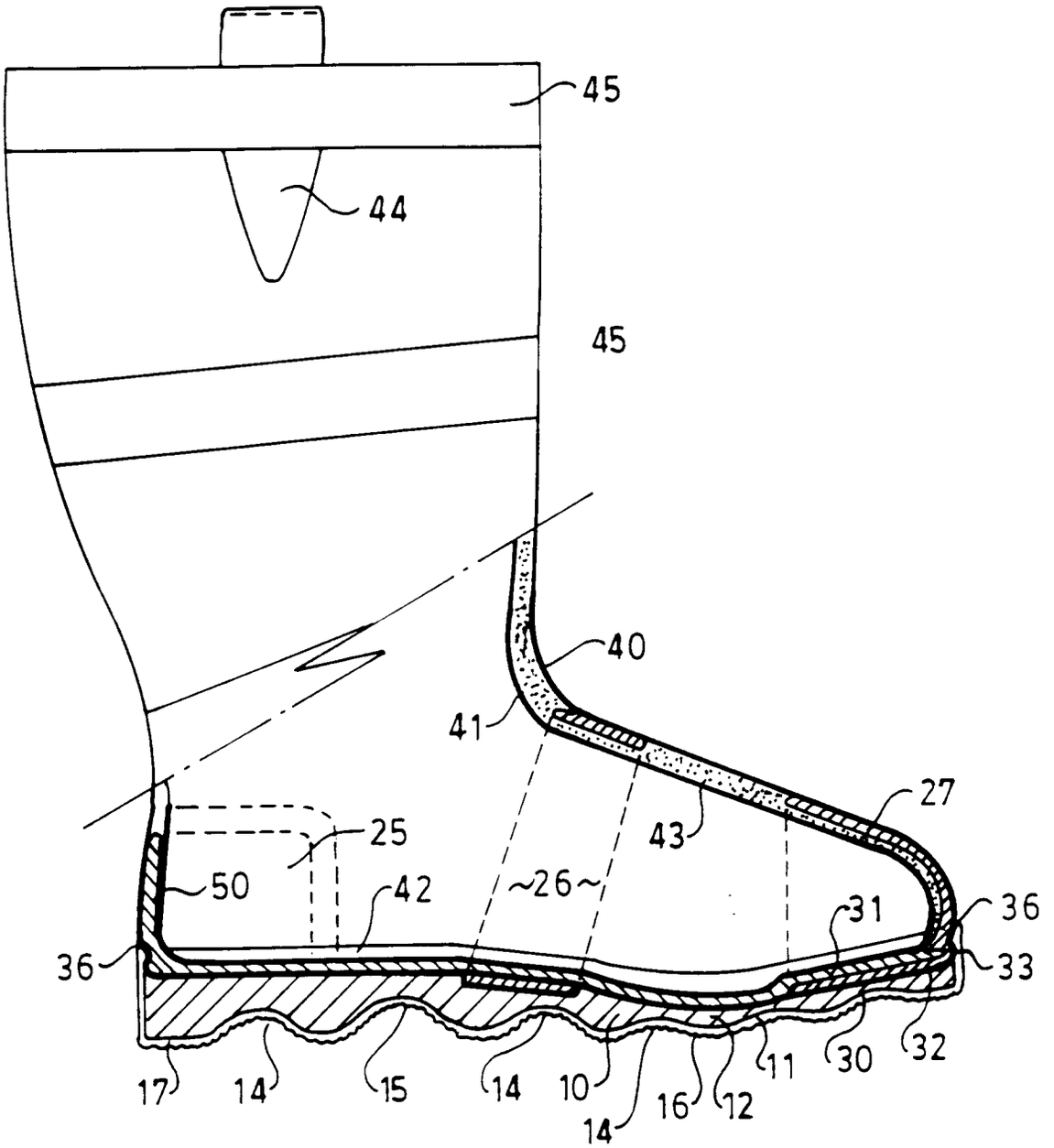
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FIG. 2

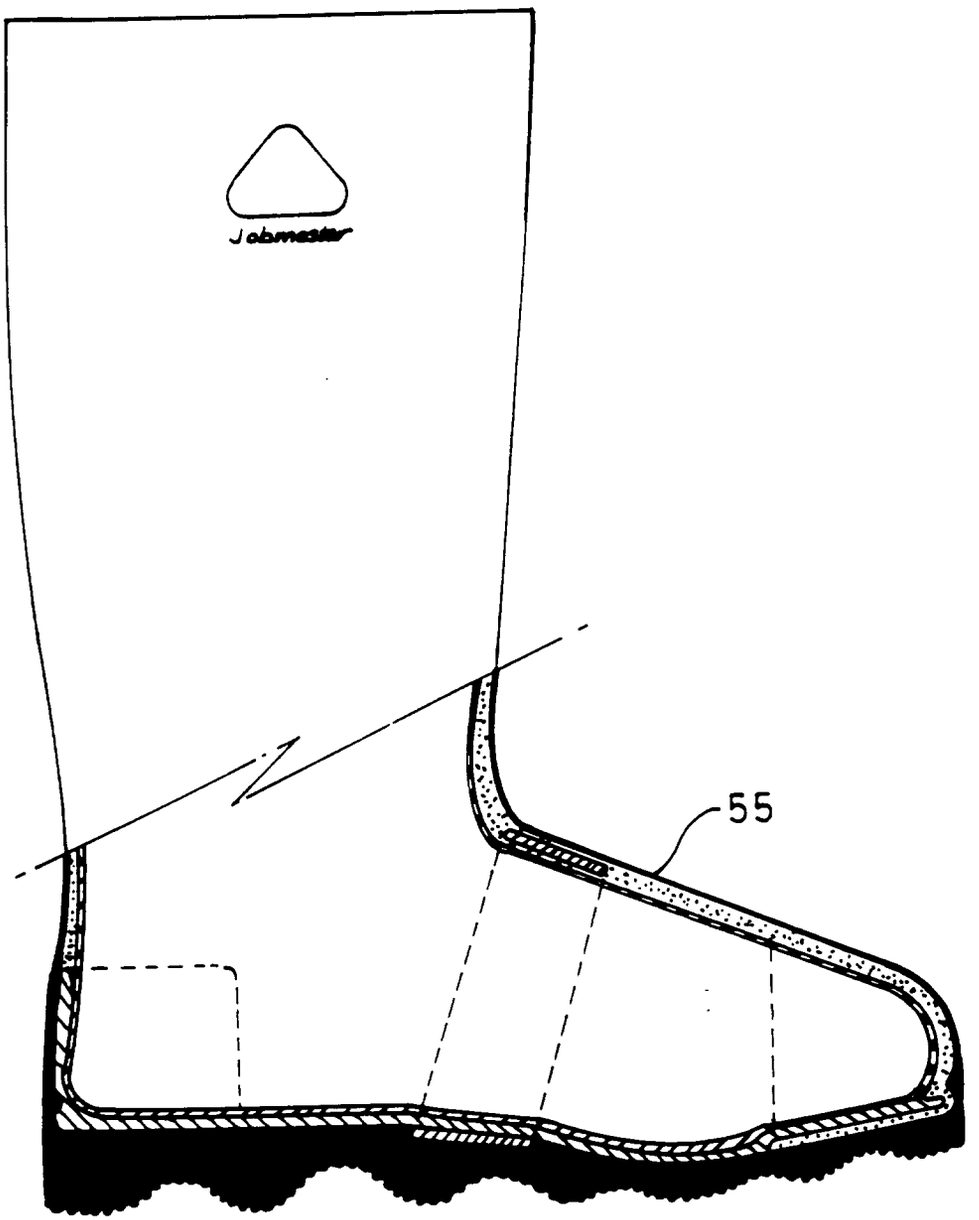
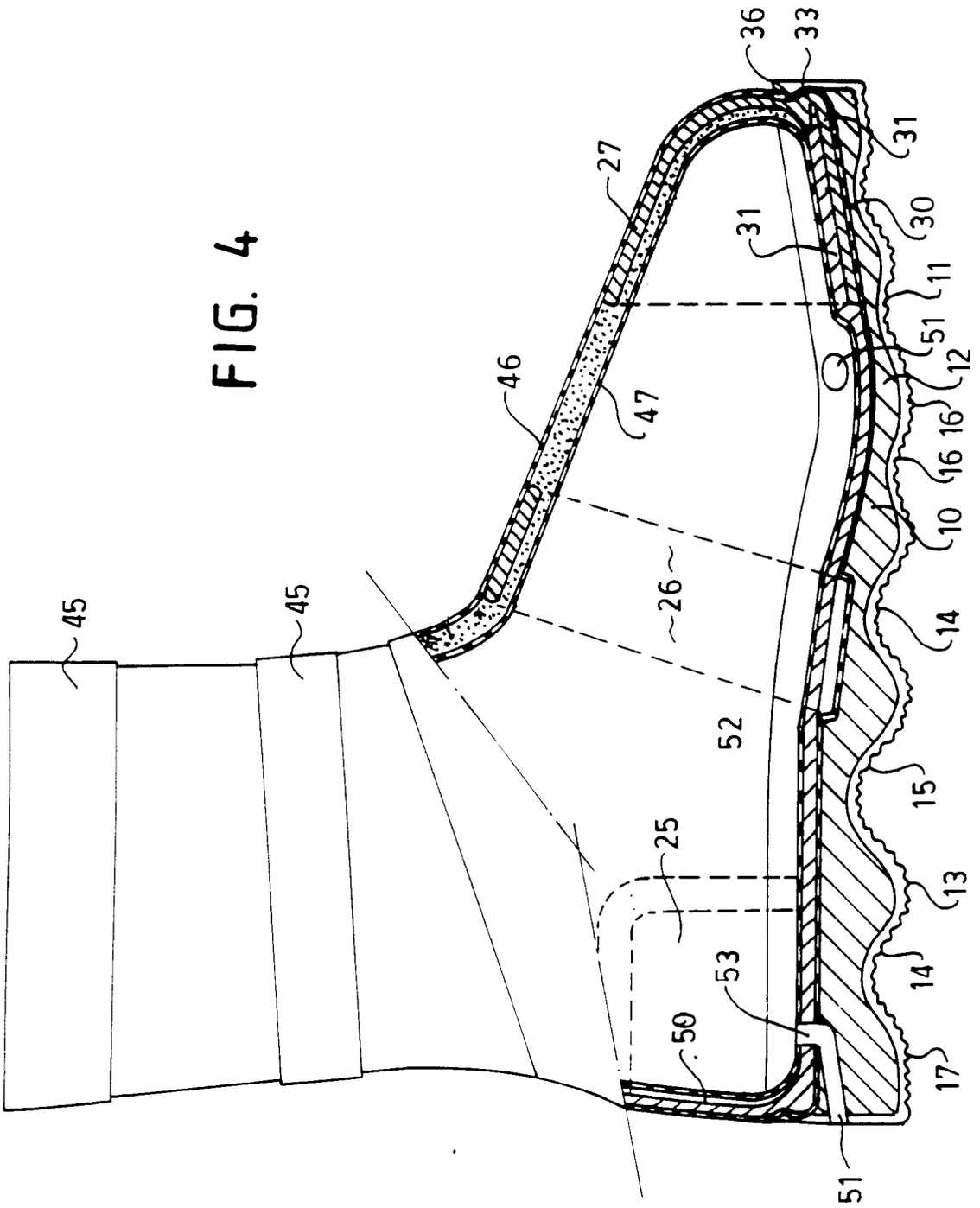


FIG. 3

FIG. 4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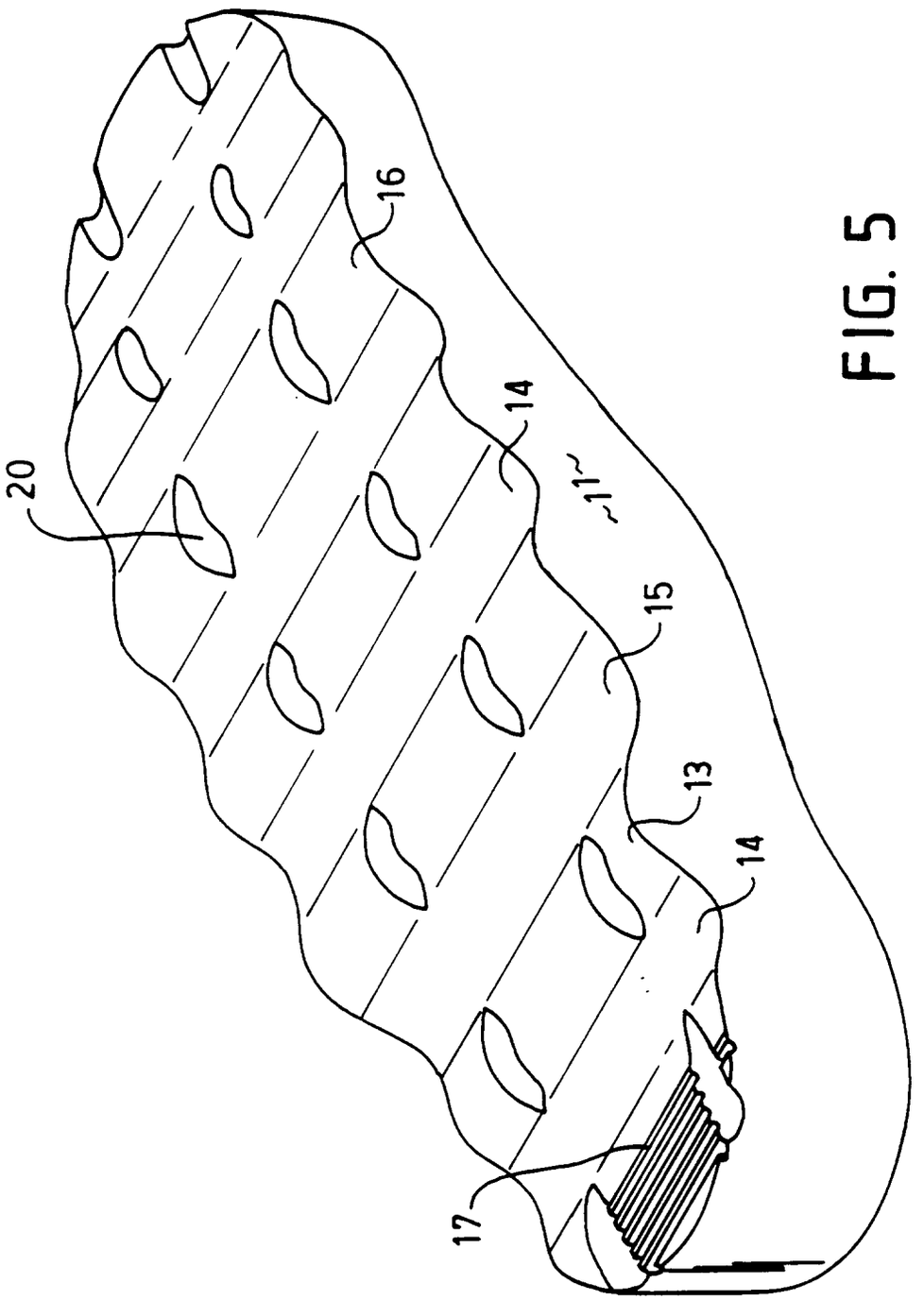

FIG. 5