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**Geer et al.**

(54) **MOLDED INSOLE FOR WELTED FOOTWEAR**

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(60) Provisional application No. 61/121,072, filed on Dec. 9, 2008.

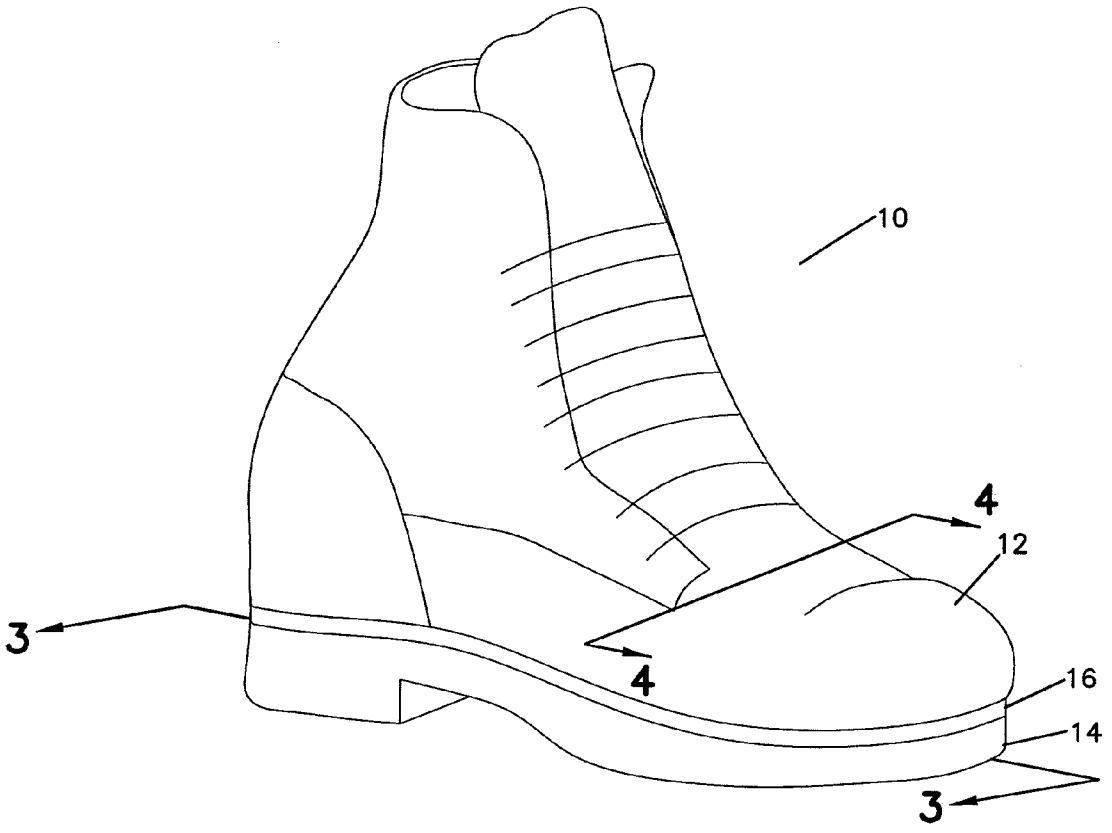
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(57) **ABSTRACT**

The present disclosure provides an improved welted footwear and related method of manufacture. The welted footwear and related method of manufacturing is directed to a molded foot support platform that provides a number of advantageous features.



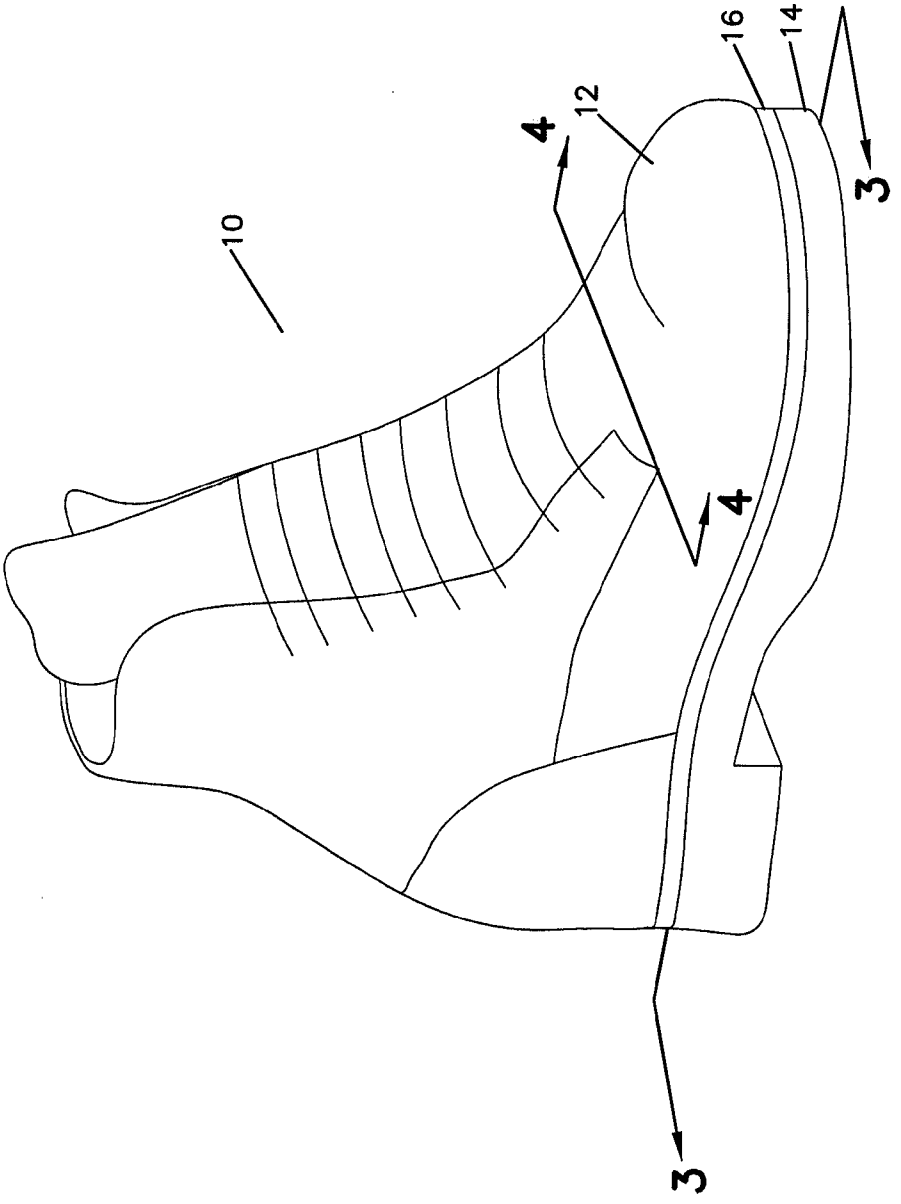
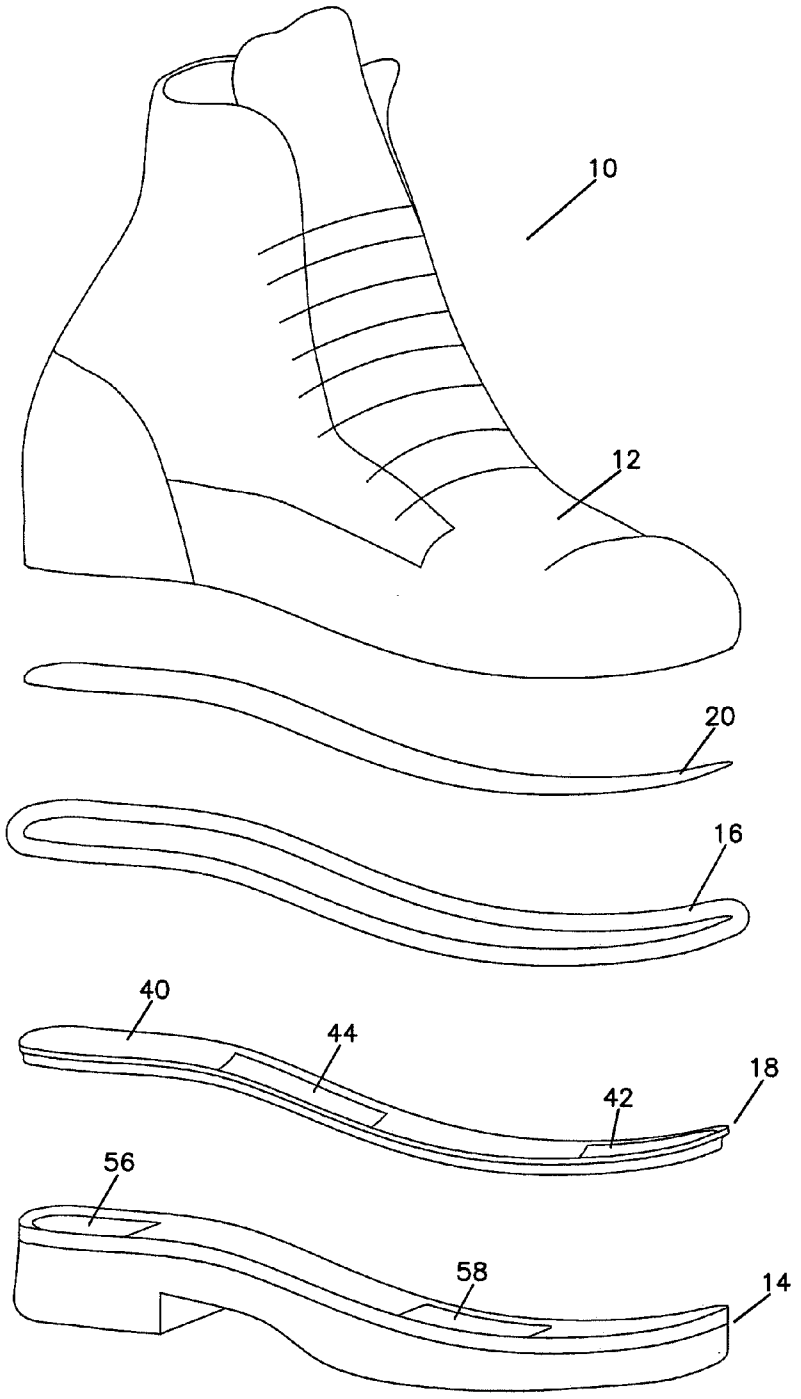



FIG. 1

FIG. 2



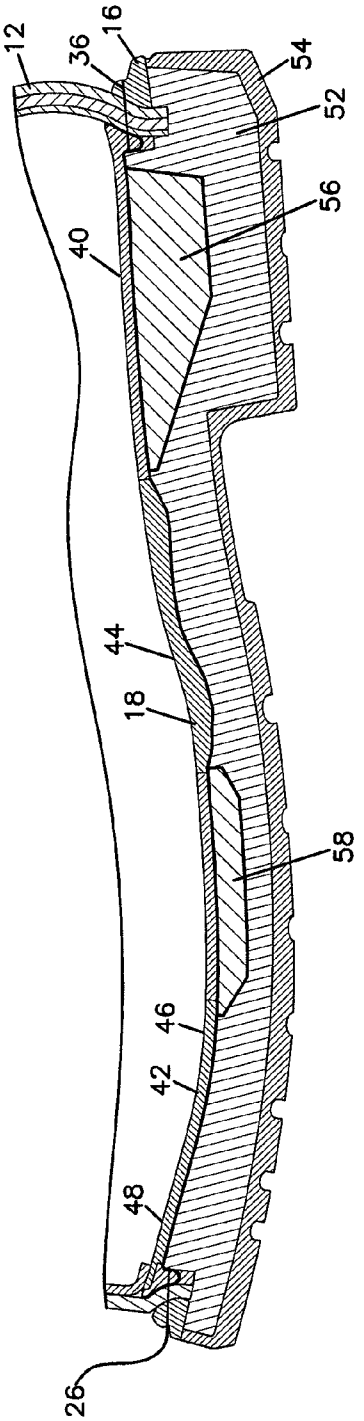



FIG. 3

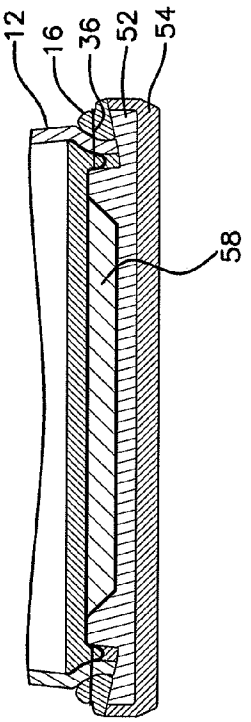



FIG. 4

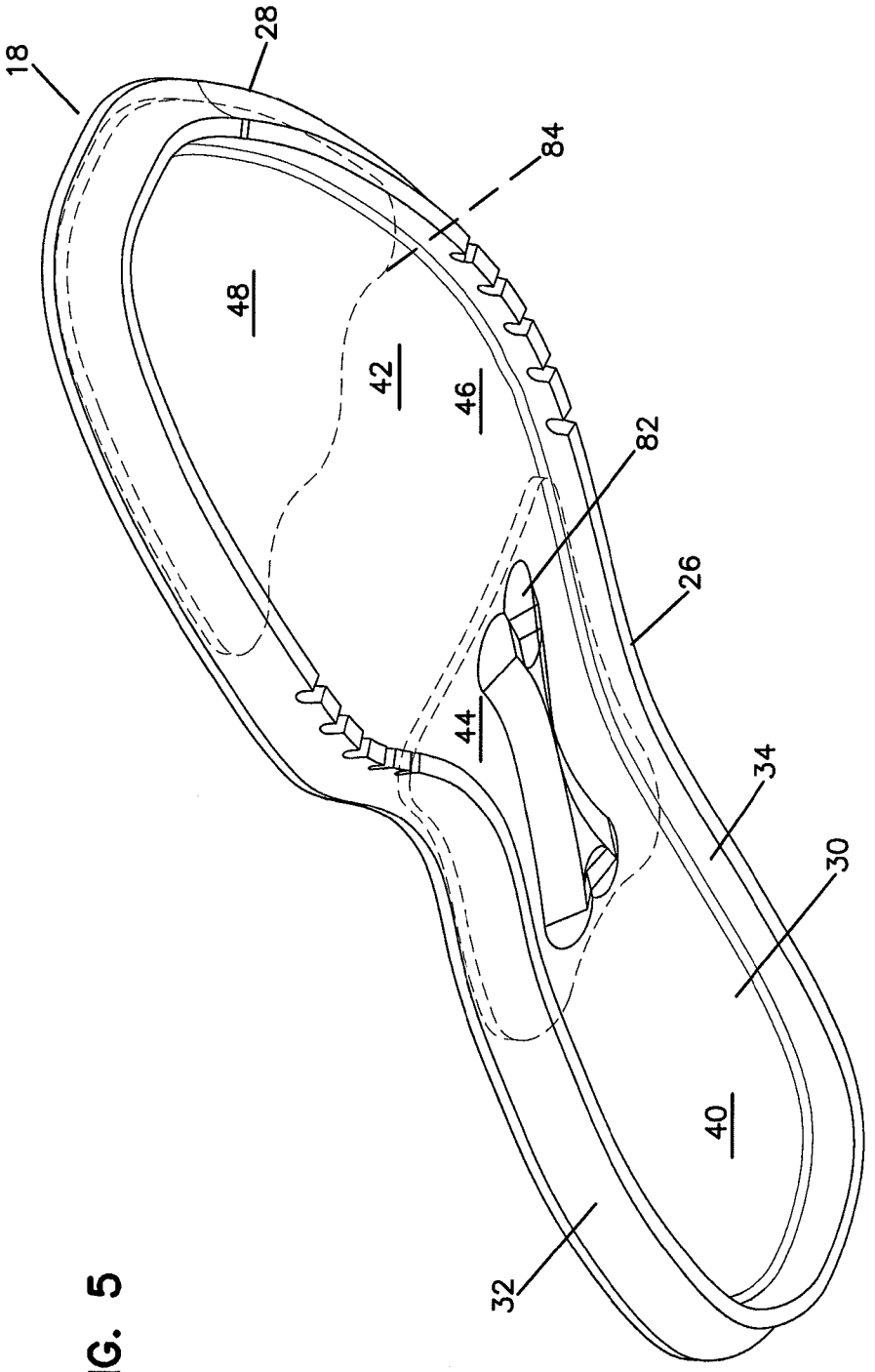



FIG. 5

FIG. 6

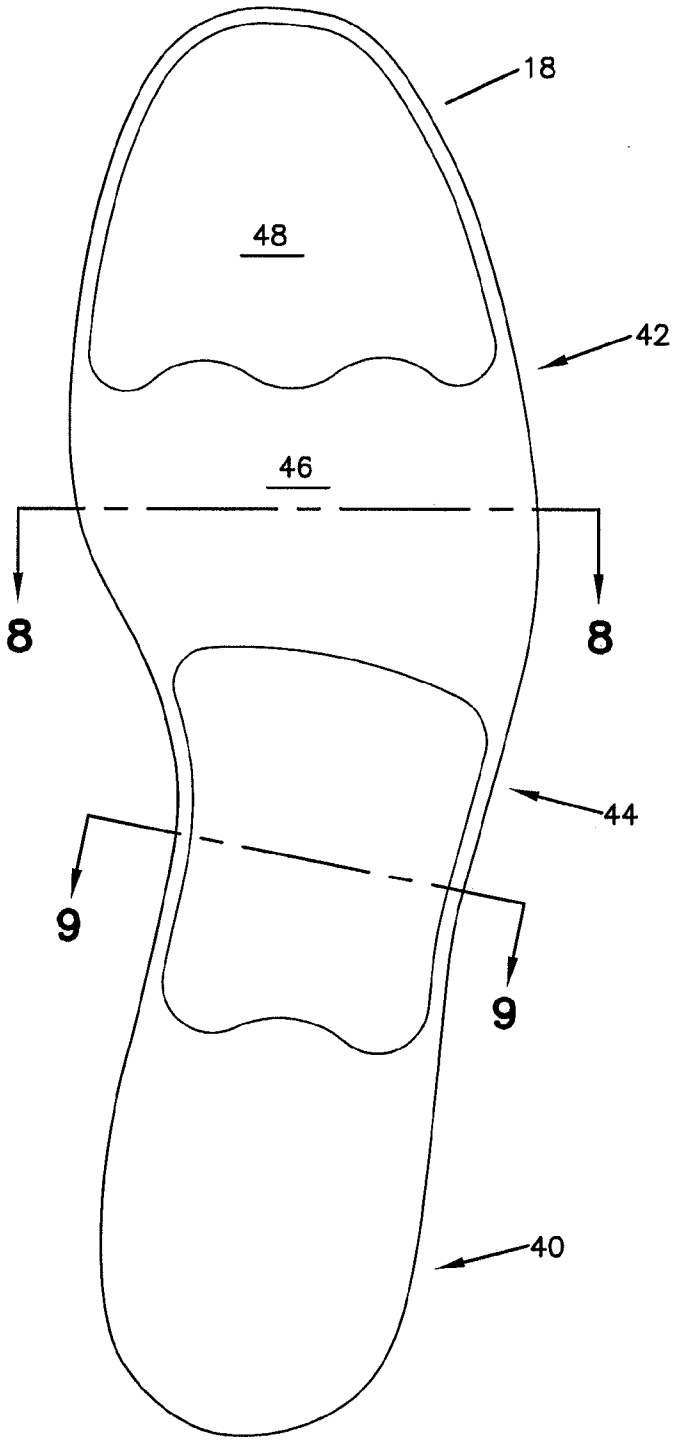


FIG. 7

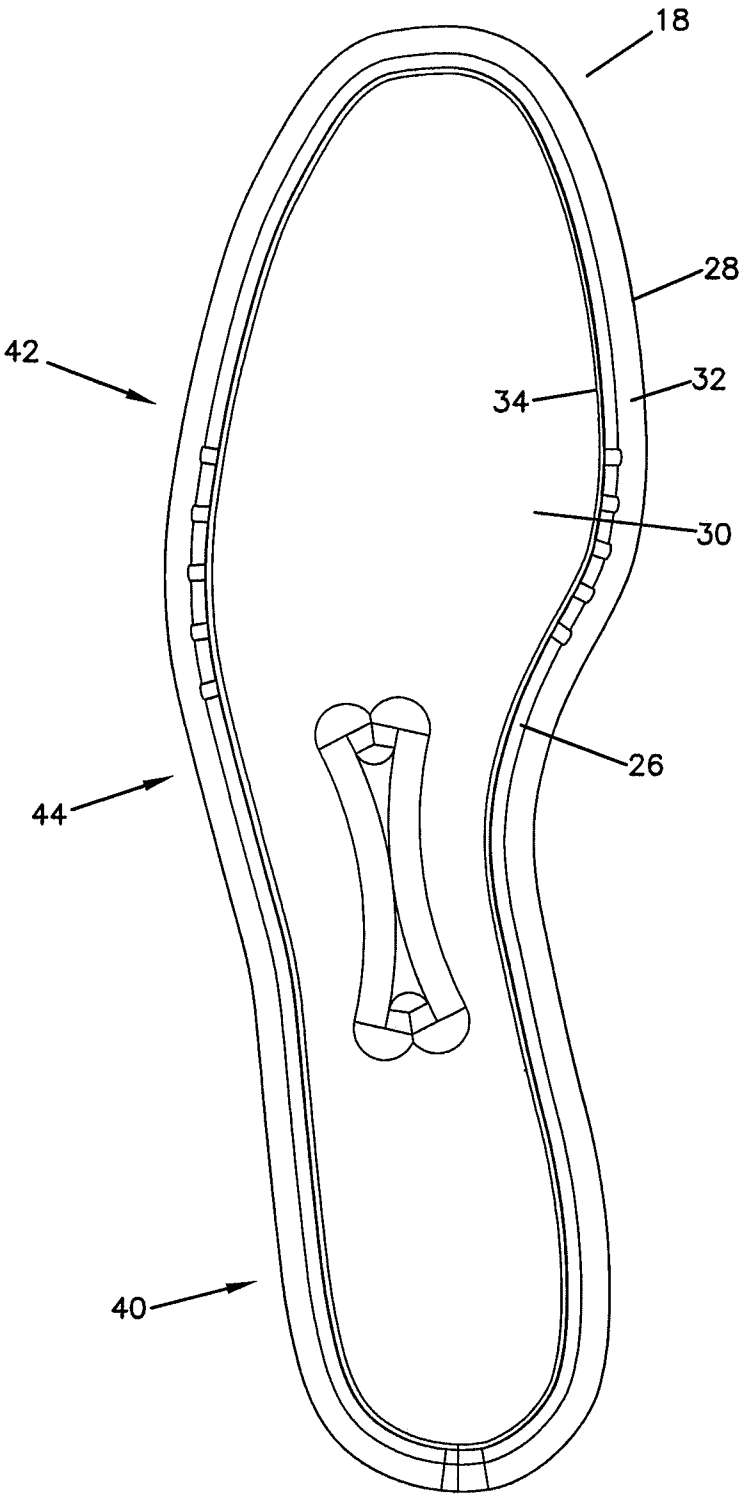


FIG. 8

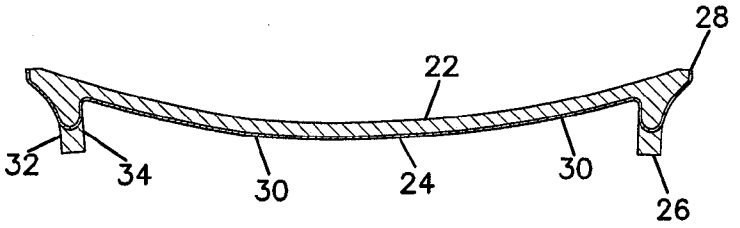



FIG. 9

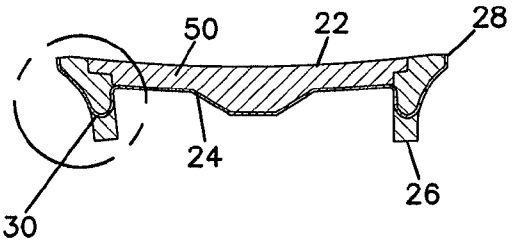
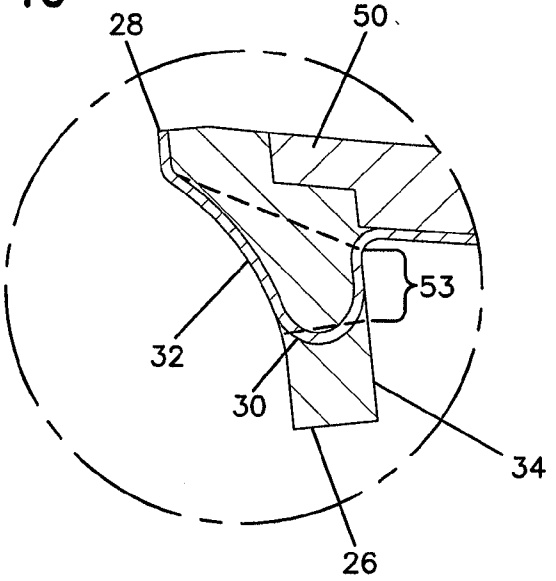



FIG. 10



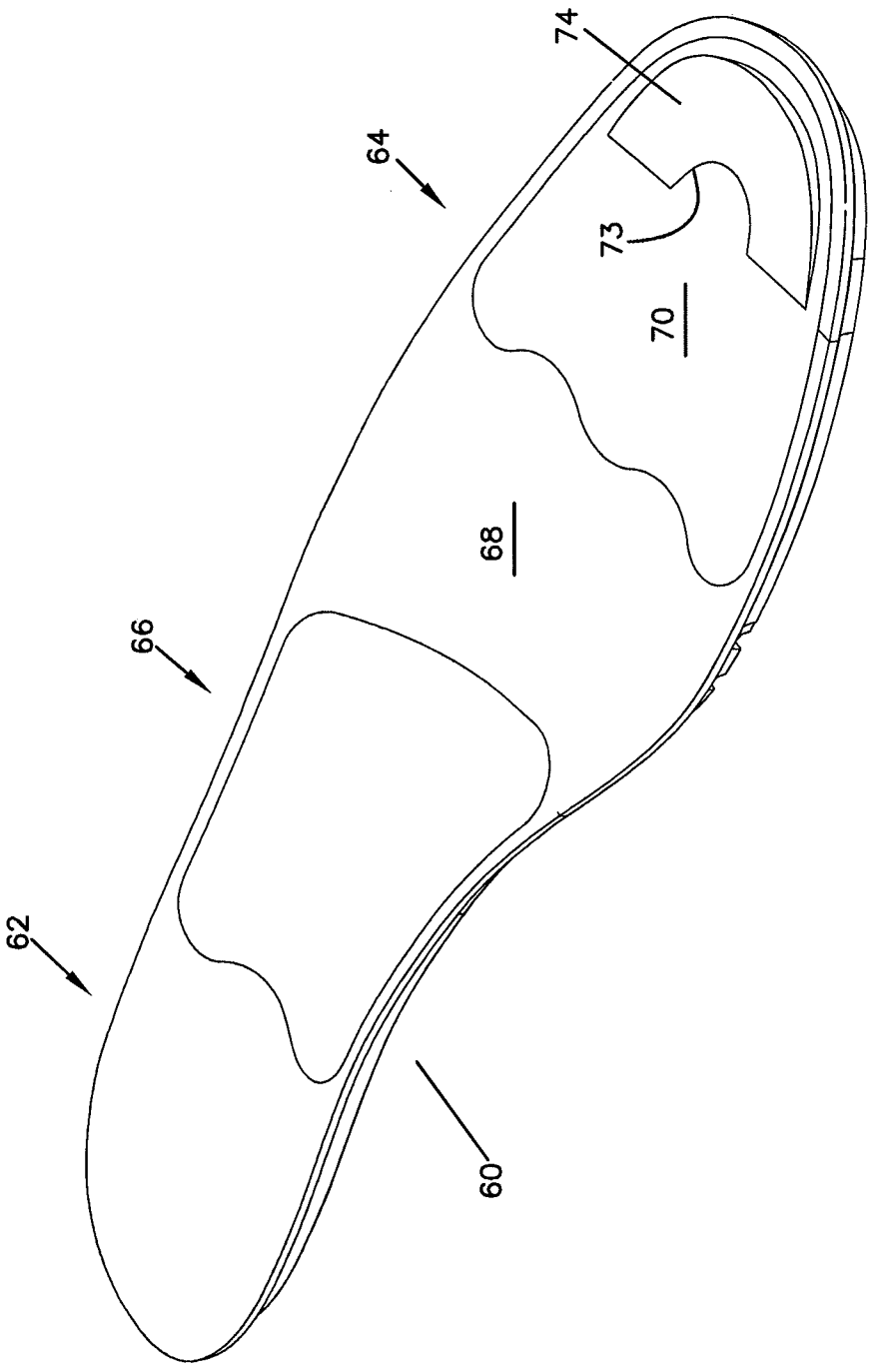



FIG. 11

FIG. 12

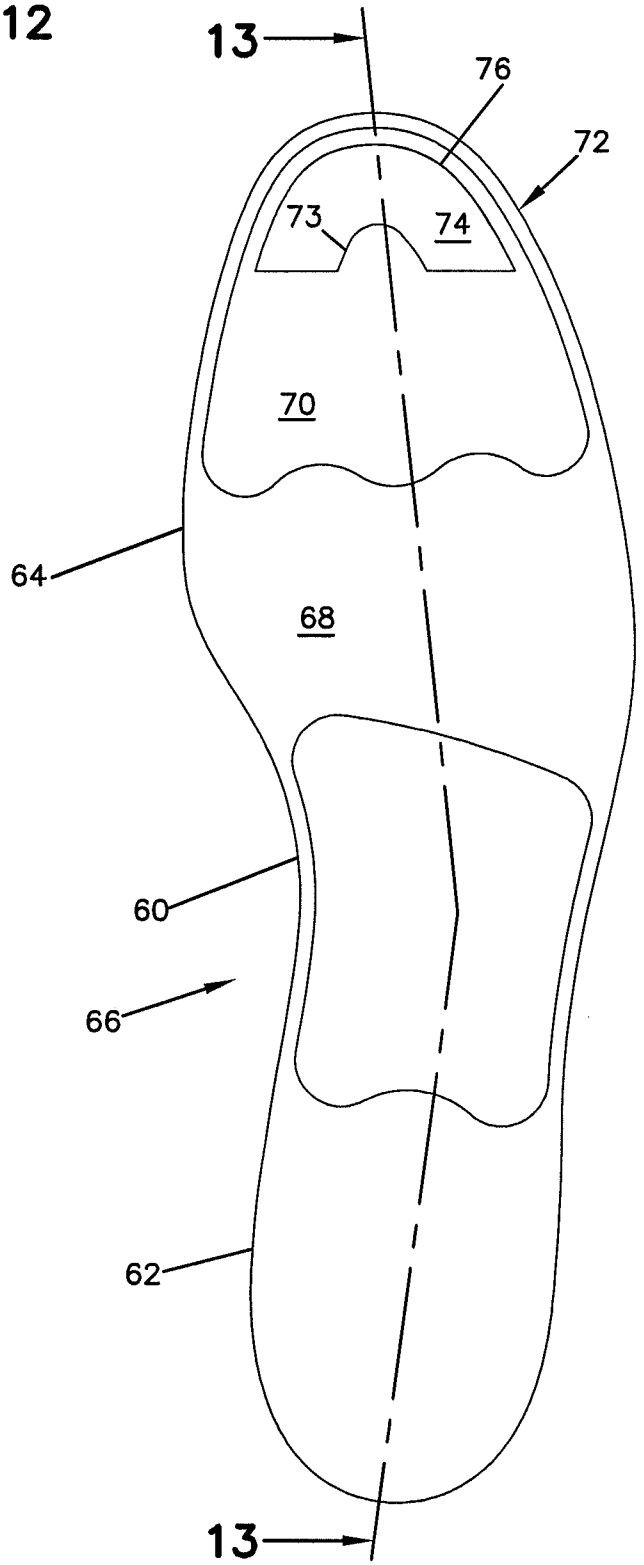
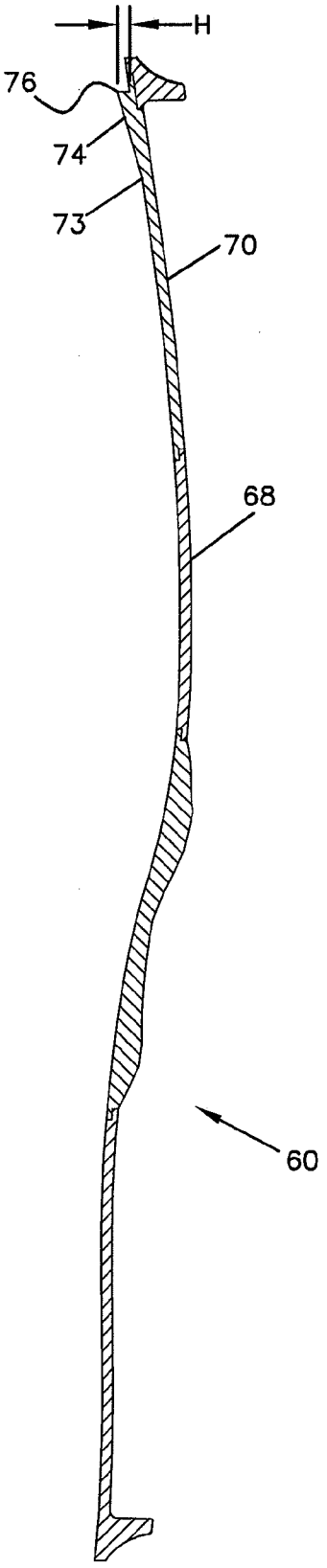


FIG. 13



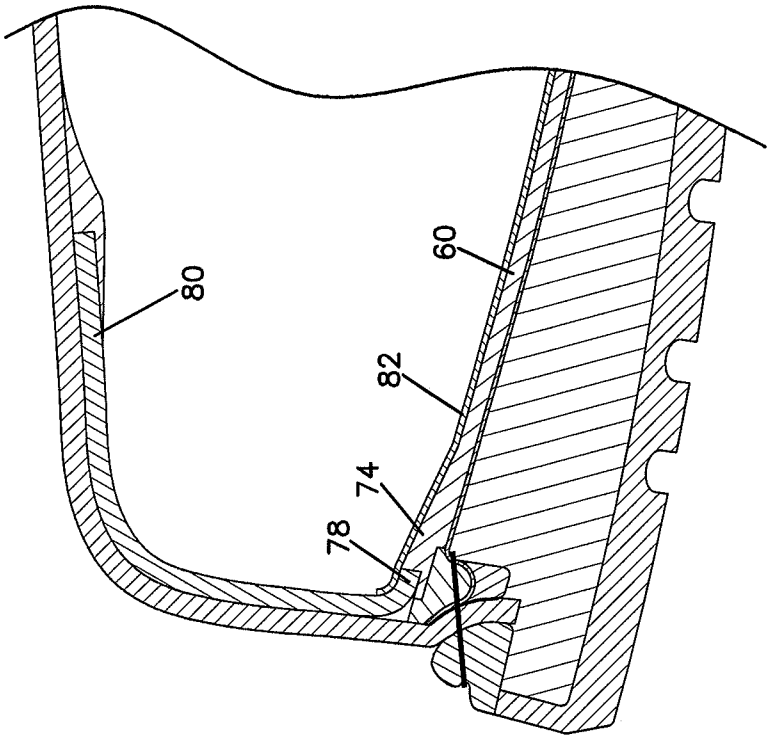



FIG. 14

FIG. 15A

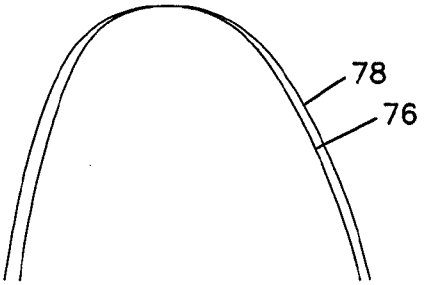



FIG. 15B

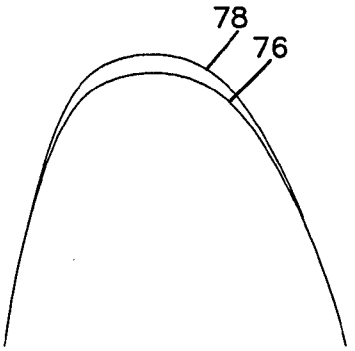
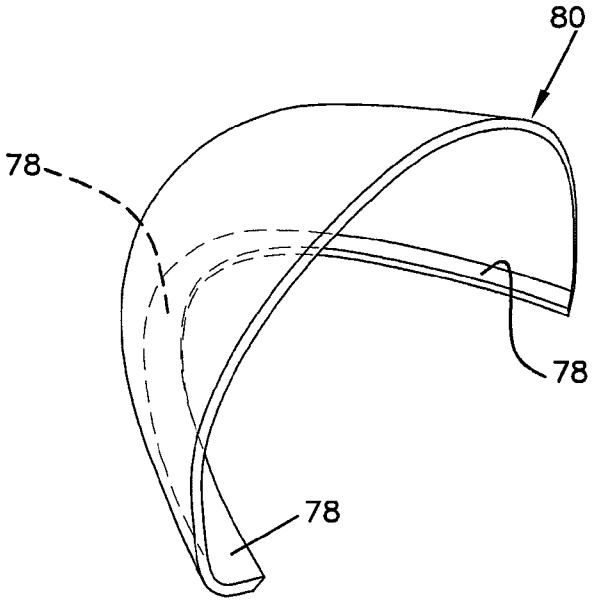



FIG. 16



# MOLDED INSOLE FOR WELTED FOOTWEAR

## RELATED APPLICATIONS

**[0001]** This application is a continuation of U.S. Ser. No. 12/634,088 filed Dec. 9, 2009, which claims the benefit of provisional application No. 61/121,072 filed on Dec. 9, 2008, now expired, the disclosures of which are hereby incorporated by reference in their entireties.

## TECHNICAL FIELD

**[0002]** The present disclosure provides welted footwear and a method of manufacturing the same.

## BACKGROUND

**[0003]** Footwear having welted constructions are well known. For example, see U.S. Pat. No. 1,656,564 titled Welting and Method of Making the Same, U.S. Pat. No. 2,754,600 titled Shoe Welting, and U.S. Pat. No. 6,802,138 titled Cushioning System for Footwear and Related Method of Manufacture. Though traditional welted type constructions are known and have been improved upon, further improvements in welted footwear are desirable.

## SUMMARY

**[0004]** The present disclosure provides an improved welted footwear and related method of manufacture. The welted footwear and related method of manufacturing is directed to a foot support platform that provides a number of advantageous features. Toe cap features are also provided.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0005]** FIG. **1** is a perspective view of an article of footwear according to an embodiment of the present disclosure;

**[0006]** FIG. **2** is an exploded perspective view of the footwear of FIG. **1**;

**[0007]** FIG. **3** is a sectional view of the footwear taken along line **3-3** of FIG. **1**;

**[0008]** FIG. **4** is a sectional view of the footwear taken along line **4-4** of FIG. **1**;

**[0009]** FIG. **5** is a bottom perspective view of a foot support platform of the footwear of FIG. **1**;

**[0010]** FIG. **6** is a top view of the foot support platform of the footwear of FIG. **1**;

**[0011]** FIG. **7** is a bottom view of the foot support platform of the footwear of FIG. **1**;

**[0012]** FIG. **8** is a sectional view of the foot support platform taken along line **8-8** of FIG. **6**;

**[0013]** FIG. **9** is a sectional view of the foot support platform taken along line **9-9** of FIG. **6**;

**[0014]** FIG. **10** is an enlarged view of a portion of FIG. **9**;

**[0015]** FIG. **11** is a top perspective view of an alternative embodiment of the foot support platform;

**[0016]** FIG. **12** is a top view of the foot support platform of FIG. **11**;

**[0017]** FIG. **13** is a longitudinal sectional view of the foot support platform of FIG. **12** at line **13-13**;

**[0018]** FIG. **14** is a sectional view of a footwear including a toe cap;

**[0019]** FIGS. **15**A-B are schematic representations of the interface between a toe cap retaining structure and a toe cap flange; and

**[0020]** FIG. **16** is a perspective view of a toe cap.

## DETAILED DESCRIPTION

**[0021]** An embodiment of an article of footwear in accordance with the principles of the present disclosure is described herein with reference to the figures. In the depicted embodiment the footwear is a boot **10** having a welted construction. It should be appreciated that the article of footwear according to the principles of the present disclosure is applicable to many different types of welted footwear (e.g., dress shoes, athletic shoes, winter boots, sandals, hiking boots, etc.).

**[0022]** Referring to FIG. **1**, the boot **10** includes an upper portion **12** connected to an outsole **14** via a welt **16**. The upper portion **12** of an article of footwear is configured to hold the outsole **14** to a foot. In the depicted embodiment the upper portion **12** is also configured to protect a foot and an ankle of the person wearing the boot. In the depicted embodiment the upper portion **12** is constructed of leather. Many other materials can also be used in the construction of the upper portion **12** (e.g., canvas, nylon, etc.).

**[0023]** The outsole **14** is configured to engage the ground surface. In particular, the outsole **14** in the depicted embodiment includes a bottom surface **54** that is configured to contact the ground surface. In the depicted embodiment the bottom surface **54** includes a tread surface that provides grip. In the depicted embodiment the outsole includes a shock absorbing material (e.g., soft rubber, foam, gel, etc.) that is molded to the bottom surface **54**. In alternative embodiments, the shock absorbing material may be the same material that contacts the ground surface. Also, it should be appreciated that the outsole can also include stiff material such as wood, plastic, metal or a combination of materials to provide auxiliary support in the midfoot portion of the footwear. The construction of the outsole **14** is described in greater detail below.

**[0024]** Referring to FIGS. **2-10**, an exploded assembly view the boot **10** is shown. The boot **10** includes a foot support platform **18** that is connected to the welt **16** and the outsole **14**. In some embodiments the foot support platform **18** supports a removable foot bed cushion **20**, which contacts the user's foot. In other embodiments the user's foot directly contacts the foot support platform **18** or non-removable (e.g., stitched and/or cemented) foot bed cushion materials are provided over the foot support platform **18**. In the depicted embodiment the foot support platform **18** includes a first surface **22** (an upper surface) and a second surface **24** (a lower surface). The foot support platform **18** includes a downwardly extending rib **26** which extends from the second surface adjacent a periphery edge **28** of the foot support platform **18**. In the depicted embodiment the rib **26** includes an outer side wall **32** that is radiused to the periphery edge **28** and an inner side wall **34** that is generally vertical. The shape of the outer side wall **32** minimizes or eliminates the gaps between the upper portion **12** and the rib **26** where they are stitched together.

**[0025]** In the depicted embodiment the foot support platform **18** is molded and the rib **26** is integrally molded to the foot support platform **18**. In the depicted embodiment a pliable material **30** (e.g., fabric) is molded to the second surface **24** and to a portion of the rib **26**. The pliable material **30** can be any material that can make the rib **26** more tear resistance when molded thereto (e.g., a pliable material made by weaving, felting, knitting). It should be appreciated that the pliable material can be a fabric made of natural fibers, synthetic fibers, or a combination of natural and synthetic fibers.

**[0026]** In the depicted embodiment, the pliable material **30** is molded through a portion of the rib **26** such that a portion of the lower portion of the rib **26** is on one side of the pliable material **30**, and another portion of the rib **26** is on the other side of the fabric material. In the depicted embodiment the pliable material **30** is present on both the inner side wall **34** and the outer side wall **32** of the rib **26**. The pliable material provides the rib **26** improved tear resistance. In the depicted embodiment, the pliable material **30** is placed in a mold and polymeric molten material is molded to the pliable material **30**. In the area of the rib **26** the molten material is molded through the pliable material **30**, which results in portions of the rib **26** being on either side of the pliable material **30**. It should be appreciated that in alternative embodiments, the fabric **30** is molded over the rib **26** such that the fabric covers the rib **26** rather than extending through the rib **26** as depicted.

**[0027]** In the depicted embodiment the welt **16** is stitched to a lower periphery edge of the upper portion **12** and to the rib **26**. In the depicted embodiment the stitches **36** that connect the welt to the upper portion and rib extend through the pliable material on both an inner side wall **34** and an outer side wall **32** portion of the rib **26**. In the depicted embodiment, the stitches **36** extend through two layers of the pliable material **30** when the stitch extends through the zone **53** of the rib **26**, which is shown between the dashed lines in FIG. **10**. This configuration prevents separation due to the rib **26** tearing away from the foot support platform **18** due to stress applied to the rib **26** via the stitches. It should be appreciated that in some embodiments the stitches do not extend through both layers of the pliable material. In some embodiments the stitches extend through only one layer of pliable material and in other embodiments the stitches extend through no layers of pliable material.

**[0028]** In the depicted embodiment the welt **16** is molded to the outsole **14**. The connection between the welt **16** and the outsole **14** does not include stitches. However, it should be appreciated that in alternative embodiments the welt **16** can be connected to the outsole with stitches (e.g., the welt can be stitched to a midsole structure that is cemented to the outsole). In addition, in the depicted embodiment the welt **16** includes a flexible construction with a generally T-shaped cross-sectional profile. However, it should be appreciated that the welt can have many alternative configurations. For example, the welt **16** could be constructed of leather and have a generally L-shaped cross-sectional profile, the welt could include a nylon construction with a generally triangular cross-sectional profile, etc.

**[0029]** In the depicted embodiment the foot support platform **18** includes a hindfoot zone **40**, a forefoot zone **42**, and a midfoot zone **44**. The forefoot zone **42** includes a metatarsal support area **46** and a toe support area **48**. The hindfoot zone **40** supports a person's heel, the midfoot zone **44** support a person's midfoot, the forefoot zone **42** support a person's forefoot, the metatarsal support area **46** of the forefoot zone **42** supports a person's metatarsals, and the toe support area **48** of the forefoot zone **42** supports a person's toes.

**[0030]** In the depicted embodiment the foot support platform **18** is substantially stiffer in the midfoot zone **44** than the hindfoot zone **40**. A relatively stiff material (e.g., glass reinforced nylon) is molded into the midfoot zone **44** of the support platform **18** to provide additional support in the midfoot zone **44**. This added stiffness provides many advantages, including minimizing fatigue when the person wearing the boot **10** is standing on a ladder rung. The added stiffness in the midfoot zone **44** can avoid the need to provide a separate shank member in the outsole **14**.

**[0031]** In the depicted embodiment the hindfoot zone **40** includes a resilient pliable construction that allows a person's heel to press into the shock absorption materials in a heel area **56** of the outsole **14**. In the depicted embodiment, the hindfoot zone **40** is pliable and conforms to the shape of the person's heel in use, thereby avoiding pressure points and hot spots in the heel area.

**[0032]** In the depicted embodiment the toe support area **48** of the foot support platform **18** is substantially stiffer than the metatarsal support area **46**. Conversely, the metatarsal support area **46** is more flexible than the midfoot zone **44** of the support platform **18**.

**[0033]** The relative flexibility in the metatarsal support area **46** enables the person to easily flex the shoe when walking, while the stiffness in the toe support area **48** provides a platform for support for a protective toe covering (FIGS. **14** and **16**). The flexibility also allows shock to be transferred to and be absorbed by the shock absorption materials in the forefoot area **58** of the outsole **14**. In the depicted embodiment, the metatarsal support area **46** is pliable and conforms to the shape of the person's foot, thereby avoiding pressure points and hot spots in the metatarsal area. In the depicted embodiment the rib **26** is notched in the metatarsal support area to provide added flexibility.

**[0034]** The relative stiffness in the toe support area **48** provides axial support for a protective toe coverings (e.g., steel covering) common in work boots. When the protective toe covering is pressed downward, the force is transferred onto the stiffer toe support area **48**, which distributes the force down to a relatively large area of the outsole **14**. The above-described configuration prevents the toe covering from substantially sinking down into the outsole **14** when impacted, and thereby helps to maintain a relatively constant vertical space in the toe box of the boot **10** when in use.

**[0035]** In the depicted embodiment, the material used to mold the relatively flexible hindfoot zone **40** and the metatarsal support area **46** is thermoplastic polyurethane (TPU), the relatively stiffer material **50** used to mold a portion of the midfoot zone **44** and toe support area **48** is glass reinforced nylon (FIGS. **9** and **10**). The construction of the midfoot zone **44** is at least ten percent stiffer than the construction of the hindfoot zone **40**. The toe support area **48** is at least ten percent stiffer than the construction of the metatarsal support area **46**. The toe support area **48** is at least ten percent stiffer than the construction of the hindfoot zone **40**, and the midfoot zone **44** is at least ten percent stiffer than the metatarsal support area **46**. In the depicted embodiment midfoot zone **44** is sufficiently stiff to prevent the midfoot from significant bending when a person stands on a ladder rung, the hindfoot zone **40** is sufficiently soft to conform to a person's heel, the metatarsal support area **46** is sufficiently flexible to allow the metatarsal area of the shoe to bend in use, and the toe support area **48** is sufficiently stiff to distribute the force applied from the toe covering to a larger area of the outsole **14**. In the depicted embodiment the midfoot zone **44** includes an integrally molded dog bone shaped shank member that provides stiffness. In the depicted embodiment the transition between the zones (e.g., line **84**) is wavy rather than straight and does not have abrupt corners. This construction avoids stress concentration at the transitions as a result of the bending of the platform and results in overlap between the zones in the longitudinal direction. It should be appreciated that many

alternative constructions are possible, including transition with sharp corners, straight line transition, or overlaps in the vertical direction.

**[0036]** In the depicted embodiment the outsole **14** is a multi material type body that is directly connected to the upper **12**. The outsole **14** includes a shock absorption portion **52** that is molded into the portion that is configured to engage the ground surface **54**, otherwise referred to herein as the tread. In the depicted embodiment, the shock absorption portion **52** of the outsole **14** is molded to the pliable material **30** on the second surface of the foot support platform **18**. In the depicted embodiment the shock absorption portion **52** is delivered into the cavity defined by the tread portion **54** and the bottom surface **24** of the foot platform **18**. This step adheres the outsole **14** to the support platform **18**, and thereby also connects the outsole **14** to the upper. In the depicted embodiment softer materials are molded into the heel areas **56** and the forefoot areas **58** of the shock absorption portion **52** of the outsole **14**. In the depicted embodiment gel-like materials are molded in these areas. In some embodiments the softer materials are preformed and provided as inserts into the heel areas **56** and forefoot areas **58**.

**[0037]** In an alternative embodiment, the tread portion of the outsole may be constructed of the same material that is used to construct the shock absorption portion. In such embodiments, the outsole **14** may still be directly connected to the upper via molding. In such an embodiment, molten outsole material would be provided in a cavity defined by a mold portion and the bottom surface **24** of the foot support platform **18**.

**[0038]** It should be appreciated that the foot support platform **18** can also be used in construction where the outsole is indirectly attached to the upper. In such embodiments the outsole can be preformed. In such embodiments one surface of a midsole can be cemented to the bottom surface **24** of the foot support platform **18**, and another surface of the midsole can be cemented to the outsole. In such an embodiment the welt can also be stitched to the foot support platform **18**, the midsole, and the outsole.

**[0039]** Referring to FIGS. **11-14** an alternative embodiment of the foot support platform is shown. In the depicted embodiment the foot support platform **60** is similar to the support platform **18** as it also includes a hindfoot zone **62**, a forefoot zone **64**, and a midfoot zone **66**. Moreover, the forefoot zone **64** includes a metatarsal support area **68** that is less stiff than a toe support area **70**.

**[0040]** The support platform **60** further includes a toe cap retaining structure **72**. In the depicted embodiment the toe cap retaining structure **72** includes a ramp **74** having a curved forward raised edge **76**. In the depicted embodiment forward raised edge **76** is configured to engage a portion of a toe cap (e.g., a flange on the toe cap). In the depicted embodiment the raised edge **76** has a height H of about 1.0 mm. It should be appreciated that the height can vary from application to application (e.g., in another embodiment H could be between 0.5 mm and 5.0 mm). The raised edge defines the front arc shape of the ramp **74**. The toe cap retaining structure **72** is configured to engage the toe cap wherein the toe cap has a different profile than the arc shape raised edge. For example, if the toe cap has a curvature that is greater than the radius of curvature of the ramp, the toe cap will engage the raised edge along the center line. See, for example, FIG. **15**A. However, if the toe cap has a curvature that is less than the radius of curvature of the front of the toe cap, the toe cap will engage the raised edge on either side of the center line. See, for example, FIG. **15**B. The configuration enables a certain size toe cap to fit with a variety of side support platforms.

**[0041]** In the depicted embodiment the ramp has a sloped profile that transitions the plane of the toe support area upward towards the upper surface of the flange **78** of the toe cap **80**. See FIG. **14**. In the depicted embodiment the ramp slopes upward from the upper surface of the platform in 180 degrees (both in the forward direction and towards each side). See FIG. **11** (see arc **73** identifying the location where the ramp begins to slope upward). In the depicted embodiment a securing layer **82** is cemented over the ramp **74** and the flange **78** of the toe cap to secure the toe cap **80** down on the platform **60**. The securing layer can be, for example, a fibrous board material (e.g., Texon). It should be appreciated that the toe cap retaining structure **72** can have many different configurations. For example, alternatively, the toe cap retaining structure can be a raised rib with a squared off edge rather than a ramp shaped wedge, or the toe cap retaining structure can also be raised spaced apart posts. In addition, the toe cap retaining structure could also be a recess in the foot support platform. In the depicted embodiment the toe cap retaining structure **72** is molded integrally as part of the support platform **60**. It should be appreciated that the toe cap retaining structure can be attached in many other ways (e.g., cemented, riveted, stitched, etc.).

**[0042]** The above specification, examples and data provide a complete description of the manufacture and use of the composition of the invention. Since many embodiments of the invention can be made without departing from the spirit and scope of the invention, the invention resides in the claims hereinafter appended.

**1**. A welted footwear comprising:
- an upper portion configured to hold the footwear to a person's foot, the upper portion including a lower peripheral edge;
- a molded foot support platform including a first surface and a second surface, the foot support platform including a rib extending downwardly from the second surface adjacent a periphery edge of the foot support platform, wherein the rib is integrally molded to the foot support platform, the foot support platform including a toe cap retaining structure;
- a welt configured to extend around at least a portion of the peripheral edge of the upper portion of the footwear;
- a stitch that extends through at least a portion of the peripheral edge of the upper portion, the welt, and the rib of the foot support platform;
- an outsole including a portion configured to engage the ground surface, the outsole including a portion that is attached to the foot support platform;
- a pliable material molded to the rib;
- a toe cap positioned on the foot support platform and engaged with the toe cap retaining structure; and
- a securing layer positioned over at least a portion of a flange of the toe cap and at least a portion of the toe cap retaining structure.

**2**. The welted footwear of claim **1**, wherein the stitch that extends through the peripheral edge of the upper, the welt, and the rib also extends through the pliable material.

**3**. The welted footwear of claim **1**, wherein a pliable material covers an exterior surface of the rib.

**4**. The welted footwear of claim **1**, wherein the outsole is molded to the foot support platform.

**5**. The welted footwear of claim **4**, wherein the outsole includes a shock absorption portion that is molded into a cavity between the portion of the outsole that is configured to engage the ground surface and the second surface of the foot support platform.

**6**. The welted footwear of claim **5**, further comprising a pliable fabric material molded to the second surface of the foot support platform and wherein the shock absorption portion of the outsole is molded to the pliable fabric material.

**7**. The welted footwear of claim **1**, wherein the foot support platform includes a hindfoot zone, a forefoot zone, and a midfoot zone, and wherein the foot support platform is at least ten percent stiffer in the midfoot zone than the hindfoot zone.

**8**. The welted footwear of claim **7**, wherein the forefoot zone includes a toe support area and a metatarsal support area, wherein the metatarsal support area is between the toe support area and the midfoot zone, and wherein the toe support area of the foot support platform is at least ten percent stiffer than the metatarsal support area.

**9**. The welted footwear of claim **2**, wherein at least some of the stitches extend through the pliable material on both an inner side portion and an outer side portion of the rib.

**10**. The welted footwear of claim **1**, wherein the toe cap retaining structure includes a ridge that engages the flange to limit the movement of the toe cap within the footwear.

**11**. A foot support platform comprising:

a main body including a first surface and a second surface;

a rib extending downwardly from the second surface adjacent a periphery edge of the main body, the rib being integrally molded to the main body;

a pliable material molded to the second surface and to at least a portion of the rib; and

wherein the main body includes a hindfoot zone, a forefoot zone, and a midfoot zone; and

wherein the forefoot zone includes a toe support area and a metatarsal support area, wherein the metatarsal support area is between the toe support area and the midfoot zone, and wherein the toe support area of the main body is at least ten percent stiffer than the metatarsal support area.

**12**. The foot support platform of claim **11**, wherein the rib has an inside surface and an outside surface, wherein the outside surface has a curved cross-sectional profile.

**13**. The foot support platform of claim **11**, wherein the main body includes a wherein the foot support platform is at least ten percent stiffer in the midfoot zone than the hindfoot zone.

**14**. (canceled)

**15**. The foot support platform of claim **11**, wherein the pliable material is located on both an inner side portion and an outer side portion of the rib and wherein the pliable material includes fabric.

**16**. The foot support platform of claim **11**, wherein the rib includes notches in a forefoot portion.

**17**. The foot support platform of claim **14**, further comprises a ramp shaped toe cap retaining structure molded to the toe support area of the main body.

**18-22**. (canceled)

**23**. A footwear comprising:

an upper;

an outsole below the upper;

a foot support platform connected above the outsole, wherein the foot support portion includes a toe cap retaining structure having at least an edge;

a protective toe cap supported on the foot support platform, the protective toe cap including a flange engaged with the edge of the toe cap retaining structure.

**24**. The footwear of claim **23**, wherein the toe cap retaining structure is ramp shaped and integrally molded to the foot support platform.

**25**. The footwear of claim **23**, wherein the front edge of the toe cap retaining structure defines an arc shape.

**26**. The footwear of claim **23**, further comprising a securing layer cemented over at least a portion of a flange of the toe cap and at least a portion of the toe cap retaining structure.

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