March 30, 1965 C. MacQUAID 3,175,310

WEBBED INSTEP PROTECTOR

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Fig. 1.

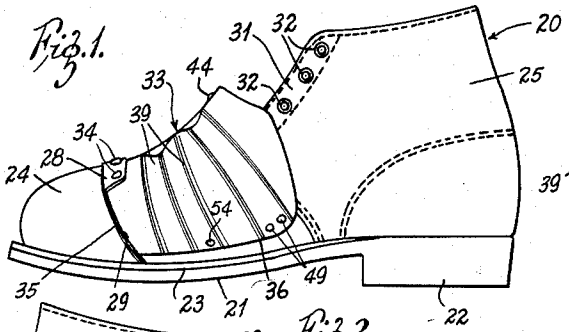


Fig. 2.

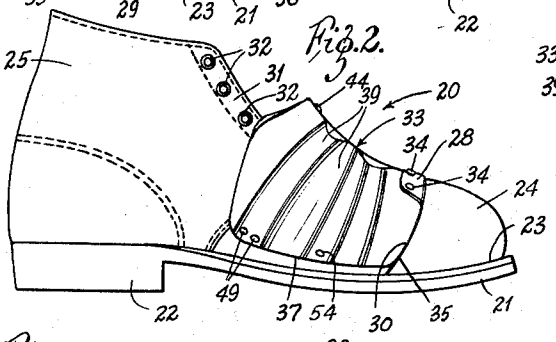


Fig. 3.

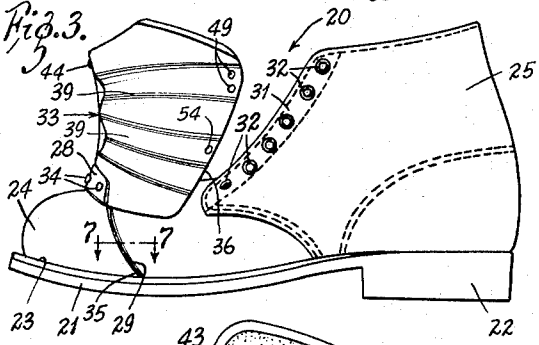


Fig. 4.

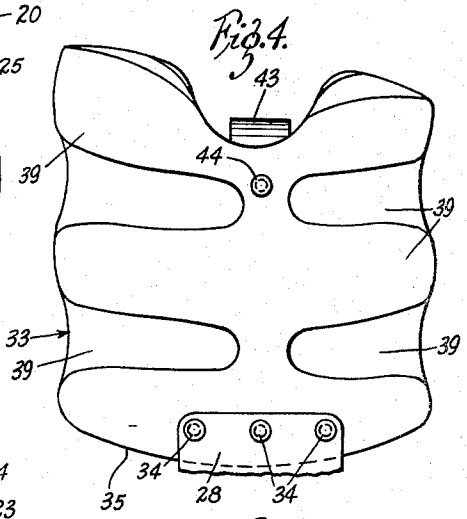


Fig. 5.

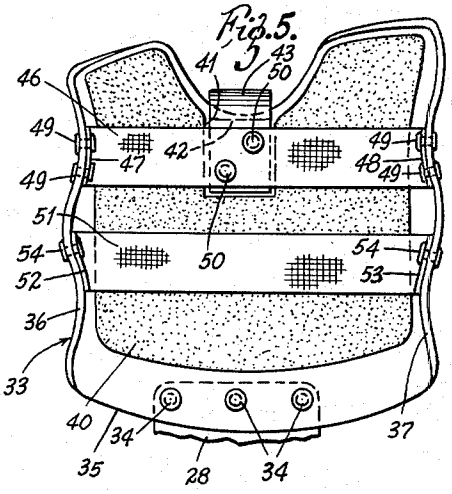


Fig. 6.

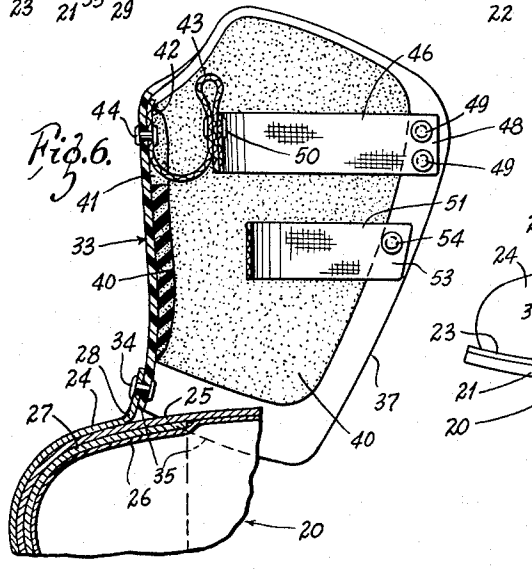
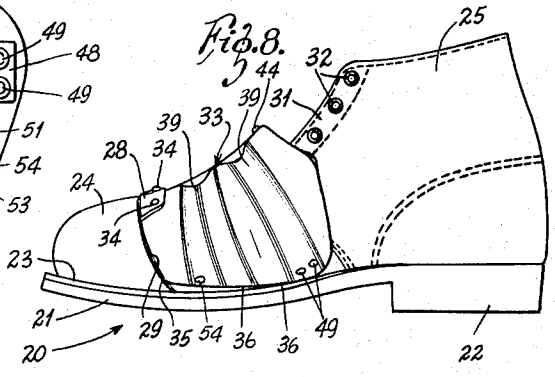


Fig. 8.



INVENTOR:
CRAIG MacQUAID,
BY Kingsland, Rogers, Ezell & Robbins
ATTORNEYS

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Fig. 7.

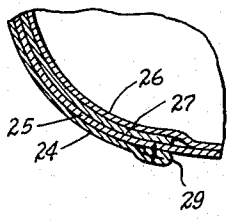


Fig. 9.

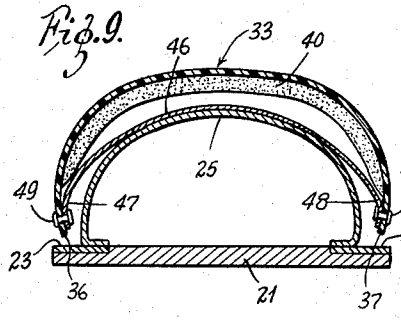


Fig. 10.

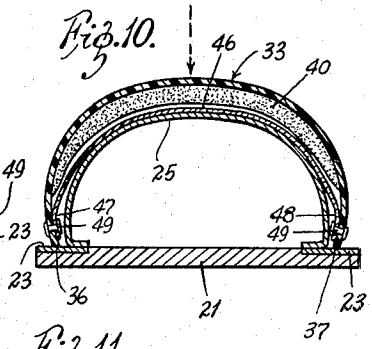


Fig. 12.

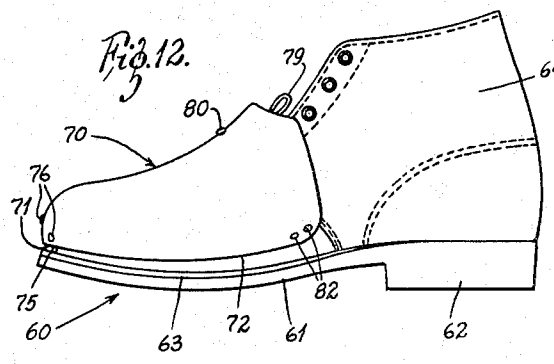


Fig. 11.

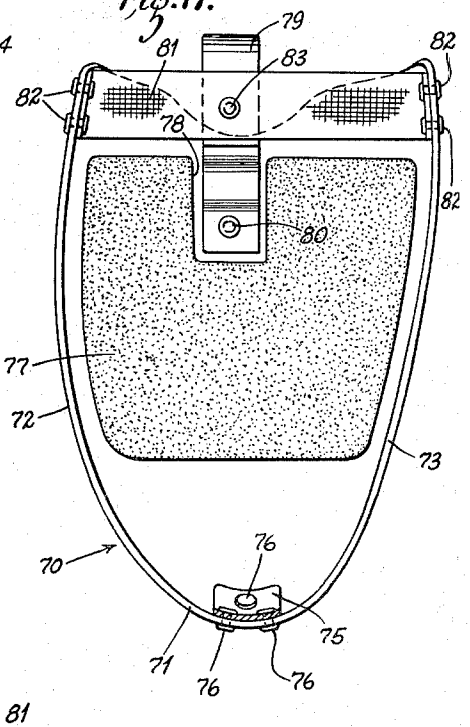
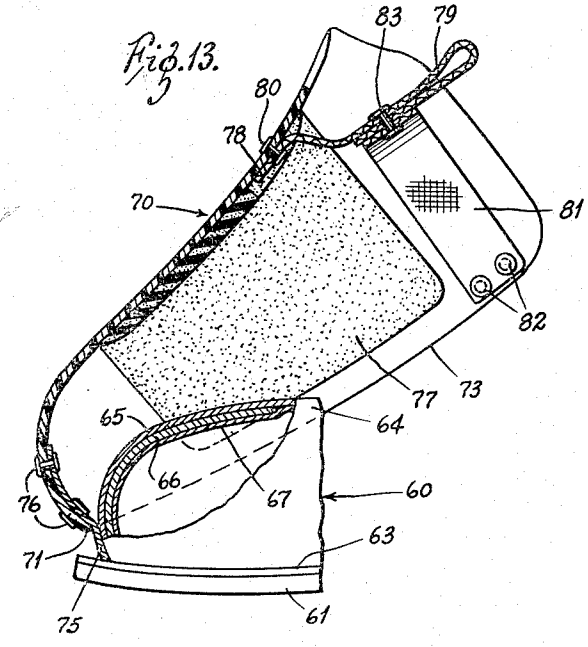


Fig. 13.



INVENTOR:
CRAIG MACQUAID
BY Kingsland, Rogers, Egell & Robbins
ATTORNEYS

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3,175,310

WEBBED INSTEP PROTECTOR

Craig MacQuaid, Clayton, Mo., assignor to International Shoe Company, St. Louis, Mo., a corporation of Delaware

Filed Mar. 20, 1964, Ser. No. 353,420
8 Claims. (Cl. 36—72)

This invention relates to a protective shoe having an instep guard overlying the instep part of the shoe. The sides of the instep guard extend downwardly to overlie the welt of the shoe. The general object of this invention is to provide means for applying a lateral restraint on these sides of the instep guard so that when the guard is subjected to downward blows, its sides will not spread beyond the welt. In other words, an object of the invention is to provide an instep guard for protecting the instep of a foot against downward blows with means to assure the transmittal of these impacts from these blows from the instep guard directly to the welt of the shoe.

The invention involves two embodiments. In one embodiment the shoe has a rigid toe cap and the instep guard overlies the toe cap of the shoe and extends downwardly along the sides of the shoe with its side edges overlying the welt of the shoe. In the other embodiment, the instep guard extends over both the instep and the toe portion of the shoe. The sides of the instep guard still are positioned above the welt of the shoe. In both embodiments there is a substantially inelastic webbing extending across the instep of the shoe. Ends of the webbing are fastened to the lower sides of the instep guard. Whenever the instep guard is pressed downwardly, as by impact blows, the inelastic webbing contacts the shoe upper, and the ends of the webbing draw the sides of the instep guard inwardly, or at least restrain these sides of the instep guard from spreading laterally outwardly.

Hence, another object of the invention is to provide a shoe with an instep guard that overlies the instep guard and extends downwardly to overlie the welt of the shoe, and to provide a relatively inelastic webbing for restricting lateral outward movement of the sides of the instep guard to assure the transmittal of downward forces from the instep guard directly to the welt of the shoe.

Other objects and advantages will be apparent to those skilled in the art.

In the drawings:

FIGURE 1 is a left side elevation view of a right-footed shoe showing one embodiment of the invention;

FIGURE 2 is a right side elevation view of the shoe of FIGURE 1;

FIGURE 3 is a left side elevation view of the shoe of FIGURE 1 but with the instep guard pivoted upwardly;

FIGURE 4 is a plan view on an enlarged scale of the instep guard;

FIGURE 5 is a bottom view on an enlarged scale of the instep guard;

FIGURE 6 is a fragmentary enlarged view in vertical section taken through the longitudinal center of the shoe of FIGURE 1;

FIGURE 7 is a view in section on an enlarged scale taken along the line 7—7 of FIGURE 3;

FIGURE 8 is a side elevation view of the shoe of FIGURE 1 but showing the position of the instep guard when it is subjected to a downward force;

FIGURE 9 is a diagrammatic view in transverse section through the instep portion of the shoe and the instep guard showing the position of the instep guard when not subjected to a downward force;

FIGURE 10 is a view similar to FIGURE 9 but showing the instep guard subjected to a downward force;

FIGURE 11 is a bottom view of a modified guard;

FIGURE 12 is a side elevation view on a reduced scale of a shoe having the modified guard of FIGURE 11; and

FIGURE 13 is a fragmentary view in vertical section through the longitudinal center of the shoe of FIGURE 12.

Referring to the shoe 20 of FIGURE 1, the basic shoe construction may be conventional, at least as to the component parts, including an outsole 21, a heel 22, a welt 23 above the outsole, a toe cap 24, and an upper 25.

There is an inside liner 26 at least at the front part of the shoe, and a metal plate 27 curved to the shape of the toe and fitted between the upper 25 and the liner 26, as shown in FIGURE 6. The toe cap 24, which is leather, fits over the front or toe portion of the upper 25.

At the center of the rear edge of the toe cap 24, there is a hinge flap 28. Preferably the hinge flap 28 forms a continuation of the toe cap 24 and is made of the same piece of leather. On each side 29 and 30, the edge of the toe cap 24 is doubled over and sewed to the upper 25, as shown in FIGURE 7. This doubling over of the edges 29 and 30 creates a raised edge or bead that continues from the outsole or welt of the shoe to the hinge flap 28. Even if the upper 25 is made without a portion extending under the toe cap 24, so that the rear edges 29 and 30 of the toe cap 24 are stitched to forward side edges of the upper (and the shoe may alternately be made this way), the doubled over beads 29 and 30 are desirable for reasons to be explained.

The upper 25 has sides 31 overlying the instep part of the shoe. The sides 31 have eyelets 32 through them so that they can be tied together by a shoe lace as is conventional. An instep guard 33 is fastened to the hinge flap 28 by rivets 34 or other suitable fasteners. The forward edge 35 of the instep guard 33 overlies the metal plate 27 when the guard 33 is in the position shown in FIGURE 1 and the sides of this forward edge 35 are positioned immediately to the rear of the ribs 29 and 30. The guard 33 is formed so that the beads 29 and 30 project outwardly at least to the outer surface of the forward edge 35 of the guard 33. Any wires or the like that are projected toward the guard from in front of the shoe are deflected outward by the ribs 29 and 30 and do not penetrate between the guard and the shoe upper 25. The hinge flap 28 across the top of the toe also deflects these wires.

The sides of the guard 33 have lower edges 36 and 37 that are positioned just above the welt 23 when the guard is in the position shown in FIGURE 1.

The guard 33 may be made with the corrugations 39 on opposite sides, as illustrated, or the guard may be smooth. The corrugations 39 add strength and rigidity to the guard. Also, the guard may be made of a plastic composition, of steel, or of aluminum. Whether the guard 33 is corrugated or smooth, its over-all shape generally follows the shape of the instep of the shoe and is therefore concave-convex. A suitable plastic for the guard 33 is high impact styrene. Other strong resilient plastics may be used.

A shock absorbing pad 40 is cemented to the lower side of the guard 33. The pad 40 may be any foam elastomer selected for maximum absorption of load stresses. A small portion 41 adjacent the center of the rear edge of the pad 40 is cut away so that the end 42 of a loop 43 may be fastened to the guard 33 by a rivet 44 or other suitable fastening device.

A loop 46 of flexible non-elastic cotton or nylon ribbon or webbing extends between the lower sides of the guard shell 33. The ends 47 and 48 of the webbing 46 are fastened to the sides of the guard shell 33 by rivets 49 just above the lower edges 36 and 37 of the guard. When the guard 33 is in the position shown in FIGURE 1, the loop 46 rests upon the shoe upper and holds the guard spaced from the upper. The loop 43 may be fastened to the webbing 46 by eyelets 50 or by stitching.

Another flexible non-elastic cotton or nylon loop 51 is positioned forward of the loop 46. The loop 51 also extends between the sides of the guard shell 33 and its ends 52 and 53 are fastened to the sides of the guard shell by rivets 54. The loop 51 is shorter than the loop 46 so that when the guard 33 is in the position illustrated in FIGURE 1, both loops 46 and 51 contact the upper 25 of the shoe with the guard being spaced from the upper.

When the guard is in this position, the loop 43 is opposite the shoelace and the shoelace can be threaded through the loop 43 to keep the guard in place. The loop 43 nevertheless allows some movement of the guard so that it will not interfere with comfortable wearing of the shoe.

Referring to the shoe 60 illustrated in FIGURE 12, this shoe also has an outsole 61, a heel 62, a welt 63 above the outsole 61, and an upper 64. The upper extends across the toe and includes a portion 65 that generally follows the shape of the toe of the shoe. A metal toe guard 66 is positioned beneath the toe portion 65 and a liner 67 lines the inner surface of the toe guard 66 and at least a portion of the upper 64. In the shoe of FIGURE 12, the metal toe guard 66 may be omitted because the shoe has a guard 70 that extends across both the instep and the toe of the shoe. The guard 70 has a forward edge 71 that is positioned just above the welt 63 and has side edges 72 and 73 that are also positioned just above the welt 63 when the guard 70 is in the position illustrated in FIGURE 12.

The guard 70 is shaped as illustrated in FIGURES 11, 12 and 13 with a portion that overlies the toe conforming generally to the shape of the toe portion of the shoe and the portion overlying the instep conforming generally to the shape of the instep portion of the shoe.

The guard 70 is fastened to a leather hinge 75 by rivets 76 or other fastening devices, the hinge 75 in turn being stitched to the upper 64. There is a shock absorbing pad 77 similar to the pad 40 cemented to the lower surface of the guard 70. A cutout portion 78 allows a loop 79 to be fastened to the guard 70 by a rivet 80.

A flexible non-elastic cotton or nylon loop 81 is fastened to the sides of the guard 70 by rivets 82. A rivet 83 connects the loop 79 with the loop 81. The loop 81 rests upon the upper 64 and spaces the guard 70 from the upper when unloaded, as shown in FIGURE 12.

The general purpose of both shoes 20 and 60 is to protect the exposed parts of the foot against injury from heavy blows. Both guards 33 and 70 cover the instep portion of the foot. Both guards have the shock absorbing pads on their lower surfaces, the pad 40 being on the guard 33 and the pad 78 being on the guard 70. If a sufficiently heavy blow strikes either guard to push that guard into contact with the shoe, contact will be made by the respective pads 40 or 78 and the force of the load will be distributed over the entire surface of the pad.

Also, both guards 33 and 70 are made with the inelastic loops or webbing, the loops 46 and 51 being fastened to the guard 33 and the loop 81 being fastened to the guard 70. More loops of different shapes may be substituted for the loops illustrated so long as they accomplish the purpose. This purpose is diagrammatically illustrated in FIGURES 9 and 10. Thus, in FIGURE 9, the guard 33 is not loaded and the loop 46 merely rests upon the upper surface of the upper 25. The lower edges 36 and 37 of the sides of the guard 33 are positioned above the welt 23 of the shoe. When a downward blow is applied to the guard 33 as indicated by the arrow in FIGURE 10, the guard 33 is moved downwardly. At this time, the sides of the guard 33 above the lower edges 36 and 37 might tend to spread laterally outwardly beyond the welt 23, but this lateral spreading is prevented by the inelastic webbing 46. Thus as the guard 33 moves downwardly, the webbing 46 stays in contact with the shoe upper 25 and the ends 47 and 48 of the webbing that are attached to the sides of the guard 33 hold these sides in. The downward blow then drives the guard 33 downwardly a short distance until the lower edges 36 and 37 contact the welt 23, thereby transmitting the force of the impact from the guard directly to the welt and the outsole 21. If the blow is sufficiently hard to flex the upper part of the guard 33 further downwardly, the pad 40 contacts the shoe upper and distributes some of the load onto the upper of the shoe.

This same action occurs with the guard 70. The guard 33 differs from the guard 70 in that its forward edge 35 overlies the metal toe cap 27. Therefore, portions of the load are transmitted directly from the guard to the toe cap and therefrom to the outsole of the shoe. The lateral hinge 28 that is preferably a continuation of the leather cover 24 across the toe of the shoe prevents wires from projecting beneath the guard. On opposite sides of the hinge 28, the beads 29 and 30 project laterally beyond the forward edge 35 of the guard 33 and also prevent wires from projecting beneath the guard 33.

The guard 70 extends across the toe of the shoe 60. The forward edge 71 of this guard 70 is immediately above the welt 63 of the shoe 60 so that downward forces applied to the guard 70 are transmitted through the side edges 72 and 73 of the guard to the welt 63 and also to the front edge 71 to the welt 63.

Various changes and modifications may be made within the purview of this invention as will be readily apparent to those skilled in the art. Such changes and modifications are within the scope and teaching of this invention as defined by the claims appended thereto.

What is claimed is:

1. A protective shoe comprising an upper, an outsole, a welt above the outsole, the upper having sides adjacent the welt, the welt extending laterally beyond the sides of the upper, a relatively rigid guard extending across at least the major portion of the instep part of the shoe, the guard having sides that extend downwardly adjacent the sides of the upper to provide lower edges of the guard positioned above the welt, and a flexible relatively inelastic tape having ends attached to the sides of the guard, the central portion of the tape between its ends being disconnected from the guard and resting upon the upper, the length of the central portion of the tape between its points of attachment to the guard being less than the length of the guard between the points of attachment of the tape so that when no downward force is applied to the guard the tape rests upon the upper and spaces the guard above the upper, whereby the tape restrains lateral separation of the sides of the guard beyond the side edges of the welt when downward forces are applied to the top of the guard.

2. The combination of claim 1 wherein the guard is corrugated.

3. The combination of claim 1 wherein the guard is steel.

4. The combination of claim 1 wherein the guard is aluminum.

5. The combination of claim 1 wherein the guard extends across the instep and the toe portions of the shoe, and a hinge extending laterally of the front side of the guard and fastened to the front side of the guard and to the front of the shoe.

6. The combination of claim 1 wherein the shoe has a rigid protective toe cap and the front edge of the guard overlies the rear portion of the toe cap.

7. A protective shoe having an upper and an outsole extending laterally beyond the sides of the upper, a rigid toe guard fixed to the toe portion of the shoe, an instep guard covering the instep portion of the shoe and having sides extending across the sides of the instep, the guard having forward edges rearward of the front of the shoe and bead means projecting outwardly from the shoe in front of substantially the entire forward edges of the guard to deflect wires away from the forward edge of the guard.

8. The shoe of claim 7 wherein the bead means comprises rolled leather portions supported by the shoe.

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JORDAN FRANKLIN, *Primary Examiner.*

FRANK J. COHEN, *Examiner.*