July 25, 1944. K. A. STRITTER 2,354,338

SAFETY SHOE

Filed Aug. 25, 1943

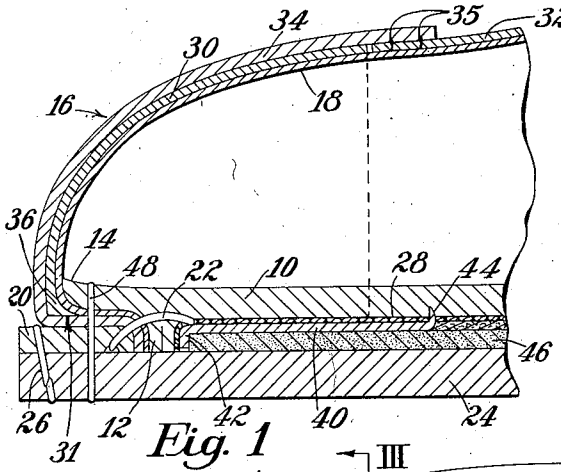


Fig. 1

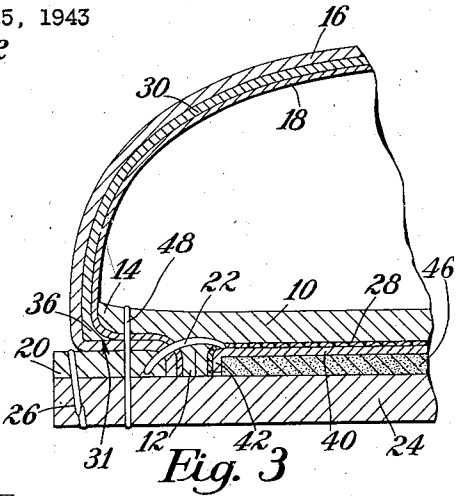


Fig. 3

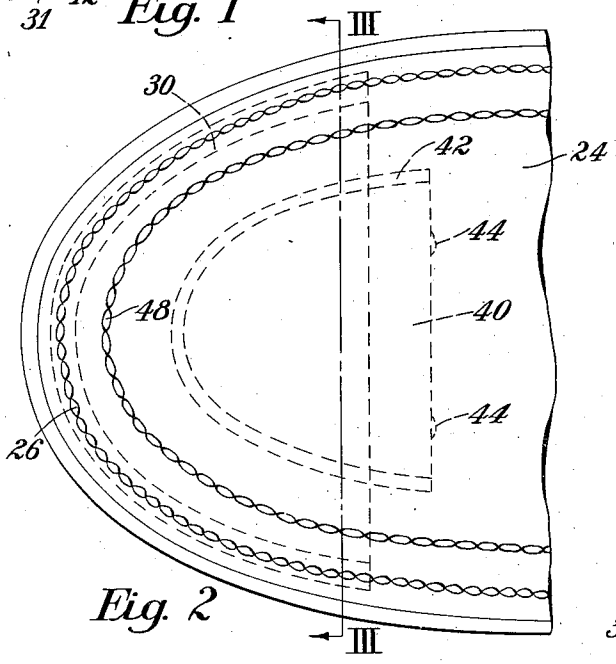


Fig. 2

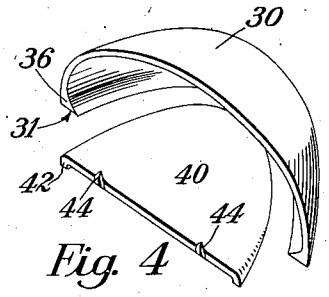


Fig. 4

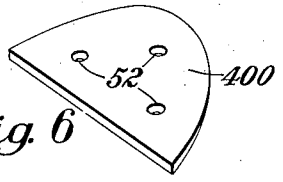


Fig. 6

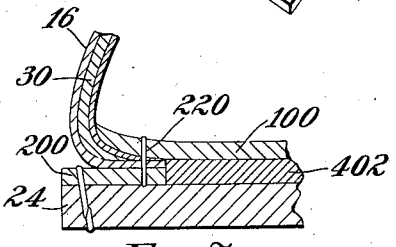


Fig. 7

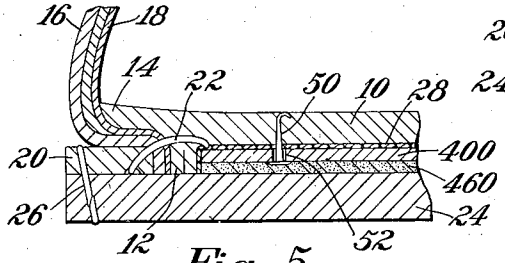


Fig. 5

Inventor

Karl A Stritter

By his Attorney

Thomas J Ryan

Patented July 25, 1944 2,354,338

UNITED STATES PATENT OFFICE

2,354,338

SAFETY SHOE

Karl A. Stritter, Nahant, Mass., assignor to United Shoe Machinery Corporation, Flemington, N. J., a corporation of New Jersey

Application August 25, 1943, Serial No. 499,974

10 Claims. (Cl. 36—17)

This invention relates to so-called safety shoes such as those worn by workmen to protect their toes from being injured in the course of their employment as, for example, by being squeezed or crushed by heavy objects. Although not limited thereto, the invention is particularly adapted for embodiment in shoes of Goodyear welt construction.

In safety shoes of this general type as heretofore constructed the protection for the toes is afforded by a metallic toe box which prevents the toe portion of the upper from collapsing under heavy pressure. Such a toe box will effectively safeguard the toes from injury if, at the time when the shoe is subjected to external pressure, the forepart of the outsole is resting flatwise and directly upon the floor or the ground. However, if there should be some small solid object, such as a bolt or a nut or a chip of metal, between the sole of the shoe and the floor of the factory when the crushing pressure is being applied to the shoe that object is liable to form an upward bulge or bend in the insole and thereby cause the foot to be squeezed and perhaps seriously injured even though the upper is prevented from collapsing by the toe box.

To insure adequate protection for the toes of the foot under such conditions I provide, in my improved safety shoe, a toe box and a toe plate each of which is made of metal or other hard material capable of offering a high degree of resistance to crushing or bending strains, these elements being constructed and arranged to cooperate with each other and with certain elements of the shoe bottom to prevent any substantial amount of inward displacement or distortion of any portion of the interior of the toe of the shoe so that, regardless of how the shoe may be supported when its toe portion is struck by a heavy object or subjected to crushing or squeezing pressure, the space inside the toe of the shoe will not be reduced to such an extent as to cause injury to the foot.

As shown, the toe box is interposed between the upper and the lining and it is formed with a bottom flange which underlies the edge of the insole to reinforce it against upward distortion. Preferably the toe box is formed without any outward bulge in its side walls above the bottom flange thereby adapting the flange to support the box most effectively against downward thrust tending to collapse it. Preferably, also, the toe box flange is formed with a flat lower face of substantial width adapted to seat flatwise substantially throughout the full width of the flange upon the underlying portions of the shoe to prevent the toe box from cutting through the upper margin and into the shoe bottom. The toe plate is located between the insole and the outsole and serves to prevent the portion of the insole which directly overlies it from being upwardly bent or bulged by any object, projection or irregularity on the floor or ground upon which the sole of the shoe may be resting or against which it may be forced when the shoe is subjected to external pressure. The toe plate is somewhat smaller than the corresponding toe portion of the insole and it is positioned with its edge spaced inwardly from the inner edge of the toe box flange so that it will not interfere with such stitches or other fastenings as may be employed to secure together the various parts of the bottom of the shoe. In the narrow region between the edge of the toe plate and the flange of the toe box the several layers or plies of material which are tightly bound together by some or all of the stitches or other fastenings above referred to serve effectively, in conjunction with the fastenings, to resist any force tending to distort or deform the corresponding portion of the insole.

For use in shoes of Goodyear welt construction the toe plate is shaped in marginal contour to fit tightly within the bottom cavity inwardly of the insole rib with the margin of the plate bearing against the inner face of the rib so as positively to prevent the latter from bending inwardly under the influence of any force tending to displace the shoe bottom upwardly. Thus the toe plate stiffens the inseamed materials of the shoe and reinforces them against such upward distortion as would result in reducing the heightwise dimensions of the interior of the toe portion of the shoe. For even more effectively supporting and reinforcing the insole rib of a welt shoe the toe plate, as shown, may be provided with a downturned marginal flange for engaging the inner face of the rib substantially throughout the full height of the latter. It is preferred to employ between the inseam and the outseam, at least in the toe portion of the shoe, a third seam the stitches of which extend through the insole, the inturned margins of the upper materials, the welt and the outsole in the locality just inwardly of the toe box flange, these stitches serving tightly to bind together the parts through which they extend thereby to stiffen and reinforce the marginal portion of the shoe bottom against any such deformation or distortion as would occur if the toe plate were raised bodily by the presence of some solid object beneath the sole of the shoe

at a time when the toe portion of the upper is being subjected to heavy external pressure. This third seam, by reinforcing the securement of the upper to the insole by the inseam stitches, serves also to anchor the upper to the insole with sufficient firmness to resist effectively any tendency of the side walls of the toe box to spread under pressure. Consequently, this seam helps to prevent the toe box flange from being forced downwardly over the outer edges of the welt and the outsole in such a manner as further to reduce heightwise the space inside the toe of the shoe with resulting injurious effects upon the toes of the foot.

The invention will now be described with reference to the accompanying drawing, in which

Fig. 1 is a view in longitudinal section of the toe portion of a safety shoe of Goodyear welt construction in which my invention is embodied;

Fig. 2 is a bottom view of the toe portion of the shoe;

Fig. 3 is a partial cross-section of the shoe taken substantially along the line III—III of Fig. 2;

Fig. 4 is a perspective view of the metallic toe box and the metallic toe plate employed in the shoe, these parts being shown substantially in the relative positions which they occupy in the shoe;

Fig. 5 is a partial cross-sectional view of a Goodyear welt shoe illustrating particularly the use of a toe plate of a somewhat modified construction;

Fig. 6 is a perspective view of the toe plate shown in Fig. 5; and

Fig. 7 is a partial cross-sectional view of a shoe of McKay welt construction in which my invention is embodied.

Referring to the drawing, the shoe illustrated in Figs. 1 to 3, inclusive, is of Goodyear welt construction comprising an insole 10 having a marginal rib 12 and a feather 14, an upper 16, and an upper lining 18, the upper and the lining having lower marginal portions secured in overlasted positions beneath the feather and outwardly of the rib of the insole. The overlasted margins of the upper and the lining, together with a welt 20, are secured by inseam stitches 22 to the insole rib 12 and an outsole 24 is secured by outseam stitches 26 to the welt. The insole 10, as shown, has a thin layer of canvas 28 secured to its lower side, the marginal portion of the canvas overlying the inner face of the rib 12 to reinforce the rib against the pull of the inseam stitches.

To prevent collapse of the toe portion of the upper of the shoe under heavy pressure a metallic toe box 30 is herein shown as being employed between the upper 16 and the lining 18. In order that the presence of the toe box shall not detract from the external appearance of the shoe the upper, as shown, may comprise a vamp 32, which is cut without any toe portion, and a separate toe cap 34 the rear portion of which overlaps the vamp and is secured to the latter as by means of stitching 35, thus providing ample space between the toe cap 34 and the lining 18 for the reception of the toe box. The illustrated toe box 30 is made from heavy gage sheet metal, preferably hardened and tempered steel, the metal being molded to conform to the shape of the toe portion of the shoe and having an inturned bottom flange 36. The bottom flange 36 is formed with a flattened surface 31 of substantial width adapting the flange to seat flatwise upon the marginal portion of the upper where the latter is inturned above the welt so that the toe box will be firmly supported against downward thrust and will have no tendency to cut through the upper, or to cut into the shoe bottom material beneath the marginal portion of the upper. Moreover, in the construction shown in Figs. 1 to 4, there is no outward bulge in the side walls of the toe box above the bottom flange. In other words, the side walls of the toe box are substantially perpendicular to the flat face 31 where they merge with the bottom flange 36. The bottom flange is thus adapted to support the toe box in a manner which is most effective to prevent collapse of the latter under heavy pressure.

To prevent the toes of the foot from being squeezed or otherwise injured by upward displacement or deformation of the insole in case some small solid object is located beneath the toe portion of the outsole when the shoe is subjected to pressure, a toe plate 40 is employed between the insole and the outsole. The toe plate 40 is preferably made of sheet metal and may be of substantially the same gage as that employed in making the toe box. However, the toe plate may be made of any other strong material which is highly resistant to bending or distortion. In marginal contour the toe plate 40 is shaped to fit tightly in the bottom cavity inwardly of the insole rib 12 with the margin of the plate bearing against the inner face of the rib to provide internal support for the rib, particularly at its base portion, and thus to prevent the rib from being bent or deformed inwardly by any force tending to displace upwardly any portion of the insole at the inner side of the rib. In order to provide for even more effectively supporting the insole rib against such inward bending or deformation, the toe plate 40, as illustrated in Figs. 1 to 4, inclusive, is formed with a depending marginal flange 42 of a width corresponding substantially to the height of the insole rib. Advantageously the toe plate may be provided with attaching prongs 44 which, as shown, are struck up from the rear edge of the plate and are embedded in the insole when the toe plate is applied to the shoe. The space inwardly of the flange of the toe plate is filled with suitable filler material 46 such as felt, cork composition or other plastic or cushioning substance, in order to provide a level bottom for the reception of the outsole. The filler 46 also serves as a cushion to absorb minor stresses resulting from upward distortion of the outsole. The metallic toe plate will positively prevent any upward bulge or bend being formed in the portion of the insole which is directly above the plate by any object or projection upon which the sole of the shoe may be resting when heavy pressure is applied to the exterior of the toe portion as the result, for example, of the falling of a heavy casting or other object on the shoe. The presence of any object beneath the sole of the shoe at such a time may, of course, have a tendency to force bodily upward the entire portion of the insole which is above the toe plate. Such action tends to distort the material of the shoe bottom in the locality outwardly of the toe plate in such a manner as to bend the rib of the insole inwardly. Consequently the flange of the toe plate is effective to resist such distortion by supporting the insole rib against inward bending. However, in order to provide further insurance against distortion of the shoe bottom I prefer to employ between the inseam and the outseam, at least in the toe portion of the shoe, a third seam 48 the stitches of which extend through the insole

feather 14, the inturned margins of the lining 18 and the upper 16, the welt 20 and the outsole 24 in the locality just inwardly of the bottom flange 32 of the toe box. The stitches 48 serve tightly to bind together the above enumerated parts of the shoe and further to stiffen and reinforce the marginal portions of the shoe bottom and thus effectively supplement the action of the toe plate in preventing distortion of the insole. Moreover, the stitches 48 serve also to supplement the inseam stitches 22 in securing the upper to the insole and thus to anchor the upper to the insole in a manner to resist any tendency of the side walls of the toe box to spread under pressure. On account of this, the bottom flange of the toe box is quite positively prevented from being forced downwardly over the outer edges of the welt and the outsole in such a manner as to reduce heightwise the space inside the toe of the shoe, and resulting injurious effects upon the toes of the foot are avoided.

In Figs. 5 and 6 my invention is illustrated as embodied in a Goodyear welt shoe in which a toe plate 400 of modified construction is employed. As shown, the toe plate 400 is shown as having no marginal flange and as being secured in place by means of tacks 50 which are driven through holes 52 in the toe plate and are clenched against the upper face of the insole 10. The toe plate 400, being substantially thicker than the toe plate 40 hereinbefore described, and being disposed with its edge bearing against the rib 12 of the insole will support the rib against inward bending and, in cooperation with the inseam stitches 22, will serve to strengthen and reinforce the inseamed materials thereby to insure that no substantial amount of upward displacement of the shoe bottom will take place in the region between the toe plate and the bottom flange of the toe box 30. As shown, a filler piece 460 is provided between the toe plate 400 and the outsole 24. It will be noted in Fig. 5 that the feather of the insole 10 is somewhat narrower than in the insole illustrated in the preceding figures and that the space between the toe box flange and the toe plate is correspondingly reduced in width. Thus less opportunity is afforded for upward distortion or displacement of the shoe bottom materials in the vicinity of the inseam and it is practicable to make the shoe without employing a line of reinforcing stitches, such as the through-and-through stitched seam 48 employed in the shoe disclosed in Figs. 1 to 3, inclusive.

My invention is illustrated in Fig. 7 as being embodied in a shoe of McKay welt construction, a toe box and a toe plate being employed which are so shaped and so disposed relatively to each other that ample space is provided between the toe box flange and the edge of the toe plate for a McKay stitched inseam 220 by means of which the upper 16, together with a welt 200, is secured to the insole. In this shoe the toe plate 402 is disposed with its edge spaced inwardly from the bottom flange of the toe box 30 to enable the upper 16 and the welt 200 to be secured by the inseam 220 directly to an unlipped insole 100. Advantageously and as shown, the toe plate 402 may be made thick enough to fill completely the space between the insole 100 and the outsole 24 of the shoe so that the use of conventional bottom filling material is rendered unnecessary.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A safety shoe comprising an insole, an upper having a marginal portion inturned beneath the insole, a toe box inside the upper for preventing collapse of the toe portion of the upper, said box being capable of withstanding excessive pressure without crushing and having an inturned bottom flange between the insole and the inturned marginal portion of the upper, an outsole, a welt between the outsole and said inturned portion of the upper, a line of stitches extending through the welt and said portion of the upper inwardly of the toe box flange and securing the upper and the welt to the insole, means securing the outsole to the welt, and a toe plate between the insole and the outsole inwardly of the welt for preventing inward distortion of the insole.

2. A safety shoe comprising an insole having a marginal rib and a feather, an upper and a welt secured by inseam stitches to the insole rib, an outsole secured by outseam stitches to the welt, a toe box inside the upper having an inturned bottom flange underlying the insole feather, and a toe plate underlying the body of the insole and having its margin bearing against the inner face of the insole rib and supporting the latter against inward displacement, the toe box and the toe plate each being made of hard material capable of offering a high degree of resistance to bending.

3. A safety shoe comprising an insole having a marginal rib and a feather, an upper and a welt secured by inseam stitches to the insole rib, an outsole secured by outseam stitches to the welt, a metallic toe box inside the upper having an inturned bottom flange underlying the insole feather, and a metallic toe plate secured to the insole and engaging the lower side of the latter and having its margin bearing against the base of the insole rib and supporting the rib against inward displacement.

4. A safety shoe comprising an insole, an upper having a marginal portion inturned beneath the insole, a metallic toe box inside the upper having an inturned bottom flange underlying the edge of the insole and having a flat lower face of substantial width seated upon said marginal portion of the upper, the side walls of the toe box being perpendicular to said face in the immediate vicinity of said flange, a welt secured to the upper and the insole, an outsole secured to the welt, and a metallic toe plate between the insole and the outsole for reinforcing the insole against inward distortion.

5. A safety shoe comprising an insole, an outsole, an upper having its lower margin inturned between the insole and the outsole, a metallic toe box inside the upper, a metallic toe plate between the insole and the outsole, the edge of the toe plate being spaced inwardly from the edge of the toe box, and a line of stitches located outwardly of the toe plate securing together the upper, the insole and the outsole.

6. A safety shoe comprising an insole having a marginal rib and a feather, an upper and a welt secured by inseam stitches to the insole rib, an outsole secured by outseam stitches to the welt, a metallic toe box inside the upper having an inturned bottom flange underlying the insole feather, and a metallic toe plate beneath the insole, said plate engaging the lower side of the insole and having a downturned marginal flange bearing against the inner face of the rib substantially throughout the height of the rib.

7. A safety shoe comprising an insole having a marginal rib and a feather, an upper and a welt secured by inseam stitches to the insole rib, an

outsole secured by outseam stitches to the welt, a metallic toe box inside the upper having an inturned bottom flange underlying the insole feather, a metallic toe plate underlying the insole and having its margin bearing against the inner face of the insole rib, and a line of stitches extending through the outsole, the welt, the upper and the insole in the locality between the inseam and the bottom flange of the toe box.

8. A safety shoe comprising an insole having a marginal rib and a feather, an upper and a welt secured by inseam stitches to the insole rib, an outsole secured by outseam stitches to the welt, a metallic toe box inside the upper having an inturned bottom flange underlying the insole feather, a metallic toe plate underlying the insole and having a marginal flange bearing against the inner face of the insole rib, said plate being attached to the insole by means of prongs struck up from the rear edge of the plate and embedded in the insole, and a line of stitches between the inseam and the outseam securing together the outsole, the welt, the upper and the insole.

9. A safety shoe comprising an insole, an upper having a marginal portion inturned beneath the insole, a metallic toe box inside the upper having an inturned bottom flange between said inturned upper margin and the insole, a welt, stitches located inwardly of the bottom flange of the toe box and extending vertically through the welt, the upper and the insole and securing said parts together, an outsole secured to the welt, and a toe plate between the insole and outsole, said toe plate being located inwardly of the welt and said inturned upper margin.

10. A shoe comprising an insole, an upper having a marginal portion inturned beneath the insole, a safety toe box inside the upper for preventing collapse of the toe portion of the upper, said toe box having an inturned bottom flange between said inturned upper margin and the insole, an outsole, an intermediate member between the outsole and said inturned upper margin, a line of stitches extending through said inturned upper margin and said intermediate member inwardly of the flange of the toe box and securing said parts to the insole, means securing the outsole to said intermediate member, and a toe plate between the insole and the outsole having its edge spaced inwardly from said line of stitches, said toe plate being composed of material resistant to bending to reinforce the insole against inward distortion.

KARL A. STRITTER.