April 3, 1956 E. L. SHULTZ 2,740,209

IMPROVED LINER FOR SAFETY TOES

Filed Jan. 28, 1954 2 Sheets-Sheet 1

Fig. 1

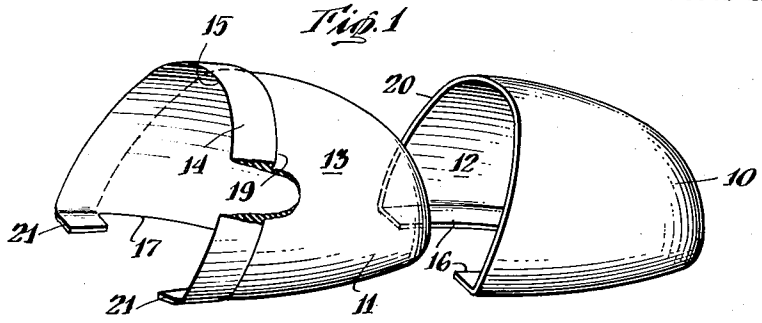


Fig. 2

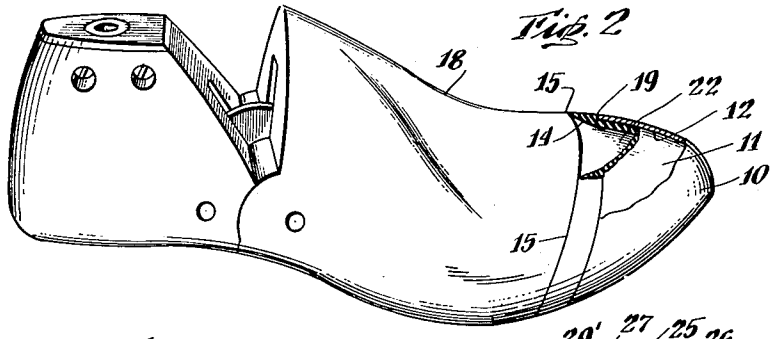


Fig. 3

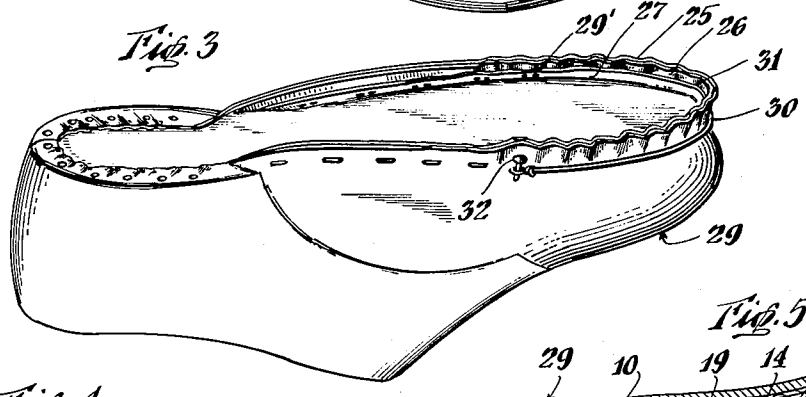


Fig. 4

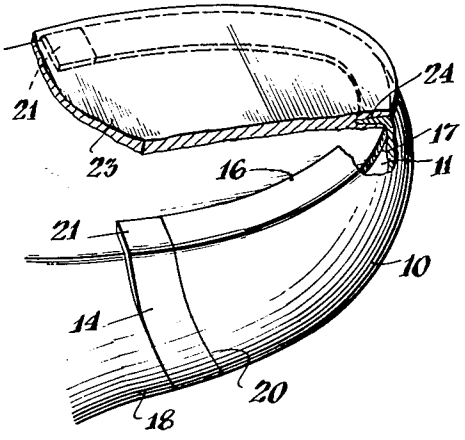
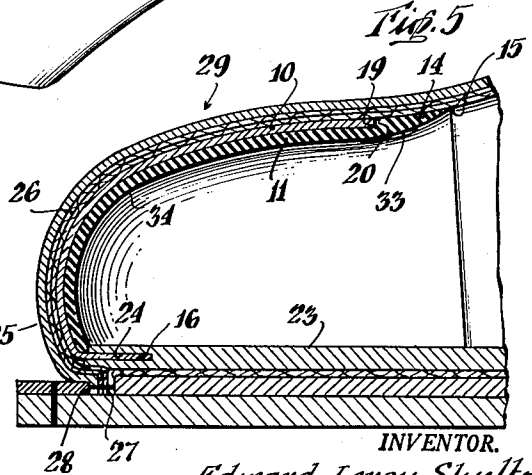


Fig. 5



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Filed Jan. 28, 1954 2 Sheets-Sheet 2

Fig. 6.

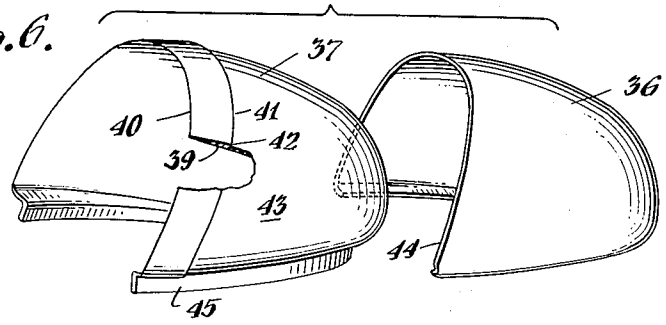


Fig. 7.

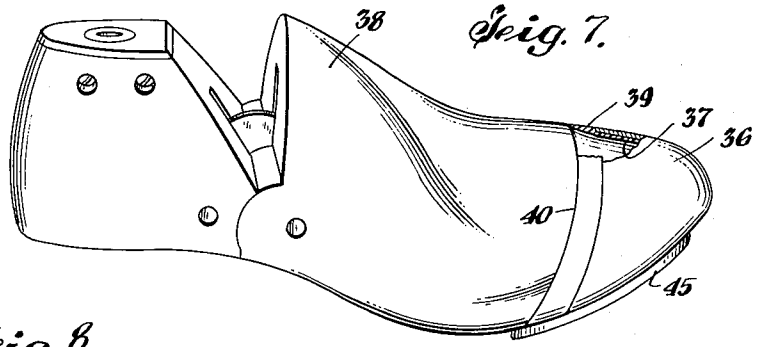


Fig. 8.

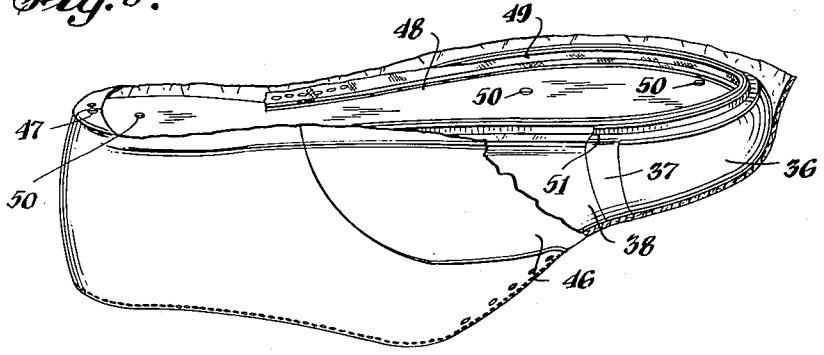
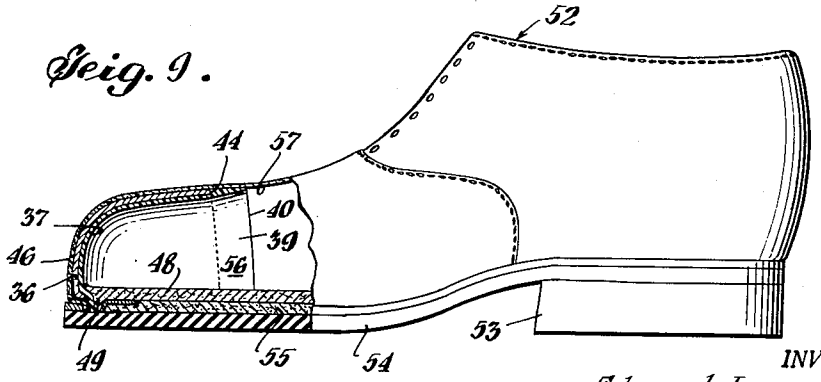


Fig. 9.



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IMPROVED LINER FOR SAFETY TOES

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Application January 28, 1954, Serial No. 406,751

4 Claims. (Cl. 36—77)

This invention relates to safety toes for shoes and more particularly to the liners for safety toes in shoes.

Safety footwear is worn for the protection of feet under hazardous conditions where falling articles, vehicles or the like might cause injury to the feet of the wearer. For this purpose the safety footwear generally includes a steel toe located inside the tip of the shoe. The steel toe is in the form of a concavo-convex steel box lying underneath the tip and extending to the sole along the lateral and front edges of the box and terminating approximately at the end of the tip. A liner is provided beneath the steel toe box of safety shoes and the liners heretofore provided have presented a number of problems to the shoe industry and numerous unsuccessful attempts have been made to solve these problems.

It is an object of the present invention to overcome the difficulties and disadvantages heretofore encountered and to provide an improved safety toe liner which will simplify the production of safety shoes; which will effectively protect the feet of the wearer from the steel toe box; which will enhance the appearance of safety shoes and at the same time protect the shoe leather from the wearing or cutting action of the trailing edge of the toe box; and which will protect the steel toe box from corrosion inducing perspiration.

My invention contemplates the provision of an improved safety toe liner made of a polyethylene plastic film in concavo-convex shape to conform to the contour of the undersurface of the toe box and having a transverse marginal area extending across its trailing end defined by an upstanding forwardly facing shoulder which engages against the trailing end of the toe box so that the toe box and the marginal area of the liner present a smooth, continuous upper surface.

These and other objects of this invention will become more apparent upon consideration of the following description taken together with the accompanying drawings in which:

Fig. 1 is a perspective view of a safety steel toe box and a plastic polyethylene liner of this invention for insertion in the steel safety toe box positioned adjacent thereto in the figure;

Fig. 2 is a perspective view of a shoe last with a steel safety toe box and a plastic polyethylene liner according to this invention positioned thereon;

Fig. 3 is a perspective view of a partially assembled shoe incorporating a steel safety toe box and plastic polyethylene liner according to this invention;

Fig. 4 is a perspective view of the toe and of the shoe last of Fig. 2 having an insole thereon and the toe box and polyethylene insert of Fig. 1;

Fig. 5 is a vertical section of the toe portion of an assembled shoe incorporating the steel safety toe box and plastic polyethylene liner of Fig. 1;

Fig. 6 is a perspective view of another form of steel safety toe box and a plastic polyethylene liner according to this invention adjacent thereto;

Fig. 7 is a perspective view of a shoe last with a steel safety toe box and a plastic polyethylene liner of Fig. 6 positioned thereon;

Fig. 8 is a partly assembled shoe with the upper partly broken away to show the steel safety toe box and plastic polyethylene liner of Figs. 6 and 7 incorporated in said partly assembled shoe mounted on said last; and

Fig. 9 is a side elevation of an assembled shoe with a section through the toe portion to show the steel toe box and plastic polyethylene liner of Figs. 6, 7 and 8 incorporated in the toe portion.

In general this invention provides a plastic liner for a safety toe shoe which is positionable within the safety toe box, eliminating any other liner material within the steel toe box. The safety toe box may be the conventional steel safety toe box or may be a steel toe box according to this invention having a broad bottom flange for spreading pressure placed on the steel toe cap. This invention also provides for fixing the respective parts of the safety toe of this invention with relation to each other.

Safety toe shoes have incorporated as a toe box therein a steel toe box which is structurally strong enough to withstand blows of considerable force without breaking or collapsing. The steel or other material of such toe boxes is absolutely rigid in relation to other parts of the shoe in which it is incorporated. The rigidity of the steel safety toe boxes presents many problems to the shoe manufacturer and the shoe wearer. Among these problems is the incorporation of the steel toe box in the shoe and the effect of the stiff toe box on the appearance of the shoe during its ultimate use. The steel toe box also has a relatively narrow bottom edge which becomes a cutting edge if a heavy force is applied to the steel toe box. Such incision by the toe box damages the shoe in which it is incorporated. This invention is applied to these problems and provides a solution to both of them and to other problems and disadvantages arising from the incorporation of a steel safety toe box in a shoe for the purpose of safety, as will be pointed out hereinafter.

Prior to my present invention, the safety toe box in a safety toe shoe was not incorporated in the shoe upper according to the customary manner of incorporating box toes in shoes but required a relatively complicated method employing additional steps. The present invention permits a safety toe shoe to be manufactured and assembled by a relatively simple method in which a number of steps are eliminated as hereinafter described.

In the manufacture of the shoe of this invention the first step in the assembly of the parts is attaching the insole to the last, and the second step is the placing of the polyethylene liner and the steel safety toe box of this invention on the last. Next, the upper containing the counter is applied to the last. The upper is then tacked at the heel and the upper is pulled over the last. This pulling over drafts the upper to the last and the upper is then completely side-lasted with staples. After the side-lasting the upper is completely heel-lasted. Heel-lasting includes a wiping over of the heel portion and tacking the heel portion. The toe lasting takes place next. Toe lasting includes wiping the toe end of the upper over the toe portion of the last, bedding down and securing with the toe lasting wire and anchoring the wire with anchoring tacks. After the pullover and the toe lasting, the shoe is ready for the inseaming operation and for the application of the outer sole. It will thus be noted that the method of manufacture of safety toe shoes of this invention eliminates several steps of the prior methods of manufacture of safety toe shoes. The more important of the steps which are eliminated are the second pullover, the second side-lasting and the second bed or toe lasting operations, and the operation of taping at the rearward edge of the steel toe box.

The accompanying drawings show the steel safety toe box of this invention and a plastic polyethylene liner of this invention in the various steps of the manufacture of a shoe incorporating the toe box and liner. Referring specifically to Fig. 1, the steel toe box **10** is shown. This toe box forms a safety toe box and has for association with it a plastic polyethylene liner **11**. The polyethylene liner **11** is formed to conform to an inner wall **12** of the toe box and has an outer surface which fits the inner wall **12** and may be snugly adhered thereto. At the rear of this outer surface **13**, the polyethylene liner **11** has a rear lip **14**. The rear lip **14** tapers to a fine rear edge **15**. The steel toe box **10** has an inwardly turned relatively wide flange **16**. The flange is, in turn, to underlie a bottom edge **17** of the liner when the liner is inserted in the toe box. As shown in Fig. 2 on a last **18** the toe box **10** overlaps the liner **11** to a shoulder **19** at the front edge of the tapered rear lip **14**. The shoulder **19** extends from the outer surface **13**. Thus, when the outer surface **13** and the inner wall **12** are brought into contact, a rear edge **20** of the toe box **10** abuts against the relatively vertically oriented shoulder **19**, as shown in Fig. 2. The bottom edge **17** of the liner **11** terminates at the rear lip **14** so that a tab **21** extends from the liner **11** at the lower rear portion of each side of the rear lip **14**. The rear lip **14**, with its rear edge **15** and the rear edge **20** of the toe box **10** form an irregular hemispherical curve at the rear edges of the cup-shaped toe box **10** and polyethylene liner **11**.

The toe box **10** and the polyethylene liner **11** are shown mounted on the last **18** in Fig. 2 which has a shaped toe area **22** for receiving the toe box **10** and the liner **11** beneath the toe box **10**. In Fig. 3 a partly assembled shoe **29** is shown at the completion of the manufacture of the upper portion and immediately prior to the steps of applying the plastic composition and the outer sole. In Fig. 4 the toe box **10** and the liner **11** are shown as they are positioned in relation to an insole **23** and the last **18**. The flange **16** overlies the bottom surface of the last **18** and the bottom edge **17** of the liner **11**. The insole **23** is formed with a slit **24** at the outer edge of its toe portion. The flange **16** is inserted in the slit **24** and remains that way in the assembled shoe, as shown in Fig. 5. The tabs **21** also overlie the edge of the insole **23**.

As shown in Fig. 5 the toe portion of the completed shoe containing the toe box **10** and the liner **11** of this invention has the liner **11** on the interior of the toe portion of the shoe. The liner **11** terminates at the insole **23**. The toe box **10** is interlocked by its flange **16** with the insole **23**. An upper **25** and a shoe liner **26** are formed over the toe box **10** and are stitched to a welt rib **27** by stitching **28** in a customary manner for the Goodyear welt type of shoe. The rear lip **14** has an upward bias which holds its rear edge **15** against the inner surface of the shoe liner **26** in the assembled shoe.

In the manufacture of a shoe of this invention, the first step in the assembly of the parts is the application of the liner **11** to the last **18**. The toe box **10** is then cemented on the liner **11** to form the assembly shown in Fig. 2. The upper **25** is then applied to the last **18**. The upper **25** is tacked at the heel and is pulled over the last. The upper **25** containing the shoe liner **26**, as shown in Fig. 3, and a counter, not shown, is then completely side lasted with staples **29'**. This side-lasting extends up to the toe portion of the upper. Heel lasting then takes place and includes a wiping over of the heel portion and tacking the heel portion. Bed or toe lasting of the upper **25** and the shoe lining **26** over the toe box **10** of the liner **11** next takes place. This toe lasting includes wiping the toe end of the upper over the toe portion of the last, bedding down and securing with a toe lasting wire **30** the toe portion of the upper to form a skirt **31**. The toe lasting wire is anchored with anchor tacks **32**. After the pull over and the toe lasting, the shoe **29** is formed in the condition shown in Fig. 3 and the shoe is ready for inseaming and for the application of an outer sole.

Thus this invention eliminates the characteristic and customary inner lining of the steel toe boxes in safety shoes. In the place of this lining is presented the plastic liner **11** of this invention with its rear lip **14** and a sloped surface **33**. The liner **11** has a smooth inner surface **34** which becomes the inner surface of the toe portion of the completed shoe **29**. By eliminating the lining inside the toe box, this invention has eliminated the steps in the assembly of safety toe shoes in which the toe portion of the upper is turned back after the first pull-over, the safety toe is placed over the lasted lining, tape and felt are applied to the rear edge of the steel toe box, a second toe pull-over shapes the toe portion of the upper and a second side lasting completes the side lasting, all occurring before the final toe lasting of the upper.

The liner **11** of this invention is composed of plastic polyethylene as mentioned above. The polyethylene has a molecular weight of 18,000–21,000 and is molded to conform to the inside dimensions of the steel toe box **10** as well as the contour of the toe portion of the shoe last **18**. This invention provides a bond between the polyethylene liner **11** and the toe box **10**. An adhesive is provided which maintains the liner fixed against displacement. In general terms, this cement is a one-way cement which is applied to one or both of the two surfaces to be joined. It has 23% or 24% solids which are about equally divided between crude rubber and resin. The resins are usually rosin or its derivatives such as polypale ester. The solvent is petroleum naphtha except that about 10% toluol may be used to obtain a lower viscosity. The bond provided by this adhesive holds the parts of the shoe together and maintains their proper relationship.

Modifications of the steel toe box and plastic liner of this invention are shown and described in Figs. 6 through 9. Referring specifically to Fig. 6, a steel toe box **36** is shown. This steel toe box **36** may be a steel toe box which is satisfactory for the safety purposes for which it is intended but without the wide inturned flange. Shown in Fig. 6 together with the steel toe box **36**, is a liner **37** of this invention. The liner **37** may be, and in this embodiment preferably is composed of polyethylene. This plastic polyethylene is preferably within a molecular weight range of 18,000 to 21,000. As indicated in Fig. 6, the liner **37** is designed and intended to fit substantially within a toe box **36**. Thus, according to this invention, it is intended that liners be made to fit the various sizes of steel safety toe boxes.

In Fig. 7 the combined steel safety toe box **36** and plastic liner **37** are shown assembled on a conventional safety toe shoe last **38** composed of a suitable material for the assembly of the safety toe shoe. The liner **37** is shown lying between the last **38** and the steel safety toe box **36**. The liner **37** is provided with a rear lip **39** which forms a rear edge **40** of the liner. As shown in the section of the partly broken away portion of the assembled toe box **36** and liner **37** of Fig. 6, the liner **37** is formed so that the rear lip **39** has at its forward edge **41** a shoulder **42**. The toe box **36** and the liner **37** fit together so that the toe box **36** abuts against an outer surface **43** of the liner **37** and a rear edge **44** of the toe box **36** abuts against the shoulder **42** of the liner **37**. The liner **37** is shown provided with a downwardly extending flange or rib **45** which is present when this invention is applied to shoes manufactured by the Goodyear welt process. This invention is applicable to the manufacture of shoes by the McKay process and the liner **37** of this invention does not have the rib **45** when incorporated in shoes made by the McKay process.

In Fig. 8 a shoe is shown in the course of manufacture. A shoe upper **46** is shown mounted on the last **38**. In Fig. 8 the toe box **36** is in position on the last **38** with the liner **37** cemented to the toe box **36** and fitted on the last **38** under the toe box **36**. The upper **46** containing

a counter not shown is mounted on the last 38 and tacks 47 inserted at the rear central area in the heel assembly operation to hold the upper 46 in place. The upper 46 of Fig. 8 has been pulled over and is ready for side lasting. An insole 48 is shown mounted on the last 38 and has a welt rib 49. The insole 48 is shown fastened to the last 38 by tacks 50. The toe box 36 and the plastic liner 37 surround the toe of the last 38 and are positioned to abut closely thereto and to each other. The rib 45 of the liner abuts against the toe end of the welt rib 49. The liner 37 has a flanged portion 51 which curves over the last 38 and over the outer edge of the insole 48. Thus positioned the steel safety toe box 36 and the plastic liner 37 are in close juxtaposition and fit snugly on the toe end of the last 38. The upper 46 is extended to overlie completely the steel safety toe box 36 and the liner 37. In this condition the upper 46 and its associated parts are ready for the toe lasting mentioned above in the upper assembly and for the subsequent completion of the shoe.

In Fig. 9 a shoe 52 is shown in completed form with the toe portion cut away to show in section the parts of this invention. The shoe 52 has a conventional heel 53 and outer sole 54 which are added to the shoe after the completion of the above mentioned steps. A filler composition 55 is applied to fill cavity between the insole 48 and the outer sole 54. The sectional view of the toe portion of Fig. 9 shows the structure of this invention as incorporated in the completed shoe 52. The plastic liner 37, the steel safety toe box 36 and the upper 46 are a three-layer combination which form the toe portion of the shoe 52. The plastic liner 37 is innermost with the steel toe box 36 situated between the liner 37 and the upper 46. The liner 37 is formed to extend beyond the rear edge 44 of the toe box 36. Thus the liner 37 is interposed between the toe box 36 and the interior of the shoe 52. The shoe 52 is a Goodyear welt type shoe. Accordingly the flange 45 of the liner 37 extends downward adjacent and substantially parallel with the welt rib 49. The upper 46 similarly has an edge which fits around the toe box 36 and in the completed shoe 52 underlies the toe box 36. The upper 46 is fastened to insole 48 by means of the welt rib 49. The outer sole 54 is attached to the upper 46 and the insole 48 by means of a welt 58 and the welt rib 49.

As described above in connection with the embodiment shown in Figs. 1 through 5, at the rear edge 44 of the toe box 36 the lip 39 of the liner 37 may be wedge shaped so as to provide a surface 56 tapering upward. The tapering lip 39 terminates in the rear edge 40 which is a relatively thin or fine edge. The lip 39 of the polyethylene liner 11 is formed so as to flare outwardly of the toe box 36 and is sufficiently stiff to abut against and maintain contact with an adjacent portion of an inner surface 57 of the upper 46. Thus positioned the inside of the liner 37 presents a smooth continuity with the inner surface of the upper 46.

In the use of the toe box 10 embodied in Figs. 1 through 5, the flange 16 serves to spread any blow on the toe box 10. As the flange 16 is positioned over the welt rib 27, the force is transmitted to a strong portion of the insole 23. Another advantage to the flange 16 is that by spreading the blow on the toe box 10, the flange 16 eliminates or minimizes cutting into the insole 23.

Advantages of this invention, in general, are the elimination of many operations necessary to the manufacture of safety toe footwear by conventional methods; it also provides for a smooth liner under the steel toe box without the necessity of double lasting operations.

The safety toe construction of this invention provides a shoe which is longer lasting and has a better appearance than any previous safety toe shoe of comparable simplicity in construction. This invention combines the advantages of a simple inexpensive construction with the elimination of well-recognized objectionable features of safety toe shoes. The need for an attractive appearance in women's workshoes makes the safety toe construction of this invention particularly applicable to women's shoes. Among other advantages, this invention provides a means for minimizing the break in the upper across the region directly behind the steel toe box. Another advantage is the elimination of the bite of the rear of the steel toe box into the toes of the wearer which occurs at the rear edge of the steel box toe.

In the modification of the toe box flange there is provided a means for increasing the life of the shoe as well as strengthening the shoe. As a result of incorporating the modified toe box into a shoe, bunching under the toe edge of the insole is eliminated.

The reduction in the number of steps necessary in the manufacture of safety toe shoes according to this invention includes steps involving the preparation of the leather under-box in the conventional safety toe shoe. The steps which are eliminated include cutting the leather under-box, splitting the leather under-box to a desired thickness range, skiving back the edge of the leather under-box, cementing the leather under-box to the shoe lining, and stitching the rear edge of the leather under-box to the shoe lining.

The above described embodiments of this invention have been set forth for the purpose of illustration. Modifications of the plastic polyethylene liner, the flange of the steel toe box and the bond between the polyethylene liner and the other parts may be made within the spirit of this invention. As pointed out above, this invention is applicable to shoes manufactured by other manufacturing methods than the Goodyear welt method of manufacturing. For example, this invention may be incorporated in the McKay type shoe and the McKay method of shoe manufacture. The method of this invention is also applicable to the stitch-down method of manufacture and other methods and to the shoes produced by these methods. Accordingly, it is intended that this invention be limited only by the scope of the following claims.

I claim:

1. An improved liner for use with a metallic safety toe of the type having a concavo-convex dome-like box with depending lateral and forward edges and being open at its rear edge, said liner comprising: a unitary member made of a solid polyethylene plastic film of concavo-convex shape to conform to the contour of the undersurface of a toe box with which it is used and cooperable to be applied thereto, said member having depending lateral and forward edges and being open at its rear edge and having a transverse marginal area extending across its rear portion defined by an upstanding forwardly facing shoulder on its upper surface spaced a short distance from its rear edge, said shoulder being cooperable to engage the rear edge of the toe cap with the upper surface of said marginal area being smooth and being cooperable to form a continuation of the upper surface of the toe cap.

2. An improved liner for use with a metallic toe cap as set forth in claim 1 in which the said transverse marginal area of said liner member tapers in thickness from the shoulder to the rear edge so as to provide a relatively fine feathered edge.

3. An improved liner for use with a metallic toe cap as set forth in claim 1 in which an inwardly projecting flange is provided at each of the two lateral edges of the transverse marginal area of the liner member.

4. An improved liner for use with a metallic toe cap as set forth in claim 1 in which the lower ends of the depending lateral and forward edges of the liner member are provided with a continuous inturned shoulder portion terminating in a depending flange.

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