March 2, 1948. J. HOZA 2,437,030

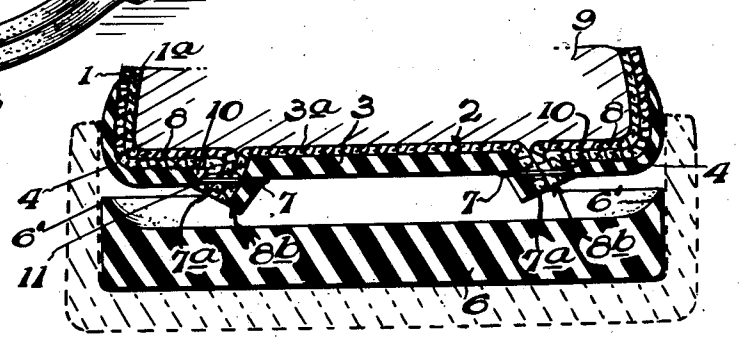
ATTACHMENT OF RUBBER SOLES TO UPPERS OF SHOES

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Fig. 1.



Fig. 2.



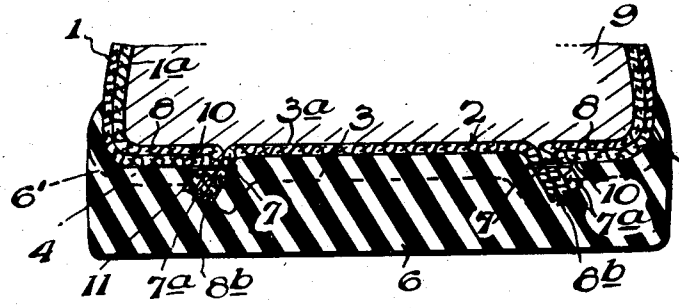


Fig. 3.

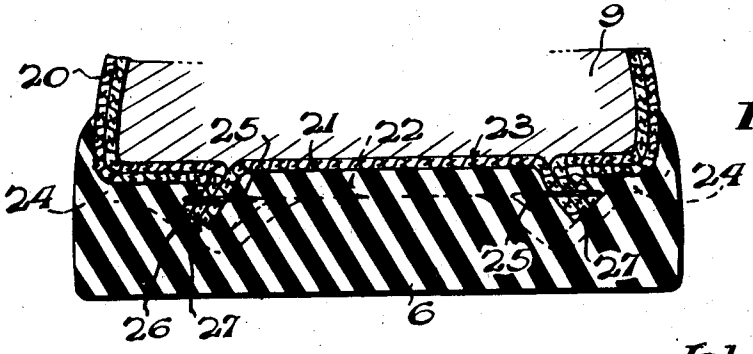


Fig. 4.

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Fig. 6.

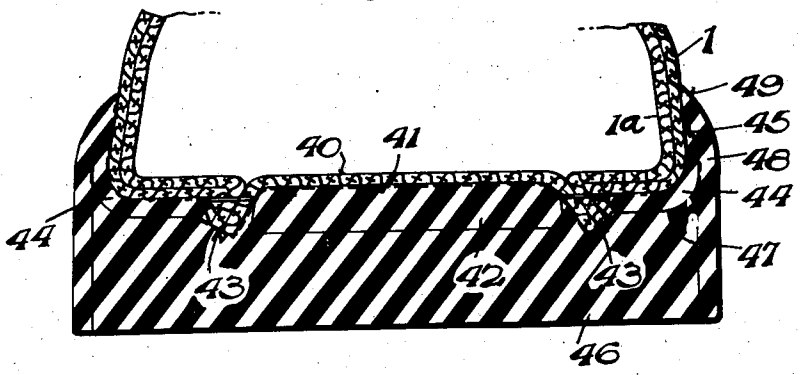


Fig. 5.

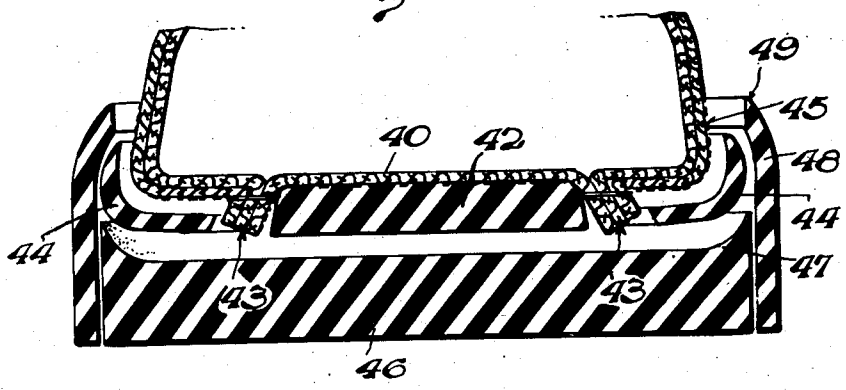
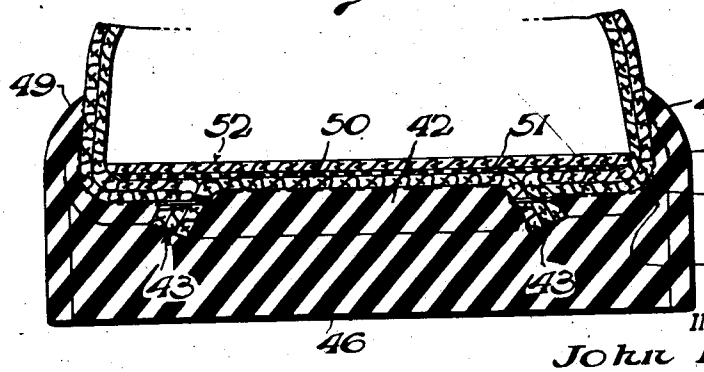


Fig. 7.



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Patented Mar. 2, 1948 2,437,030

UNITED STATES PATENT OFFICE

2,437,030

ATTACHMENT OF RUBBER SOLES TO UPPERS OF SHOES

John Hoza, Belcamp, Md.

Application June 19, 1946, Serial No. 677,785

11 Claims. (Cl. 36—14)

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This invention relates to improvements in shoes and to the method of making same, and is a continuation in part of my pending application, Serial No. 570,142 filed December 28, 1944, now abandoned. In the manufacture of shoes, more particularly that type of shoes wherein the upper is composed of fabric and a lining and the sole is of rubber or like material with a lining, great trouble, and incidentally, considerable expense, is involved in lasting skeleton shoes of this type preparatory to forming or attaching the soles to the uppers. For instance, it is customary when uniting the upper to the lower portion of the type of shoe of which this invention is an improvement, that the lower portion of the upper be stitched to the end portion of the inner sole or the lining forming part of the inner sole as close to the line of the side wall of the shoe as possible. Hence, when forcing the skeleton shoe thus formed on a last to shape it, the pressure exerted on the material by the last forces the flexible upper outwardly directly on the stitches, and they pull out and the parts become separated. To some extent, what may be termed edge stitching as now employed in the manufacture of shoes, when such shoes are worn, the same separation of the stitches result as when lasting the skeleton shoe.

The object of the present invention is to overcome this very serious handicap in the manufacture of shoes made of fabric and rubber. To produce a stronger and more substantial shoe, according to my invention, I stitch the lower end portion of the upper and the inner sole lining together, to form a skeleton shoe, the line of stitches being set back somewhat from the edges of the upper and inner sole. This skeleton is forced on a last which is wider than the distance between the rows of stitches, so that a part of the upper will become a part of the bottom of the shoe sole, with the stitches located a substantial distance from the side of the shoe, a distance not less than one-eighth of an inch and not more than one quarter of an inch, depending on the nature of the material, said stitches being substantially parallel with the bottom of the shoe. In the lasting step, the lower turned-in portion of the upper and the inner lining of the inner sole stretches throughout the whole area of the shoe bottom, while the stitched ends of the fabric project below the bottom and below the stitches, thus in lasting the shoe, strain on the stitches is greatly reduced. In addition to this important result, the lower portion of the upper between the sides of the shoe and the line of stitches forms with the

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inner sole a distinct part of the bottom of the shoe directly over the outer sole.

Once the skeleton shoe is set on the last, a vulcanizable rubber foxing strip is applied to the lower turned-in portion of the upper to reinforce the shoe structure at this point. Then, an outer sole of vulcanizable rubber is applied over the bottom of the inner sole and a portion of the foxing strip, the parts being temporarily held together by the inherent adhesive characteristics of the vulcanizable rubber.

The skeleton or preliminary shoe thus formed, and while it is on the last, is put in a mold and vulcanized under pressure to form a homogeneous mass permanently attached to the upper. By the method employed, the stitching between the parts described is prevented from pulling apart when assembling the elements, and at the same time the upper is securely anchored in the vulcanized rubber, and when the shoe is completed, a portion of the upper forms a part of the shoe.

In the drawings:

Figure 1 is a perspective view of the improved shoe.

Figure 2 is a cross section of the shoe on an enlarged scale, with the parts assembled in diagrammatic form prior to vulcanizing.

Figure 3 is a cross section on an enlarged scale after the shoe is vulcanized.

Figure 4 is a similar view, showing a slightly different way of applying the foxing strip.

Figure 5 is a cross section in diagrammatic form showing a slightly different form of the invention.

Figure 6 is a similar view after the shoe has been vulcanized.

Figure 7 is a detailed view illustrating means for protecting the inner sole against stain.

With more particular reference to Figures 1 to 3, the improved shoe is shown as of the type involving a flexible fabric or other appropriate material upper 1, with a lining 1*a*, an inner sole 2, comprising a vulcanizable portion 3, a fabric lining 3*a*, a vulcanizable foxing strip 4, and a main sole 6, each and all of which parts, as generally identified, are conventional in shoes of this type.

In the initial operation tending to the formation of the skeleton of the improved shoe, the upper 1, upper lining 1*a* and inner sole 2 are secured together in defining the shoe outline, as by stitching 7 or other preferred or conventional securing means.

When the skeleton is formed, it is placed on a last wider than the distance between the opposite rows of stitches 7, so as to turn the lower portion of the upper inwardly, substantially at right

angles to the side of the shoe, and horizontally in line with the inner sole, as shown at 8, a distance not less than one-eight of an inch or more than one quarter of an inch, this distance depending entirely on the nature of the material used, sufficient to say, the line of stitching must be remote from the side of the shoe. The inner lower end of the upper extends downwardly and outwardly, as shown at 7a. The inner sole and its lining 3a extend between the downwardly extended portion of the upper and in the same horizontal plane as the turned-in horizontal portion 8 of said upper. The opposite ends of the inner sole and lining extend downwardly and outwardly as at 8b and fit against the surface of the correspondingly downwardly and outwardly extended end portion of the upper, and are stitched, as previously stated, to form a projection 8b, as will be presently described. Thus, the lower portion of the upper and the inner sole and lining form the complete bottom of the shoe. As will be seen, following the uniting of the inner sole and upper, when the skeleton shoe is placed on a last 9 to shape it, the actual bottom of the shoe extends beyond the edges of the inner sole 2 and includes a definite length of the lower portion of the upper, as clearly indicated in Figures 2 and 3. This lasting operation positions the projection 8b inwardly of the marginal edge or side of the shoe, and incident to this lasting formation, the projection 8b will be given a decided inclination downwardly from the bottom of the shoe. In this formation, there is provided between the projection and the actual bottom of the then preliminarily formed shoe a pocket 10, which is an important element of one form of the improved construction.

In lasting the skeleton shoe, great outward strain is imposed, which, when the stitches are formed at the edge of the shoe as now practiced, pull is directly on the stitches, and they break and the parts become separated. However, in the construction described, this difficulty is obviated, because by setting back the line of stitches from the side of the shoe and parallel with the bottom of the shoe, the outward pressure created when forcing the shoe on the last pulls or stretches the lower portion of the upper and inner sole throughout the area of the bottom of the shoe. Thus, the pull on each side of the stitches stretches the fabric of both the upper and inner sole and reduces the strain on the stitches.

A conventional foxing strip as 4 is applied to the turned-in portion of the upper, this foxing strip extending upwardly a slight distance on the side of the upper, as is conventional in foxing strip application. The lower portion of the foxing strip, for the purposes of the present improvement, underlies the side edges of the shoe, and its free edge 11 extends to or about to the pocket 10. Then, a main sole 6, having an upstanding edge 6' is applied, the sole 6, bottom of the shoe, the outer sole, and foxing strip being preliminarily held in assembled position by the adhesive characteristics of the material.

At this point, emphasis is put on the fact that the outer sole extends beyond the side of the shoe to insure that the lower turned-in horizontal portion of the upper is directly over and is securely fastened to and becomes a part of said outer sole.

As stated, the main sole 6 adheres to the inner sole and foxing strip by the adhesive characteristics of the material. The shoe thus formed on the last is then placed in a vulcanizing mold and vulcanized under pressure, and incident to such vulcanization and pressure, the main sole unites integrally with the vulcanizable portion 3 of the inner sole and the foxing strip 4. Furthermore, in the vulcanizing step, the foxing strip and the rubber portion of the inner sole are vulcanized to the fabric upper and fabric portion 3a of the inner sole.

In the form of the invention described, vulcanization takes place in a mold, the plastic condition of the vulcanizable portion of the inner sole, the foxing strip, and the outer sole merging into an integral indivisible unitary mass, and under the pressure in the mold during the vulcanizing step, a portion of this mass will completely fill the pocket 10, and thus completely embed the bonding projection 8b in this unitary mass.

As shown in Figure 3, the completed shoe presents below the upper and the fabric portion of the insole a unitary indivisible mass of rubber, into which the projection 8b depends, and is completely embedded, as this projection is now made up in effect of an appreciable length of the upper and an appreciable length of the fabric portion 3a of the insole. These parts, that is, the upper and inner sole are securely bonded and anchored in the main sole of the shoe, with the bonding securely materially added to by the integral portion of the completed outer sole and foxing strip forced into the pocket 10.

In the slightly different form of the invention, shown in Figure 4, the elements employed and the method pursued are similar to that of the form previously described. That is to say, in the modified form, the shoe includes an upper 20 of flexible material, an insole 21, including vulcanizable material 22, a fabric portion 23 and a foxing strip 24. The edges of the upper and insole are stitched together at 25 to leave a margin 26 to provide a bonding projection 27.

The shoe is lasted, as in the preferred form, to dispose the projection 27 inwardly of the edge of the bottom. The foxing strip 24 is applied in the usual manner, and it is in this particular element that the modification resides. In this modified form, the foxing strip 24 has a length to underlie the bottom of the shoe and overlie the lower edges of the projection 27.

In the disclosure of the invention shown in Figures 5 and 6, the shoe is formed somewhat similar to that heretofore described.

In this form of the invention, the skeleton shoe is formed as previously described, except that the material forming the lower element 42 of the inner sole is not attached to the fabric bottom 40 when the parts 40, 1a and 1 are sewed together. The skeleton shoe is lasted as previously described, and the lower portion of said skeleton is submerged in cement, indicated at 41, which is an important factor when a mold and pressure are not employed in the vulcanizing step. The cement 41 is permitted to dry. Then, while the skeleton shoe is on the last, a vulcanizable filler 42 is applied to the lining 40 between projection 43 formed by the stitched terminals of the upper and insole lining. Then, a foxing strip 44 is applied to the horizontally turned-in lower portion of the upper, with one end of such strip abutting against the projection 43, its upper end being extended up a substantial distance on the side of the upper, as shown at 45. An outer sole 46 of vulcanizable rubber is then placed over the filler 42 and the foxing strip 44, the flange 47 on the said outer sole snugly fitting over the foxing strip. A second foxing strip 48 is applied to the edge of the outer sole, over the first-mentioned

foxing strip 44, and beyond the upper edge of the latter, to the upper as shown at 49.

It will be understood in assembling the parts the filler 42 is preliminarily attached to the insole fabric bottom, and the first-mentioned foxing strip 44 is attached to the upper by the cement 41, while the second-mentioned foxing strip 48 is attached to the first-mentioned foxing strip 44 by the inherent characteristics of the material, although the extreme upper end portion of the second-mentioned foxing strip 48 is attached to the upper by the cement.

When the preliminary shoe is thus formed, and while on the last, it is placed in a vulcanizer to vulcanize the assembled parts. In this step of vulcanization, pressure as such, as employed in a mold, is not necessary as the heat employed in vulcanizing coacts with the cement and the vulcanizable rubber to produce a practically inseparable mass composed of the filler, foxing strips, outer sole and upper. While pressure, as when using a mold, is not required in the manufacture of this particular shoe, the parts become permanently attached but do not lose their identity as in the first form described. In this instance, the projection formed by the terminal edges of the upper and fabric bottom lining below the stitches is inclosed but not embedded in the material as in the first form. In other respects, in the modified form of the invention, to offset the strengthening of the shoe when the projection is not actually embedded in the rubber, the two foxing strips 44 and 48 and the manner of securing them in place are employed.

The underlying purpose in forming a shoe such as disclosed in Figures 5 and 6 is economy in manufacture. A shoe, such as made according to the first described form while on a last, is clamped in a mold and is under pressure with sufficient heat, and the vulcanizable parts merge together in a homogeneous mass, and a strong durable product results. A shoe made as disclosed in Figures 5 and 6 possesses the same general characteristics as in the preferred form, except that the cement and vulcanizing heat coact to take the place of pressure in vulcanizing to securely bind the elements together in a less expensive and more economical way than when vulcanizing in an expensive mold. In other words, the character of cement employed cooperates with the inherent characteristics of the vulcanizable rubber to closely and intimately unite the parts.

The double thickness of rubber at the point of bend of the upper, plus the set back of the seam from the side of the shoe and the tie between the edge of the outer sole and the upper per se provide a susbtantial bond between the upper and sole. Thus, to compensate for the strength flowing from embedding the extended ends of the upper and inner sole in the mass forming the outer sole in the preferred form, the overlapping foxing strips in the modified form are provided, but in both instances the lower portion of the upper is turned in horizontally in the same plane as the inner sole to form the bottom of the shoe with the stitches set back a substantial distance from the side of the shoe.

The essential and underlying characteristic of the invention, both in the main and modified forms, may be summed up as follows. Utilization of a part of the bottom of the upper to form a horizontal continuation of the inner sole by setting back the stitches from the side of the shoe to spread the strain incident to outward pressure when lasting, or when the shoe is worn; the particular way the parts are secured together which includes a portion of the inner sole, the main sole, and a portion of the upper, to prevent possibility of the separation of these parts from the main sole as long as the latter remains as a part of the shoe.

The type of inner soles of general use in the manufacture of shoes is made up of a lower layer of raw rubber and an upper layer of fabric. In some instances, in the use of such an inner sole, it has been found that in the final vulcanization of the shoe, the stain of the rubber works through the necessarily thin fabric layer and presents an objectionable appearance. Means are here provided as a part of this invention for preventing the penetration of the rubber stain through the fabric by coating the upper surface of the fabric layer of the inner sole with a stain-resisting compound, and then applying a second fabric layer over the coated surface of the first mentioned layer of fabric. One form of coating employed may consist of a solution made up of the following proportions by weight: Darex 20%, clay (McNamee) 6.6%, Darvan No. 1, 1%, casein 3.3%, water, including the inherent water in the mixture 9.9%, ammonium hydroxide 1%. Other stain-resisting compounds may be employed, but the mixture outlined has been found to serve the purpose. As stated, this solution is applied to the outer surfaces of the initial fabric layer of the inner sole prior to the application thereto of the final fabric layer. The solution not only firmly secures the final fabric layer in place over the initial fabric layer, but prevents the rubber stain from the rubber below from reaching the upper fabric layer during final vulcanization of the shoe. This form of inner sole is shown in Figure 7, wherein the initial fabric layer is shown at 50, and a layer of the solution, enlarged for illustration purposes, shown at 51, and the final or upper fabric 52. In this instance, the fabric inner sole is vulcanized directly to the outer rubber sole.

What I claim is:

1. A shoe, including an upper having its lower portion turned inwardly horizontally to form part of the shoe bottom, the terminal edges of the upper extending downwardly and outwardly at an angle toward the side edges of the shoe, an inner sole extending between the turned-in portions of the upper and in the same horizontal plane to complete the bottom of the shoe, the marginal edges of the inner sole extending downwardly and outwardly at an angle corresponding to and contacting with the correspondingly turned terminal edges of the upper, stitches uniting the contacting terminal edges of the upper and inner sole to form an anchor, a mass of rubber providing an outer sole vulcanized to the inner sole and that portion of the upper forming part of the shoe bottom and also vulcanized to the lower portion of the shoe upper proper to provide an edge protective portion for the upper, and said anchor and stitches being enclosed in the mass of rubber to secure the meeting edges of the turned-in portion of the upper and of the inner sole, said stitches uniting such parts against breakage or separation during use of the shoe.

2. A shoe, including an upper having its lower portion turned inwardly substantially at right angles to the side of the shoe to form part of the shoe bottom, the terminal edge of the up-

per extending downwardly below the bottom of the shoe, an inner sole extending between the turned-in portion of the upper and in the same horizontal plane to complete the bottom of the shoe, the marginal edge of the inner sole extending downwardly below the bottom of the shoe corresponding to and contacting with the correspondingly turned-down terminal edge of the upper, stitches uniting the contacting ends of the upper and inner sole, a foxing strip extending over the turned-in portion of the upper, a mass of rubber providing an outer sole vulcanized to the inner sole and to the foxing strip, the terminal portion of the upper and inner sole and the stitches thereof being enclosed in the mass of rubber, whereby the upper, inner sole, foxing strip and outer sole are united against breakage.

3. A shoe, including a flexible upper having its lower end turned inwardly to provide a horizontal bottom portion, the inner end of the horizontal portion of the upper extending downwardly, an inner sole and lining extending between the downwardly extended portion of the upper and in the same horizontal plane as said horizontal turned-in portion, the inner end of the inner sole and lining extending downwardly and in matching contact with the turned-down inner end of the upper, stitches uniting the turned-down ends of the upper and the inner sole and lining, a foxing strip over the turned-in portion of the upper, the inner end of the foxing strip terminating against the outer surface of the turned-down end of the upper, an outer sole vulcanized to the inner sole, foxing strip and downwardly extending ends of the upper, inner sole and lining, the lower turned-in horizontal portion of the upper outwardly of the line of stitches being directly over a part of the outer sole.

4. A shoe, including an upper having its lower portion turned inwardly substantially at right angle to the side of the upper to form part of the shoe bottom, the turned-in end of the upper extending downwardly below the bottom, an inner bottom lining extending between the turned-in portions of the upper and in the same horizontal plane to complete the bottom of the shoe, the ends of the inner lining extending downwardly below the bottom corresponding to and contacting the ends of the upper and inner lining, a coating of cement over the bottom of the lining and lower portion of the upper, a rubber filler interposed between the oppositely disposed downwardly turned-in ends of the upper and inner lining to form an inner sole, said filler being attached to the lining by the cement, a rubber foxing strip, the lower edge of which extends to the outer surface of the downwardly turned-in end of the upper, the inner surface of the rubber strip engaging that portion of the upper forming part of the bottom of the shoe, said rubber foxing strip being attached to the upper by the cement, a rubber outer sole held by the cement and extending over the bottom of the rubber filler, the edges of the terminals of the lining and upper and the lower portion of the first-mentioned rubber foxing strip being attached in position by the cement, a second-mentioned rubber foxing strip, the lower portion of which engages the edge of the rubber outer sole and extends over the first-mentioned rubber foxing strip, the rubber filler, rubber foxing strips, and rubber outer sole being vulcanized and combined with the cement to permanently secure said elements together and to the upper.

5. A shoe, including an upper having its lower portion turned inwardly to form a horizontal part of the shoe bottom, the terminal edges of the upper extending downwardly at an angle to the shoe bottom, an inner sole extending between the turned-in horizontal portion of the upper and in the same horizontal plane to complete the bottom of the shoe, the marginal edges of the inner sole extending downwardly at an angle to the bottom of the shoe corresponding to and lapping over the correspondingly turned-down terminal edges of the upper, stitches uniting the lapped terminal edges of the upper and inner sole to form a projection, and a mass of rubber to provide an outer sole vulcanized to the inner sole and that portion of the upper forming part of the shoe bottom and also to the lower side portion of the upper to provide an edge above the outer sole proper, the projection and stitches being enclosed in the mass of rubber to secure the meeting edges of the upper and inner sole and the uniting stitches against undue strain or separation.

6. A shoe, including a flexible upper having its lower portion turned inwardly substantially at right angle to the side of the upper and terminating at least an eighth of an inch and not more than one quarter of an inch from the side of the upper to form a horizontal part of the shoe bottom, the end of the upper being turned downwardly, a vulcanizable inner sole having a lining extending between the turned-down ends of the upper, the inner sole and lining being in the same horizontal plane as the horizontal portion of the turned-in lower part of the upper to complete the bottom of the shoe, the marginal edges of the inner sole and lining extending downwardly corresponding to and contacting with the correspondingly downwardly turned end of the upper, stitches uniting the contacting down-turned ends of the upper, and inner sole and lining, a mass of rubber providing an outer sole vulcanized to the inner sole and that portion of the upper forming part of the shoe bottom and the lower side portion of the shoe to provide an edge protective portion for the upper, the turned-down end portions of the upper and inner sole lining and the stitches being encased in the mass of rubber, whereby the upper, inner sole, foxing strip and outer sole are secured together.

7. A shoe, including an upper having its lower portion turned inwardly substantially at right angle to the side of the shoe to form part of the shoe bottom, the terminal edge of the upper extending downwardly below the bottom of the shoe, an inner lining extending between the turned-in portion of the upper and in the same horizontal plane to complete the bottom of the shoe, the marginal edges of the inner lining extending downwardly below the bottom of the shoe corresponding to and contacting with the correspondingly turned-down terminal edge of the upper, stitches uniting the contacting ends of the upper and inner lining, a strip of rubber below the inner lining to form with said inner lining an inner sole, a foxing strip extending over the inturned portion of the upper and vulcanized thereto, an outer sole vulcanized to the inner sole and to the foxing strip, the terminal portions of the upper and inner sole lining and the stitches thereof being enclosed between the inner sole, the foxing strip and outer sole, whereby the upper, inner sole, foxing strip and outer sole are united against separation.

8. A shoe, comprising an inner sole having a

lining, the ends of the lining being turned downwardly, an upper having its lower end portion turned inwardly in a horizontal plane to correspond to the horizontal plane of the lining of the inner sole and having its terminal edges turned downwardly, stitches uniting the turned-down ends of the upper and lining of the inner sole below said inner sole and the horizontally turned-in portion of the upper, and an outer sole vulcanized to the inner sole and the turned-in lower horizontal portion of the upper and enclosing the turned-down ends of the upper and lining of the inner sole.

9. A shoe including an upper having its lower portion turned inwardly substantially at right angles to the side of the shoe to form part of the shoe bottom, the terminal edge of the upper extending downwardly below the bottom of the shoe, an inner lining extending between the turned in portion of the upper and in the same horizontal plane to complete the bottom of the

shoe, the marginal edges of the inner lining extending downwardly below the bottom of the shoe corresponding to and contacting with the correspondingly turned down terminal edge of the upper, stitches uniting the contacting ends of the upper and inner lining, a strip of rubber below the inner lining to form with said inner lining an inner sole, a foxing strip extending over the inturned portion of the upper and vulcanized thereto, and an outer sole vulcanized to the inner sole and foxing strip.

10. A shoe as defined in claim 9, wherein a second foxing strip is vulcanized to the first mentioned foxing strip and the outer sole.

11. A shoe as defined in claim 9, wherein a second foxing strip is vulcanized to the first mentioned foxing strip and the sole, one of said foxing strips extending up to and vulcanized to the side of the shoe.

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