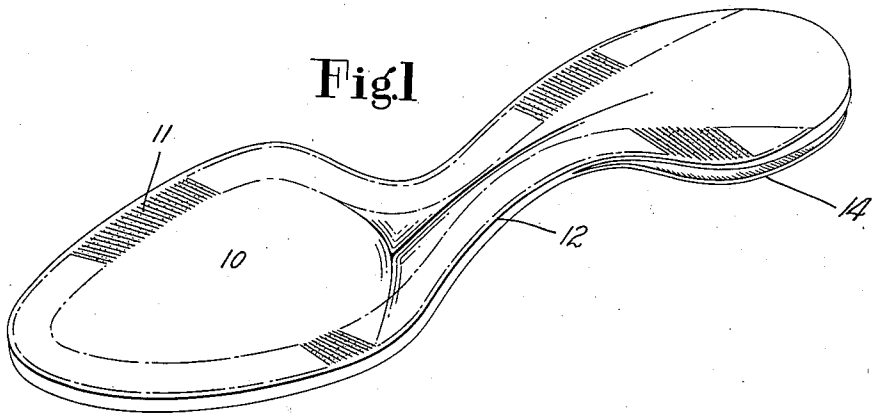
July 30, 1940. W. P. LE RETTE 2,209,406

OUTSOLE AND METHOD OF MAKING THE SAME

Original Filed April 4, 1938 2 Sheets-Sheet 1

Fig.1



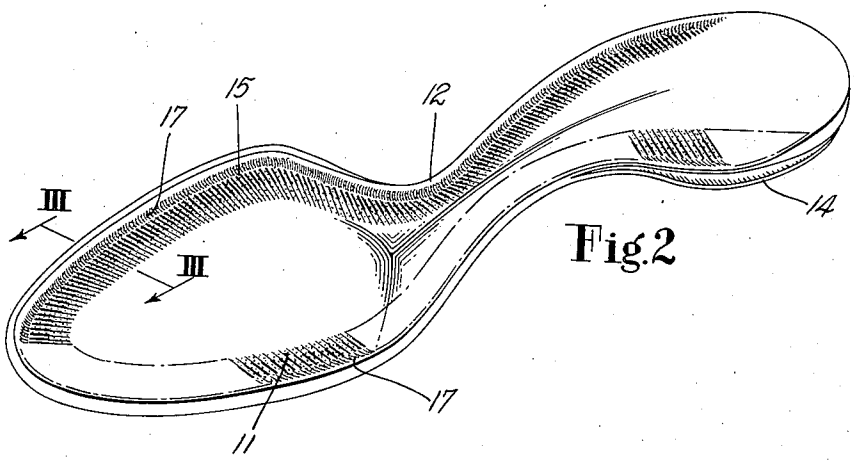


Fig.2

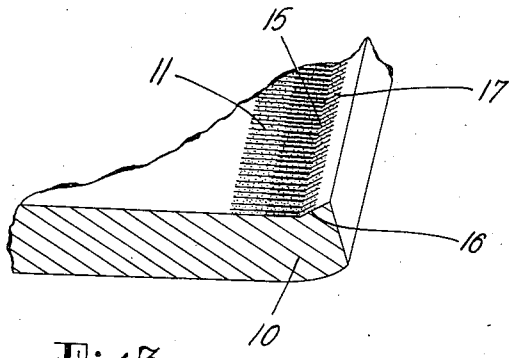


Fig.3

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OUTSOLE AND METHOD OF MAKING THE SAME

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Fig.6

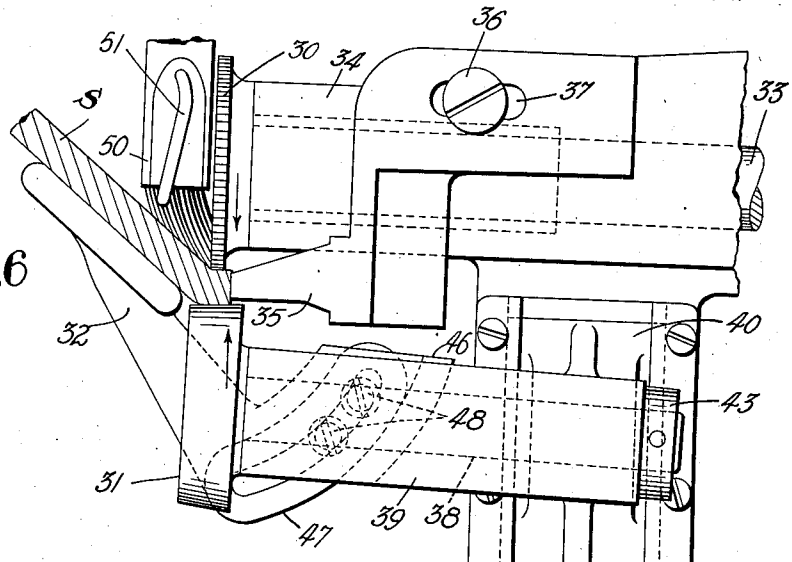
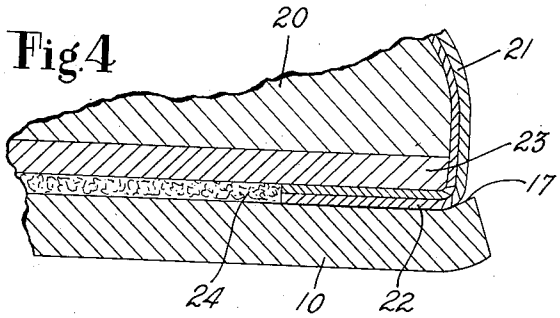
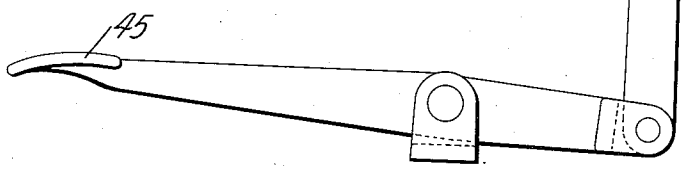


Fig.4





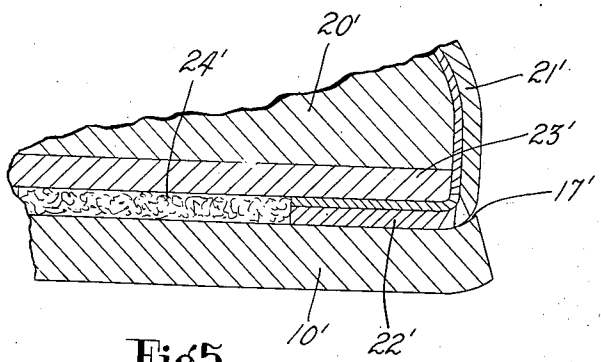


Fig.5

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Patented July 30, 1940 2,209,406

UNITED STATES PATENT OFFICE

2,209,406

OUTSOLE AND METHOD OF MAKING THE SAME

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Original application April 4, 1938, Serial No. 199,854. Divided and this application March 13, 1939, Serial No. 261,479

10 Claims. (Cl. 12—146)

This invention relates to improvements in outsoles and methods employed in preparing outsoles for attachment to shoes, the present application being a division of my pending application Serial No. 199,854, filed April 4, 1938. The invention is herein illustrated with special reference to the manufacture of shoes having cement attached outsoles and, more particularly, to shoes having outsoles attached by means of pressure-responsive rubber-like cements, such as the non-malodorant polymerized chloroprene taught in United States Letters Patents Nos. 2,061,296 and 2,087,878, granted November 17, 1936, and July 20, 1937, respectively, on applications filed in the name of Walter H. Wedger.

As taught in said patents, polymerized chloroprene cements for sole attaching have been developed which obtain a highly flexible joint and a bond approximately fifty per cent stronger than at present obtainable with the best of the pyroxylin adhesives so extensively employed for attaching soles to compo shoes. Moreover, the bond initially obtained between the surfaces carrying polymerized chloroprene (that is, the bond obtained when the surfaces are first brought together) is stronger than that obtained with pyroxylin cement even after several hours and sufficiently strong so that the sole attaching pressure may be safely released immediately after the cemented surfaces have been intimately pressed together, which is a great advantage in the quantity production of shoes, permitting the shoes to be promptly completed and making unnecessary a large number of sole attaching presses.

However, this latter advantage has heretofore been realized only where the soles have been attached while quite moist or in sufficient temper to render them substantially inert, as otherwise the margin of the sole, wrapped up over the feather line of the shoe by the conformable pad of the usual sole attaching press, will return to its normal condition. A dry sole will "spring back" upon release of the sole attaching pressure, due to the normal resilience inherent in dry sole leather, with the result that the rubber-like cement is stretched slightly to form a great number of short threads, spoken of as "legs," which appear as a dirty gray line in the crease of the shoe defined between the marginal portion of the sole and the upper. It will be appreciated that it is of great practical advantage to be able to attach soles in a substantially dry condition and to remove the shoe from the sole attaching press promptly. Where the soles are attached while wet, they conform so closely under the attaching pressure, usually about eighty pounds per square inch, that even small irregularities in the bottom of the shoe are reflected as objectionable marks on the tread surface of the sole, making necessary subsequent costly bottom finishing operations. Much the same results are obtained if the attaching pressure is increased or even if such pressure is maintained on dry soles for a protracted period, as would be required for the cement to cure sufficiently to hold the margin of the sole against its inherent resilience.

Accordingly, it is a principal object of the present invention to provide an improved outsole pre-fitted so that its margin is initially placed in substantially the form it is desired to have it assume in the finished shoe, thereby eliminating the tendency for the sole to change materially its relationship to the shoe bottom when the attaching pressure is applied, it being understood that to the extent the sole margin does not become distorted under the sole attaching pressure, it will have no tendency to change its relationship to the shoe when the sole attaching pressure is released, so that the objectionable cement legs will not be formed. Another object is to provide a practical method of preparing my improved sole member. Further objects will appear from the following specification.

Referring to the accompanying drawings which form a part of this specification,

Fig. 1 is a perspective view showing a rounded outsole, conformed or molded in the shank or waist portion to the desired longitudinal and transverse curvatures, and carrying a coating of cement at the margin of its shank and forward portions;

Fig. 2 is a view similar to Fig. 1 showing the same sole with the marginal portions of its shank and forepart bent in the direction of its attaching face in accordance with my invention;

Fig. 3 is a cross-sectional view on an enlarged scale taken on the line III—III of Fig. 2;

Fig. 4 is a cross-sectional view of my improved sole member, similar to Fig. 3, showing the relationship of the sole to the bottom of a lasted shoe having an upper of moderate thickness;

Fig. 5 is a view like Fig. 4 showing the same sole member in combination with a similar shoe having an upper of considerably greater thickness; and

Fig. 6 is a elevational view illustrating means for imparting the desired form to the sole margin.

In carrying out my invention, I first provide a tread sole 10 of leather, rounded to proper size and shape and preferably molded or conformed to impart the longitudinal and transverse shank curvatures desired, the margin of the sole being roughed or abraded and having cement applied thereto, as illustrated at 11 in Fig. 1. If desired, the sole may be reduced on its flesh side in the shank portion, as shown at 12, and may be split at the heel portion to provide a heel breast flap 14. The sole may also be reduced about the forepart margin preliminary to the roughing and cementing operations. When the sole is conformed in the shank portion, as shown, this may be done either before or after application of the cement, but where polymerized chloroprene cement is employed, I prefer first to apply the cement and thereafter, when the cement has dried, to conform the shank. On the other hand, if a pyroxylin adhesive is used, it may be found preferable to conform first and apply the cement afterwards. The conforming operation may be performed in a machine of the character illustrated in United States Letters Patent No. 1,939,750, granted December 19, 1933, on an application of E. E. Winkley. All the foregoing operations are usual in preparing soles for cement attachment, and the exact manner and means by which the soles are to this extent prepared are well known to those skilled in this art.

In accordance with my invention, the margin of the sole is progressively bent in the direction of the attaching face throughout both its shank and forward portions, the operation commencing near the heel breast line at one side and progressing through the shank, about the forepart, and through the margin of the shank portion on the opposite side of the sole. In this way, a continuous and substantially even upturn of the edge at the juncture of the forepart and shank portions is insured in cases where the shank portion has been molded or conformed, avoiding the formation of "ears" or marginal irregularities such as occur adjacent to the break line of the sole when the margin is progressively turned in the forepart only and the conforming operation is depended upon to position the edge at the shank or waist. It will also be apparent that, were the margin to be progressively turned or molded in the shank and forepart prior to a shank conforming operation, the latter operation would destroy the effect of the edge turning operation in the shank and impart instead a different effect peculiar to itself, producing "ears" adjacent to the break line of the sole where it is commonly most difficult to obtain proper edge conformation.

Where the sole is to be attached by means of pyroxylin and carries cement of that character, the margin may be turned in a turn sole molding machine of the usual type, such as the machine illustrated in United States Letters Patent No. 1,059,394, granted April 22, 1913, on application of J. E. Reid, to conform the attaching surface of the margin approximately complemental to the transverse edge curvature of the shoe, thereby facilitating the operation of locating the sole relative to the shoe preparatory to attachment and mitigating the subsequent tendency of the edge and margin to distort when the attaching pressure is applied and to "spring back" when such pressure is released. However, while such approximate conformation is helpful where slippery and comparatively slow setting cements such as pyroxylin are used the bond effected instantaneously by polymerized chloroprene is such as to prevent any shifting of the sole relative to the shoe bottom after the start of the application of the attaching pressure, with the result that at any points where the sole margin may be undermolded, it will be deformed under the attaching pressure and will spring back when the pressure is released, creating an objectionable gray line of cement legs in the crease of the shoe, while at points where the sole may be overmolded, the sole margin is distorted under the attaching pressure to form irregularities called "loops" in the tread surface of the sole opposite the cement joint, and the edge of the sole is wavy or undulating. In other words, where the cemented margin of the sole is overmolded, it will engage the cement-carrying overlasted margin of the upper before the central portion of the sole comes into proper bottoming position, and the marginal bond is so instantaneous as to prevent the sole from bottoming except by distortion of its fibers. I have found that it is impossible from a practical shoemaking standpoint to pre-mold and conform the margin of the sole to complement exactly the shoe bottom at the edge or feather line due to the fact that different shoes made on the same last will vary as to their transverse edge curvature, depending upon the thickness of the upper materials, and that even in a single shoe the convexity at the edge will vary due to differences in the combined thickness of the upper materials occasioned, for example, by seams, box toes, etc. Moreover, the means heretofore available for progressively molding the sole margin comprise rolls having curved faces between which the sole is engaged, and as the sole turns about between such rolls, the fibers are distorted to shape the margin differently at different parts, depending upon the changing curvature of the sole edge. For example, as the sharply convex toe portion of the sole passes between the rolls, the roll portions engaging the inner section of the margin must crowd or portions engaging closely adjacent to the edge must slip. Conversely, as the sole margin at opposite sides of the concave shank passes between the rolls, roll portions engaging inner marginal sections must slip or portions engaging adjacent to the edge must crowd. In this manner, different molded effects are obtained at different portions of the margin and the edge thickness of the sole is condensed to varying extents, obtaining an uneven edge.

Therefore, I prefer to bend the sole margin along a line 15 spaced inwardly of the edge, thereby to define a marginal flange 16 of uniform width having a face 17 without transverse curvature at its attaching side disposed at a uniform angle to the adjacent portion of the inner surface of the sole, as distinguished from the transversely curved flange faces formed by turn sole molding machines. A flange of this character is particularly preferred where the cement is pressure-responsive and obtains an instant bond which prevents slippage of the sole relative to the shoe in the attaching press, for example polymerized chloroprene cement. The attaching face of the flange extends at an angle of about 145° to the adjacent surface of the sole, such face being approximately tangent to the transverse curvature at the edge of the shoe bottom, so that when the sole is attached it will engage the edge of the shoe evenly and closely. I have found that for best results the line along which the margin of the sole is bent should closely correspond to

the edge of the insole of the shoe, although it may be spaced slightly outwardly of the insole edge where the upper of the shoe is exceptionally thick or somewhat inwardly of the insole edge in the case of very thin uppers. It is desired to point out that, although the flange is defined by a sharp bend or crease along the line 15 on the attaching face, no corresponding line or mark is formed on the tread surface of the sole margin, which curves gradually toward the sole edge.

In Fig. 4, 20 indicates a last carrying a lined upper 21, the overlasted margin 22 of which is secured to the insole 23, the space between the outsole 19 and the insole being occupied by filler 24. Like characters with an exponent indicate similar or identical parts in Fig. 5. By reference to Figs. 4 and 5, it will be clear that the sole margin, flanged as above described, will be tangent to the transverse curvature of the shoe bottom at the feather line regardless of normal variations in the thickness of the upper materials. These figures show lasted shoes in which the insoles, outsoles and lasts are identical, only the thickness of the upper and filler material being different, and it will be noted that in both views the flanged sole margin lies closely against the feather line of the shoe and will so lie entirely about the shank and forepart portions regardless of normal variations in upper thickness, a result which I have found unobtainable where it is attempted to mold the sole margin concavely to correspond with the transverse edge curvature of the shoe. Also, since the flange is disposed at a constant angle relatively to the adjacent portion of the body of the sole about the shank and forepart portions, no ears or irregularities are formed at the break line of the shoe, while the sole edge, being uncompressed and undistorted, retains its full thickness.

Thus, although no attempt is made to shape the sole margin accurately to fit and complement the transverse curvature of the edge portion of the shoe bottom, nevertheless the flange 16 conforms more evenly and obtains better edge character in the finished shoe than if soles having molded margins are attached, with the result that when the attaching pressure is applied, the relationship of the sole to the shoe bottom remains practically unchanged, no distortion of the sole margin being observable and, therefore, when the pressure is released, there is no appreciable spring back of the sole margin and no cement legs are apparent in the crease between the upper and the sole of the shoe.

To form the flange 16, I prefer to turn the margin progressively, and this may be readily accomplished by gripping the margin of the sole inwardly of the edge at one side of the shank near the heel breast line between the edges of oppositely rotatable wheels, bending the body of the sole at the desired angle to the thus engaged margin, and rotating the wheels to feed the margin between them while supporting the sole in its bent relation, the operation proceeding first along the margin of the shank at one side, then continuously about the forepart and then along the margin of the shank portion on the opposite side of the sole. In this manner, a continuous even and uniform flange is produced at all marginal portions, including the portion adjacent to the break line of the sole.

For this operation I have provided a machine, as shown in Fig. 6, comprising a pair of wheels, 30 and 31, respectively, cooperating to grip and feed the margin of a sole S between them in combination with a support 32 for holding the body of the sole at an angle to its margin when engaged between the wheels. The wheel 30, which is the feed wheel, is securely mounted on the end of a power shaft 33 rotatable in a bearing 34, and has a knurled edge of a thickness less than the breadth of the marginal flange desired on the sole. An edge gage 35 is clamped on the bearing 34 by a screw 36, a horizontal slot at 37 providing for adjustment of the gage to permit the formation of sole flanges of different breadths.

The supporting wheel 31 has a slightly beveled edge face of greater breadth than that of the wheel 30 and is supported on the end of a shaft 38 freely rotatable in a bearing sleeve 39 carried rigidly on a slide 40, a collar 43 pinned on the rearwardly projecting end of the shaft serving to retain the shaft in the sleeve. The slide is supported for vertical movements in guideways 41 formed in a bracket 42 depending from the bearing 34. The link rod 44 of a treadle 45 is pivotally connected to the slide whereby the slide and the supporting wheel 31 carried thereby may be elevated and held, as shown, to clamp the sole margin against the edge of the feed wheel. Upon release of the treadle, the slide and the assembly carried by it will drop until the lower end of the slide abuts against the bottom of the guideways, as will be readily understood.

The sole support 32 is carried by the sleeve 39, which is provided with a boss 46 having an arcuate slot formed therein to receive the similarly curved and slotted arm 47 of the sole support, screws 48—48 serving to secure the arm in different desired positions so that the sole engaging surface may be disposed at various angles to the edge faces of the wheels and soles may be formed having flanges extending at different angles. In this connection, it is desired to point out that the radius on which the slot 46 is curved has its center located near to the outer periphery at the top of the supporting wheel 31, or approximately at the location where the sole margin will be bent, and the sole engaging surface of the support lies in a plane radial to the same center, so that when the support is adjusted to different angular positions, it will, in effect, pivot about the bending point of the sole and maintain a large area in contact with the tread surface of the sole.

In use, the margin of the sole is inserted under the feed wheel 30 with its edge positioned against the edge gage 35. The treadle 45 is then depressed to raise the slide 40 and to grip the sole margin between the edges of the wheels, the support 32 at the same time engaging the body of the sole and bending it upwardly at the desired angle in relation to the engaged margin. Rotation of the feed wheel 30 then propels the sole to flange the margin progressively and uniformly. It will be noted that during this operation the attaching side of the sole margin is not engaged at the edge of the sole by the relatively thin feed wheel and that the outer peripheral edge portion of the supporting wheel, due partly to its bevel, does not engage the sole, with the result that the extreme marginal portion of the sole is not compacted and the tread surface of the margin is free to stretch and assume a gradual bend over a considerable cross-sectional area.

Further in accordance with my improved method of preparing soles for cement attachment, I prefer to apply the activator or solvent

for the cement progressively as the sole margin is bent or flanged, thus saving a separate operation or, considered in a different aspect, obtaining the flanged margin without adding to the number of operations required to be performed, since the solvent must in any case be applied. Aside from the economy afforded by this feature of my method, other practical advantages result. For example, it will be appreciated that the solvent could not satisfactorily be applied before flanging the margin of the sole, as the sole would then be in a tacky condition, difficult to handle, while, were it attempted to apply the solvent after formation of the flange, the flange would create an impediment to the proper application of solvent. Furthermore, application of the liquid solvent restricted to the attaching surface margin of the sole obtains a tempering effect, softening the leather fibers along the line of bend so that they will bend readily without breaking, and as the solvent dries out of the sole, the margin holds its bent or flanged condition without any appreciable tendency to spring back.

Accordingly, I provide my improved machine with means for applying solvent or activator to the margin progressively as the margin is flanged, the means illustrated comprising a brush **50** suitably supported on the machine for engagement with the work at the operating location, the solvent being conveniently supplied by a tube **51** extending into the bristles of the brush, substantially as illustrated. In this manner, a separate operation is obviated with the further advantage that the solvent tempers the leather at precisely the time when and place where tempering is most effective. However, it will be understood that where cements of a character which do not require solvent or activator are employed, such as latex cement, the cement rather than a solvent may be applied in the course of the edge bending operation.

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

1. An outsole having its marginal portion bent in the direction of the attaching side thereof to provide a marginal flange, said flange having a continuous attaching surface without transverse curvature throughout the entire width of the flange, and said flange having at its tread side a transversely convex surface.

2. An outsole molded in the shank portion to desired longitudinal and transverse curvatures and having its marginal portion bent in the direction of the attaching side thereof to provide a marginal flange extending about the shank and forepart portions of the outsole, said flange having an attaching surface transversely non-curved throughout the entire width of the flange and said flange having at its tread side a transversely convex surface.

3. An outsole having its marginal portion bent toward its attaching face along a line on the attaching face of the outsole inwardly of the edge and parallel thereto, said flange having throughout its entire width an attaching surface non-curved transversely, there being a transversely convex surface on the tread side of the flange, said line corresponding substantially to the edge of the insole of a shoe to which the outsole is to be attached.

4. An outsole conformed in the shank portion to fit the curvature of the shank portion of a lasted shoe and provided with a marginal flange extending about the shank and forepart portions thereof at a uniform angle to the adjacent portion of the sole, said flange being defined by a crease extending along a line on the attaching face of the outsole inwardly of the edge thereof and corresponding substantially to the edge of the insole of a shoe to which the outsole is to be attached, the surface of the flange on its attaching side being without transverse curvature for the entire width of the flange and the tread side of the flange having a transversely convex surface.

5. In methods of preparing soles for attachment to shoes, that improvement which comprises molding the sole in the shank portion thereof to impart the desired longitudinal and transverse curvatures thereto, and subsequently progressively bending the sole margin throughout both the shank and forward portions in the direction of the attaching face of the sole along a line spaced inwardly of the sole edge to form a continuous and uniform marginal flange having a transversely plane surface on the attaching side thereof.

6. In methods of preparing soles for attachment to shoes by means of pressure-responsive rubber-like adhesives, that improvement which comprises shaping the sole in the shank portion thereof to impart longitudinal and transverse curvatures thereto, and subsequently progressively bending the sole margin throughout both the shank and the forward portions in the direction of the attaching face of the sole uniformly and for a sufficient distance to prevent the formation of apparent cement legs in the crease of the shoe after the sole is attached, said bending being restricted to a line spaced inwardly of the sole edge and corresponding to the edge contour of the insole of the shoe to which the sole is to be attached, said line defining an integral marginal flange having a surface without transverse curvature on the attaching side thereof and extending at a uniform angle to the inner adjacent surface of the sole.

7. As an article of manufacture, an unattached outsole having its marginal portion entirely about the shank and forepart permanently bent toward the side of the sole which is to be attached to a shoe, said portion having an attaching surface transversely non-curved throughout the width thereof and extending continuously from and at an angle to the inner adjacent surface of the outsole such that the attaching surface of said marginal portion will be substantially tangent to the transverse marginal convexity of a shoe bottom.

8. As an article of manufacture, an unattached outsole having a marginal flange entirely about the shank and forepart permanently bent toward the side of the sole which is to be attached to a shoe and defined by a crease extending along a line on the attaching face of the outsole inwardly of the edge and parallel thereto, said flange having a transversely non-curved attaching surface extending at an angle to the inner adjacent surface of the outsole such that the attaching surface of said marginal portion will be approximately tangent to the transverse marginal convexity of a shoe bottom.

9. In methods of preparing soles for attachment to shoes by means of pressure-responsive rubber-like adhesives, that improvement which comprises progressively bending the marginal portion of the sole in the direction of the attaching face thereof uniformly and for a suf-

ficient distance to prevent the formation of apparent cement legs in the crease of the shoe after the sole is attached, said bending being restricted along a line on the attaching face of the sole spaced inwardly of the sole edge so that the attaching surface of said marginal portion is maintained transversely non-curved outwardly of said line.

10. In methods of preparing soles for cement attachment to shoes, that improvement which comprises progressively bending the sole margin in the direction of the attaching face of the sole at a uniform angle approximately tangent to the transverse convexity of the marginal portion of a shoe to which the outsole is to be attached, said bending being restricted to a line on the attaching face of the sole spaced inwardly of the sole edge so that the attaching surface of said margin is maintained transversely non-curved outwardly of said line.

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