This invention relates to the manufacture of soles for shoes and is herein illustrated with reference to the manufacture of so-called complemental insole-outsole combinations.

For the purpose of securing flexibility in the foreparts of shoes it is a common present-day practice to provide a skeleton insole having an opening in the central portion of its forepart and an outsole having a central forepart projection which is complemental to the opening in the insole, such an insole and outsole being commonly produced by splitting them from a single sole member or blank and being conveniently referred to as a “complemental insole-outsole combination.” Such insole-outsole combinations have been successfully used in the manufacture of shoes in cases where no channeling operations are required to be performed upon the insoles as, for example, where the uppers are to be secured in overlasted positions directly to the body of the insole as by cement or staples and where the outsole is to be cement-attached or is to be attached directly to the upper and insole by means of through-and-through fastenings. However, because of the fact that a skeleton insole is weaker and less capable of standing up under a channeling operation than an insole which has not been skeletonized, much difficulty has been experienced in properly channeling a skeleton insole for the purpose of providing an integral lasting lip thereon or for the purpose of providing thereon an integral rib, such as the usual sewing rib, to which the upper and welt is secured by an inseam in the manufacture of a welt shoe.

One object of the present invention is to facilitate the manufacture of complemental insole-outsole combinations for use in welt shoes or in shoes in the manufacture of which the upper is secured in overlasted relation to a lasting lip that is formed integrally with the insole.

With this object in view, the invention provides an improved method of making soles for shoes which consists in forming an integral marginal channel lip on an insole, securing the tipped insole to an outsole, and thereafter separating the central forepart portion of the insole from the rest of the insole and the rest of the insole from the outsole, thereby providing an insole having a marginal channel lip and a central forepart opening and an outsole having a central forepart projection complemental to the opening in the insole. As herein illustrated I have provided an insole having a lateral extension or wing in its Shank portion for providing support for the longitudinal arch of the foot and channeled the insole to form therein inner and outer channels and inner and outer channel lips of the type to which the upper and welt are secured by an inseam in the manufacture of welt shoes. The illustrated insole and outsole are secured together by means of cement in their central forward portions only, thereby providing a laminated blank or work piece from which the insole-outsole combination is produced by a splitting operation which results not only in dividing the laminated blank into an insole and an outsole but also in skeletonizing the insole by cutting an opening in its forepart in such a way as to leave the portion cut from the insole secured to the outsole to constitute the complemental projection upon the latter.

It will be recognized also that invention resides in a novel step product which results from the practice of my improved method and which consists of a unitary work piece or sole blank comprising an outsole member and an insole member having a marginal lip thereon, the insole member being secured in face-to-face relation to the outsole member.

The invention will be explained with reference to the accompanying drawings, in which

Figs. 1 and 2 are perspective views of an insole and an outsole, respectively, which are to be secured together in face-to-face relation to provide a unitary sole blank or work piece of laminated formation from which a complemental insole-outsole combination is to be produced, the soles being shown as they appear after the insole has been channeled and after the central portions of the foreparts of the soles have been coated with cement which is to be employed for securing the soles together;

Fig. 3 is a plan view of a gaging device such as may be employed in assembling the component parts of the laminated sole blank above referred to;

Fig. 4 is a perspective view of the laminated sole blank;

Fig. 4a is a cross-sectional view of the sole blank shown in Fig. 4;

Fig. 5 is a fragmentary sectional view illustrating the operation upon the laminated sole blank or work piece of a matrix roll splitting machine such as may be employed for the purpose of dividing the blank into an insole having an opening in its forepart and an outsole having upon its forepart a projection complemental to the opening in the insole;

Fig. 6 is a vertical sectional view of the matrix rolls of the splitting machine illustrating the
operation of the rolls upon the forward portion of the laminated blank:

Fig. 7 is a cross-sectional view of the forward portions of the insole and the outsole into which the laminated blank is divided by the action of the splitting machine, the soles being shown as they appear after the material operated upon has reacted from the deforming pressure exerted thereon by the matrix rolls;

Figs. 8 and 9 are perspective views, partially broken away, of the insole and outsole members, respectively, of the complemental insole-outsole combination made in accordance with my improved method; and

Fig. 10 is a fragmentary perspective view of an insole of modified formation having an arch supporting lateral extension in its shank portion.

In the practice of my improved method I first provide an insole 12 (Fig. 1) and an outsole 14 (Fig. 2). The insole 12 is preferably composed of flexible insole stock, such as split leather of desired quality and thinness. The outsole 14 is preferably composed of relatively thick and tough outsole leather having a grain surface 15 which is to constitute the tread face of the outsole member of the insole-outsole combination, and a flesh surface 18 which is to constitute the attaching surface of the outsole member.

As illustrated, I channel the insole 12 to form thereon a marginal lasting lip or one or more marginal lips adapted to be subsequently raised to constitute a lasting rib as may be desired.

The channeling operation may conveniently be performed by a sole channeling machine of any of the various well-known types. As herein illustrated the insole 12 has been channelled to provide therein an outer channel 20 and an inner channel 22 and thereby to provide an outer marginal lip 24 and an inner marginal lip 26, these lips being adapted to be raised to constitute a lasting rib to which the welt and upper of a welt shoe are to be attached. The insole may also be provided, as indicated at 28 in Fig. 10, with a lateral extension or wing at its inside shank portion (or if desired with such an extension at each side of its shank portion) for affording support for the longitudinal arch of the foot.

After being channelled and before the channel lips have been raised, the central forward portion of the insole 12 is coated with adhesive, for example, rubber cement or latex, and the corresponding portion of the flesh side 16 of the outsole 14 is similarly coated, as indicated in Figs. 1 and 2, wherein the cemented area of the insole 56 is indicated at 30 and the cemented area of the outsole at 32. As shown, the cemented areas 30 and 32 correspond to that of the base of the projecting portion which is ultimately to be formed upon the outsole and bear the same relation to the respective soles as that borne by the base of said projection to the outsole. Preferably the cemented areas are slightly smaller in size than the base of the projection to be formed upon the outsole to avoid damage to the insole lip being cemented to the outsole and also to facilitate the operation of dividing into separate insole and outsole members the laminated blank formed by cementing the insole 12 to the outsole 14. Advantageously, suitable templates may be employed to confine the application of the cement to the desired locations on the insole and the outsole. After the cement has dried so as to become sufficiently tacky, the insole and the outsole are assembled with the channelled face of the insole facing the flesh side of the outsole and the complemented forward portions of the soles are subjected to pressure which is maintained long enough to effect the desired secure bonding together of the soles and thereby the single composite blank or work piece already referred to. The provision of a composite work piece consisting of an insole and an outsole which are secured together by cement in their central forward portions only is not broadly new, however, such a work piece being disclosed in a pending application, Serial No. 2088, filed January 16, 1938, in the name of W. D. Thomas.

Inasmuch as the insole 12, as herein shown, is somewhat smaller in size than the outsole 14, the insole and the outsole may advantageously be located in the proper relative positions preparatory to securing them together with the aid of a gaging or locating device 36, such as that shown in Fig. 3.

The illustrated gaging device 36 comprises a flat sole supporting plate 38, an insole toe gage 40, cooperating insole shank gages 42 and 44, an outsole toe gage 46, and an outsole shank gage 48. The insole toe gage 40 comprises a plate which is fixedly secured to the supporting plate 38 and is formed with a V-shaped notch providing a gage face 50 adapted to engage the opposite lateral edge portions of the toe of the insole 12. The insole shank gage 42 is fixedly secured to the supporting plate 38 and is adapted to engage one lateral edge of an insole, the opposite lateral edge of which is engaged by the gage 44. The gage 44 is carried at the front end of a finger 52 which is pivoted at 54 to the plate 38 and is acted upon by a spring 56, the force of which tends to hold the gage 44 against the insole and yieldingly to hold the insole against the gage 42. The outsole toe gage 48 is similar in construction to the insole toe gage 40 and is secured to the latter by means of screws 58 which extend through slots 60 arranged to permit adjustment of the outsole toe gage for the purpose of varying the longitudinal relation of the insole and the outsole. The outsole shank gage 48 is similar in construction to the insole shank gage 42 and is secured in place by means of a screw 62 extending through a slot 64 arranged to permit adjustment of the outsole shank gage to vary the transverse relation between the insole and the outsole. The above-described gaging device is not claimed herein, being the subject-matter of a pending application, Serial No. 45,107, filed October 15, 1933, in the name of L. F. Weber.

In using the gaging device just described an insole, the forepart of which has been cemented, is first laid, channelled face upward, upon the supporting plate 38 with the toe of the insole engaging the toe gage 50 and the shank portion of the insole interposed between the shank gages 42 and 44. Thereafter, an outsole, the forepart of which has been cemented, is laid, cemented face down, over the insole with the toe of the outsole in engagement with the toe gage 48 and with the shank portion of the toe gage 46 in engagement with the shank gage 48, the position of the outsole being indicated by the dotted lines. Thus, by proper adjustment of the outsole gages relatively to the insole gages the insole and outsole may be assembled in the relative positions which they are to occupy when they are incorporated in a shoe. After having been thus assembled a slight amount of pressure applied to the forepart of the outsole will be sufficient to secure the soles together. Such pressure may be applied while the soles remain upon the plate by means of a suitable pressure applying appa-
ber or, after the foreparts of the soles have been manually pressed together so as to hold them temporarily against accidental displacement, they may be transferred to a suitable press where the final attaching pressure may be applied.

Thus, it will be seen that at this stage of my invention, by making complimentary insole-outsole combinations there has been produced a step product consisting of a unitary work piece 68 (Fig. 4) which, as shown, comprises an outsole member 70 and an insole member 72, the latter having a marginal channel lip at one side thereof, the two members 78 and 72 having the central portions of their foreparts permanently secured together by means of cement, as indicated at 74, with the channeled side of the insole member 72 facing the flesh side of the outsole member 70. (See also Fig. 4a.)

In proceeding with the practice of my improved method, the sole blank or work piece 66 is submitted to a splitting operation as a result of which the work piece 66 is to be divided into separate insole and outsole members. In order to produce, as a result of the splitting operation, an opening in the central forward portion of the insole and a complimentary projection on the corresponding portion of the outsole, the operation may advantageously be performed by means of a machine of the general type of that disclosed in a copending application, Serial No. 759,846, filed December 31, 1934, in the name of William D. Thomas. In the use of this machine the forepart of the work piece is temporarily deformed or distorted by depressing a portion thereof corresponding in shape and location to the shape and location of the opening to be produced in the insole so that the deformed portion will avoid the knife of the splitting machine by means of which the work piece is divided. As indicated in Fig. 5, the splitting machine comprises a single straight-edged splitting knife 80, an adjustable matrix roll 82, and a lower feed roll 84 which is yieldingly mounted so as to press the sole blank or work piece toward the upper roll. The upper roll 82 has formed therein a cavity 86 shaped to conform in outline to that of the opening to be formed in the forepart of the insole, while the roll 84 has formed therein a projection 88 that is complimentary to the recess formed in the upper roll 82. The upper roll may be adjusted relatively to the knife 80 so that as the sole blank is being fed past the knife the knife edge will be located between the insole and outsole members of the sole blank until the deformed portion of the blank reaches the knife, whereupon the knife will cut obliquely to the surface of the blank around its central forepart portion, thus cutting a beveld opening in the forepart of the insole member and separating the insole member from the outsole member, leaving the portion cut from the forepart of the insole member and constituting a projection upon the latter which is complimentary to the opening in the insole. If the insole 10 and the outsole 12 are cemented together at those portions of their foreparts which are to be made complimentary to each other and which are deformed or inoperative of the matrix rolls, the oblique cut above referred to will entirely separate the insole from the outsole. However, if the cemented area extends beyond the deformed portion of the blank, the knife will cut along the plane of adhesion in the unformed portion of the insole member and constituting the separation of the insole from the outsole. It will be understood that even if the insole and outsole members of the laminated blank are cemented together throughout the entire areas of their contacting surfaces the members of the complimentary insole-outsole combination finally produced will be entirely separated one from the other by the action of the splitting machine. After the deformed portion of the work piece has been advanced past the knife and after the sole blank has had an opportunity to react from the deforming pressure of the rolls, the complimentary insole-outsole combination resulting from the splitting operation will appear as shown in Figs. 7, 8, and 9, the combination comprising an insole 80 having a central forepart recess 92 and an outsole 84 having a central forepart projection 96 which is complimentary to the recess 92. As shown, the insole 80 is also provided with the outer and inner channel lips 24 and 26, respectively, which are adapted to be raised and, if desired, reinforced to constitute a sewing rib.

It will be apparent from the foregoing that, in accordance with my invention, by first channeling an insole member and thereafter securing the channeled insole member to an outsole member so as to provide a laminated sole blank or work piece, and finally dividing the laminated blank or work piece in such a manner as to provide a channeled insole with a forepart opening and an outsole with a forepart projection complimentary to the insole opening, a practical solution has been obtained for the problem of making complimentary insole-outsole combinations, the insole members of which are to be both skeletonized and channeled in their foreparts, and the difficult and unsatisfactory operation of channeling a previously skeletonized insole is avoided. Furthermore, by the practice of the method herein described, the expense of making complimentary insole-outsole combinations will be substantially less than if they were produced from an integral or solid leather blank, it being apparent that the relatively thin insole and outsole members which are secured together to constitute the laminated blank are less expensive than a single blank of a thickness equal to the combined thickness of the insole and the outsole. In accordance with this method, also, insole-outsole combinations may be obtained in much heavier weights than would be possible where a single thickness of stock is divided. This method also provides for making the insole from regular insole stock, for example, split leather which is softer, more flexible and better adapted for use in making insoles than is the relatively expensive and tough outsole stock, and which, of course, is less expensive than outsole stock.

An insole-outsole combination produced by the practice of the method herein described is adapted to be employed in the usual way in the manufacture of a shoe, the insole being assembled with an upper on a last, the upper being lasted and secured to the insole, and the outsole being assembled and secured in proper relation to the insole and the upper. If the insole has been channeled in such a way as to provide a lasting lip thereon, the upper will, of course, be placed in overlapped position to this lip. If, on the other hand, the channeling operation resulted in the formation of inner and outer channels, the channel lips are raised to form a solid lip to which the welt and upper of a welt shoe are to be secured, after which the channel lips may be laid and secured to the welt in accordance with the usual procedure in the manufacture of a welt shoe.
Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. That improvement in methods of making soles for shoes which consists in forming an integral marginal channel lip on an insole, securing the lipped insole to an outsole, and thereafter separating the central forepart portion of the insole from the rest of the insole and the rest of the insole from the outsole, thereby providing an insole having a marginal lip and a central forepart and an outsole having a central forepart projection complementary to the opening in the insole.

2. That improvement in methods of making soles for shoes which consists in providing an insole with an arch-supporting lateral extension in its shank portion and forming upon said insole an integral marginal lip, securing the lipped insole to an outsole, and thereafter separating the central forepart portion of the insole from the rest of the insole and the rest of the insole from the outsole, thereby providing an insole having a marginal lip and a central forepart opening and an outsole having a central forepart projection complementary to the opening in the insole.

3. That improvement in methods of making complementary insole-outsole combinations which consists in channeling an insole thereby forming an integral marginal channel lip therefore, securing the central forward portion only of the lipped side of said insole to an outsole by means of adhesive, and thereafter separating said central forward portion of the insole from the rest of the insole, thereby providing an insole having a marginal lip and a central forepart opening and an outsole having a central forepart projection complementary to the opening in the insole.

4. That improvement in methods of making complementary insole-outsole combinations for use in the manufacture of welt shoes which consists in channeling an insole and thereby forming inner and outer marginal channel lips thereon, securing the central forepart portion only of the channeled side of the insole by means of adhesive to the central forepart portion of an outsole, and thereafter separating said central forepart portion of the insole from the rest of the insole thereby providing an insole having a marginal channel and a central forepart opening and an outsole having a central forepart projection complementary to the opening in the insole.

5. That improvement in methods of making complementary insole-outsole combinations for use in the manufacture of welt shoes which consists in providing an insole with an arch-supporting lateral extension in its shank portion, channeling the insole and thereby forming inner and outer marginal channel lips thereon, securing the central forepart portion only of the channeled side of the insole by means of adhesive to the central forepart portion of an outsole, and thereafter separating said central forepart portion of the insole from the rest of the insole thereby providing an insole having a marginal channel, a lateral arch-supporting shank extension, and a central forepart opening and an outsole having a central forepart projection complementary to the opening in the insole.

6. That step product in the manufacture of insole-outsole combinations which consists of a unitary work piece consisting only of an outsole member and an insole member having a marginal lip thereon, said insole member being arranged with the lipped side of the insole member facing the outsole member and having their foreparts permanently secured together only in the locality within said marginal lip.

7. That step product in the manufacture of insole-outsole combinations which consists of a unitary work piece comprising an outsole member and an insole member having a marginal lip thereon and having a lateral extension in its shank portion for providing support for the longitudinal arch of the foot, said insole member being permanently secured in face-to-face relation to said outsole member by means of adhesive in the central forward portions only of said members.

8. That step product in the manufacture of complementary insole-outsole combinations which consists of a unitary work piece consisting only of an outsole member and an insole member, the latter having a marginal channel lip at one side thereof, and said members being arranged with the channeled side of the insole member facing the outsole member and having their foreparts permanently secured together in their central portions.

9. That step product in the manufacture of complementary insole-outsole combinations for use in making welt shoes which consists of a unitary work piece comprising an outsole member and an insole member, the latter having inner and outer marginal channels and channel lips at one side thereof, and said insole member having that portion only of the channeled surface of its forepart which is located within the inner channel secured by means of adhesive to the corresponding portion of one face of said outsole member.

10. That step product in the manufacture of complementary insole-outsole combinations for use in making welt shoes which consists of a unitary work piece comprising an outsole member and an insole member, the latter having inner and outer marginal channels and channel lips at one side thereof and having a lateral extension in its shank portion for providing support for the instep arch of the foot, and said insole member having that portion only of the channeled surface of its forepart which is located within the inner channel secured by means of adhesive to the corresponding portion of one face of said outsole member.

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