Sept. 14, 1954 A. S. CLARK 2,688,759

METHOD OF MAKING RIBBED INSOLES

Filed Feb. 23, 1951 3 Sheets-Sheet 1

Fig. 1.

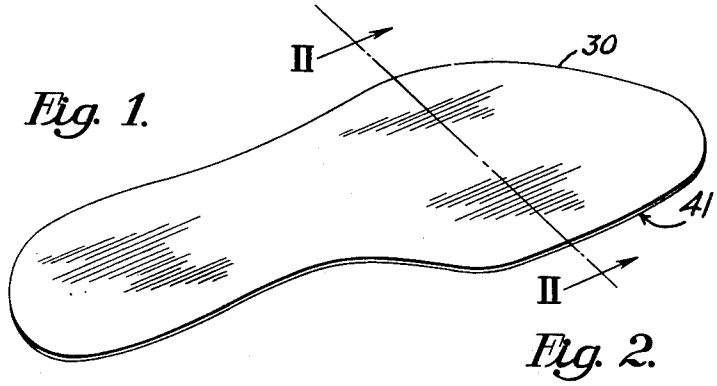


Fig. 2.

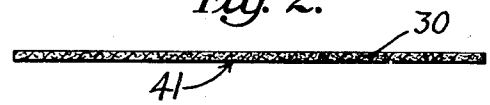


Fig. 3.

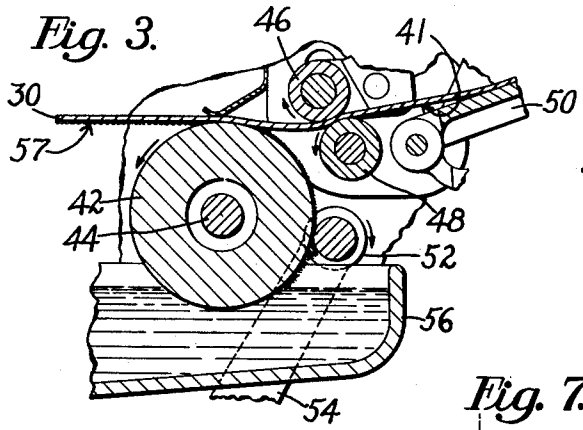


Fig. 4.

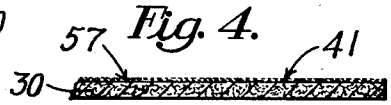


Fig. 5.

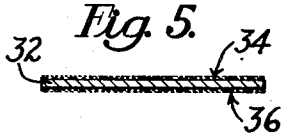


Fig. 6.

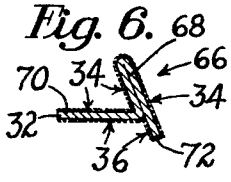


Fig. 7.

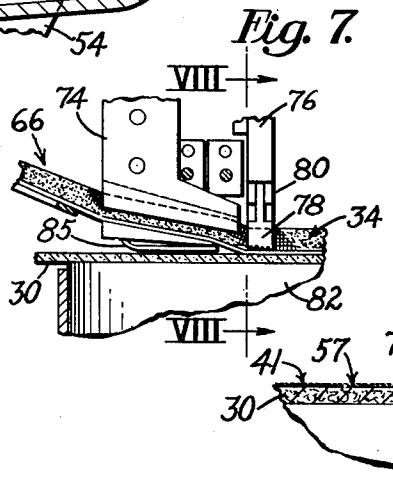


Fig. 8.

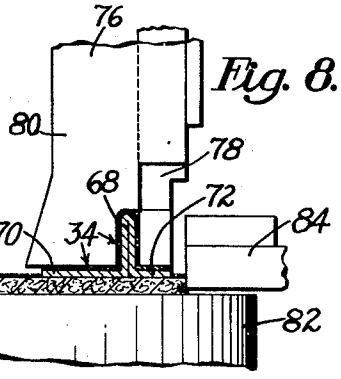
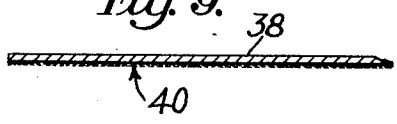


Fig. 9.



Inventor

Alfred S. Clark

By His Attorney

METHOD OF MAKING RIBBED INSOLES

Filed Feb. 23, 1951 3 Sheets-Sheet 2

Fig. 10.

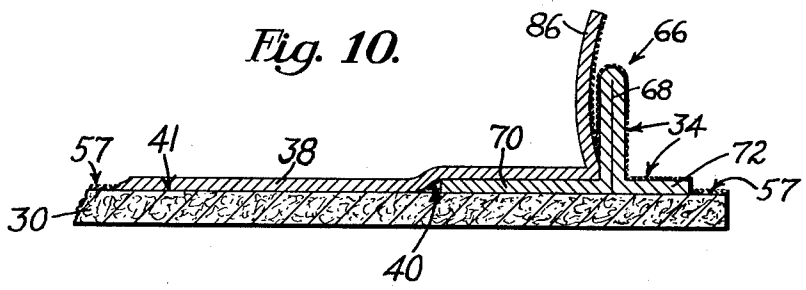


Fig. 11.

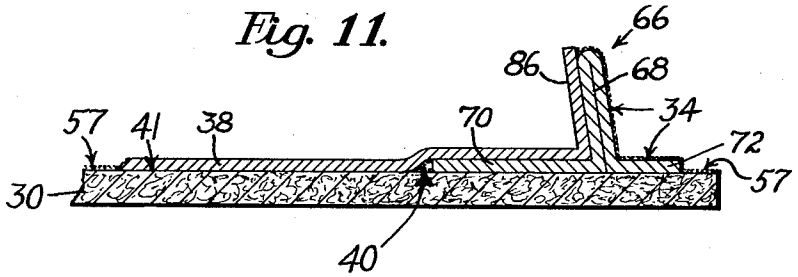
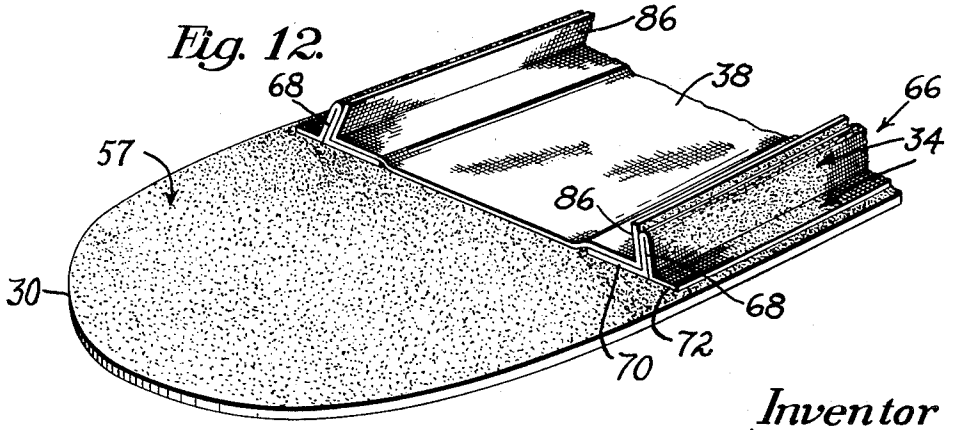


Fig. 12.



Inventor
Alfred S. Clark
By His Attorney

Sept. 14, 1954 A. S. CLARK 2,688,759

METHOD OF MAKING RIBBED INSOLES

Filed Feb. 23, 1951 3 Sheets-Sheet 3

Fig. 13.

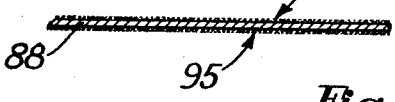


Fig. 14.

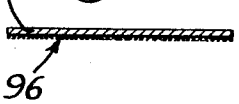


Fig. 15.

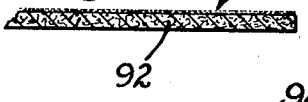


Fig. 16.

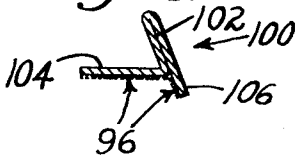


Fig. 17.

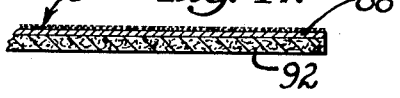


Fig. 18.

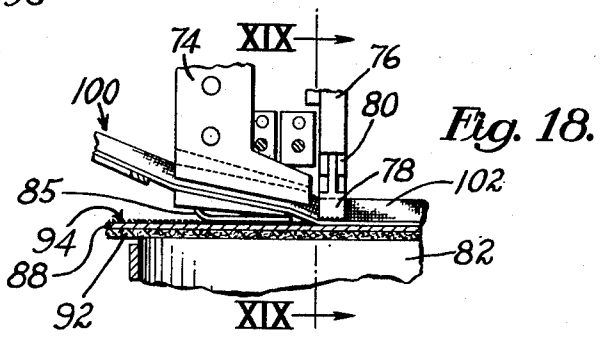
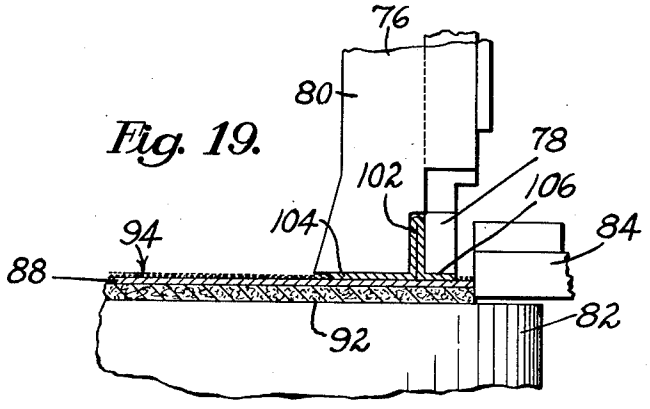


Fig. 19.



Inventor

Alfred S. Clark

By His Attorney

Patented Sept. 14, 1954

2,688,759

UNITED STATES PATENT OFFICE

2,688,759

METHOD OF MAKING RIBBED INSOLES

Alfred S. Clark, Beverly, Mass., assignor to United Shoe Machinery Corporation, Flemington, N. J., a corporation of New Jersey

Application February 23, 1951, Serial No. 212,435

1 Claim. (Cl. 12—146)

1

This invention relates to methods of making insoles and is illustrated herein with reference to methods of making insoles having sewing ribs thereon for use in the manufacture of welt shoes.

In the manufacture of shoes of the types referred to, the insole has a rib around its margin to which the upper is lasted and the upper and welt are stitched during the construction of the shoe. This sewing rib takes the strains of the lasting and inseaming operations and also tensions of the upper during the wearing of the shoe. It is necessary, therefore, that the rib be strong enough to withstand these strains and hold the upper in shape during the life of the shoe.

Economy insoles have been used for many years in making welt shoes but they are gradually being replaced by cheaper types of insoles having sewing ribs thereon, these insoles comprising thin flexible members which are too thin to channel in the manner of Economy insoles to form the sewing rib. The sewing ribs on these thin insoles usually comprise ribbed strips or tapes of fabric material attached to the insoles by stitches or cement. Some of these insoles are made entirely of leather or other fibrous materials and some are laminated by uniting a layer of leather with a layer of cheaper fibrous material. It is desirable in such insoles, however, in order to strengthen the rib, to reinforce the insole and rib in a manner similar to that in which channeled insoles are usually reinforced, that is, either by an all-over fabric reinforcement on the ribbed side of the insole, or by a fabric strip cemented to the inner side of the rib and the adjacent surface of the insole body.

Before these reinforcements can be attached to Economy or other types of ribbed insoles, it is necessary to apply cement to the inner side of the rib and the adjacent surface of the insole body and to permit this cement to dry sufficiently to be in a proper condition to bond the reinforcing material permanently to the insole. This involves a special cementing operation and a drying period for each individual insole which increases the cost of the insole. Moreover, it is difficult to apply this cement to the inner side of the sewing rib, particularly if the rib is thin and flexible, because such a rib has a tendency to bend away from the brush or the rolls of the extruding types of cement applying machines which are generally used today for this purpose. This difficulty has been partially overcome by stiffening the outer side of the sewing rib with a stiffening solution but this expedient has not always been successful and even the stiffened ribs sometimes bend down during the cement applying operation. The stiffening of the sewing rib in this manner obviously involves an extra operation and further increases the cost of the insole.

2

The cement applied to the inner side of the rib and body portion of the insole for reinforcing purposes is not always applied uniformly to the rib and insole and this operation usually results in a messy and time-consuming operation. Moreover, as indicated above, when fresh cement is applied in this way, it must be permitted to set or dry long enough to put it into a proper condition for the reinforcing operation, which takes time and increases costs. Since it would take too long to dry the cement thoroughly, as in an oven, the cement is usually somewhat tacky when the reinforcing material is applied to the insole and it has a tendency to interfere with the proper application of the reinforcing material, particularly the all-over type of reinforcing material which covers the inner side of the rib and the entire body portion of the insole inwardly of the rib.

A further difficulty arises when fresh cement is used for reinforcing purposes and is applied to insoles having ribbed strips or tapes attached thereto to provide sewing ribs. The wet cement penetrates into the fabric material forming the ribbed strip and causes this material to shrink when the cement dries. Such shrinkage causes the insole to bend or curl up lengthwise instead of remaining in its original flat condition. This distortion, which is commonly known as "strapping," is particularly noticeable in insoles composed of thin flexible materials which are the kind to which preformed tape ribs or strips are usually attached.

It will be observed from the foregoing that a thin flexible insole having a ribbed strip or tape attached thereto to form a sewing rib, and being reinforced on its outer or ribbed surface with fabric material, will be subjected to at least two separate cementing operations and sometimes more, depending upon the construction of the insole and the manner in which it is reinforced. As stated above, these individual cementing and drying operations are time consuming and add to the cost of making the insoles, besides slowing up production.

An important object of the present invention is to provide an improved method of making thin flexible insoles of the type referred to in the practice of which the difficulties enumerated

above will be eliminated or reduced to a minimum.

To these ends the invention provides, in accordance with one aspect, an improved method of making insoles which consists in first coating the outer surface of the insole blank with pressure-responsive cement and allowing the cement to set or dry, the drying period usually being rather short but depending to some extent upon the kind of cement used. This single drying period, however, constitutes the only delay or wait occurring in the present method because the other members referred to as making up the insole have already been precoated with cement on one or both sides and have been dried in an oven in the usual manner during their manufacture. Accordingly, such members are already in condition for immediate use in constructing the insole. A double-coated tape is next folded progressively to form a ribbed strip suitable for attachment to an insole to provide a sewing rib thereon, the ribbed strip when completed being coated on all its exposed surfaces with pressure-responsive cement. This double-coated member, that is, the preformed ribbed strip in the present instance, is then pressed against the coated surface of the insole blank to attach the strip permanently to said surface by reason of the pressure-responsive cement thereon and on the lower or sole-engaging surface of the ribbed strip.

The single-coated layer or sheet of reinforcing material is next attached to the insole blank, in accordance with the present aspect of the method, without any delay or wait by pressing said sheet against the blank and ribbed strip with the precoated surface of the sheet facing the ribbed surface of the insole blank, thereby immediately attaching the reinforcing material to the blank and ribbed strip by reason of the pressure-responsive cement on the reinforcing sheet and also on the outer surface of the blank and exposed surfaces of the double-coated ribbed strip forming the rib. The reinforcing sheet engages the inner surface only of the rib leaving the outer surface of the rib exposed for the attachment of the lasting margin of the upper thereto in any known manner. In this way, the thin flexible insole blank is transformed almost immediately into a finished ribbed insole reinforced on its ribbed surface with an additional layer of sheet material without any delay or wait other than the one short delay occasioned by the coating of the outer surface of the blank with cement at the beginning of the process. Since a relatively large quantity of insole blanks may be coated at one time with pressure-responsive cement preparatory to carrying out the method, this single delay can be reduced to a minimum and the method performed on large quantities of insole blanks without the several successive delays that would ordinarily be required if it were necessary to coat the parts individually with cement and dry them separately in the usual manner prior to their use in the method.

It will be seen from the foregoing that the present method of making ribbed insoles of the type referred to herein eliminates most of the delays usually found necessary in making such insoles in accordance with the methods used heretofore. In other words, in the practice of the present invention, large quantities of thin flexible insoles, having ribbed strips attached and being reinforced on their ribbed surfaces with fabric material, can be manufactured in a condition ready for immediate use in shoes without the delays

usually caused by the necessity of performing one or more cementing operations on each individual insole during the practice of the method. Accordingly, in the practice of the present method, the cost of the insoles is substantially reduced and the insoles may be produced in relatively large quantities at sufficient speed to render their manufacture feasible, even though all parts used in making up the insoles are secured in position by pressure-responsive cement. Furthermore, as pointed out above, the insoles will remain substantially flat after the ribbed strips and reinforcing materials have been attached because there will be no shrinking of the fabric materials after they have been secured to the insole blanks.

With the above and other aspects and features in view, the invention will now be described in detail in connection with the accompanying drawings and will thereafter be pointed out in the claim.

In the drawings,

Fig. 1 is a perspective view of a thin flexible insole blank composed of leather with the grain surface facing upwardly, the blank being approximately half size;

Fig. 2 is a transverse sectional view through the forepart of the insole blank taken on the line II—II of Fig. 1, the view being enlarged to approximately full size;

Fig. 3 is a vertical section at approximately half size through the cement applying mechanism of a machine for coating insole blanks, the machine being shown operating on the blank;

Fig. 4 is a transverse section of the right-hand portion of the insole blank after pressure-responsive cement has been applied to its upper surface, as shown in Fig. 3, the blank being drawn at approximately twice size;

Fig. 5 is a transverse section through a strip of tape used in the present method, the tape being precoated on both sides with pressure-responsive cement and being shown at approximately twice size;

Fig. 6 is a transverse section of the tape after it has been formed into a completed ribbed strip adapted for attachment to an insole;

Fig. 7 is a side elevation, partly in section, showing the preformed ribbed strip being attached to the outer surface of the insole blank;

Fig. 8 is a vertical section taken on the line VIII—VIII of Fig. 7 but enlarged to show the parts more clearly;

Fig. 9 is a transverse sectional view of a portion of a sheet of conventional reinforcing material precoated on its lower surface with pressure-responsive cement;

Fig. 10 is a transverse section of the insole of Fig. 8 after the ribbed strip has been attached and the reinforcing material of Fig. 9 applied to the insole and pressed or "boned" into the angle at the inner side of the rib, the view being enlarged to twice the size of Fig. 8;

Fig. 11 is a section similar to Fig. 10 after the reinforcing material has been fully attached to the insole and its marginal portion has been trimmed to complete the insole;

Fig. 12 is a perspective view of the heel portion of the completed insole;

Fig. 13 is a transverse sectional view of a sheet of thin backing material precoated on both sides with pressure-responsive cement;

Fig. 14 is a sectional view of a strip of tape coated on one side only with pressure-responsive cement;

Fig. 15 is a transverse section similar to Fig. 4

of one side of an insole blank with pressure-responsive cement applied to its upper surface, the blank being enlarged to approximately twice size;

Fig. 16 is a transverse section similar to Fig. 6 showing the single-coated tape of Fig. 14 folded to form a completed ribbed strip suitable for attachment to an insole;

Fig. 17 shows the double-coated sheet material of Fig. 13 attached to the upper surface of the insole blank;

Fig. 18 is a side elevation, similar to Fig. 7, showing the ribbed strip of Fig. 16 being attached to the insole blank of Fig. 17; and

Fig. 19 is an enlarged sectional view, similar to Fig. 8, taken on the line XIX—XIX of Fig. 18.

In carrying out the method of the present invention, a thin flexible insole blank 30 is provided, illustrated at approximately half size in Fig. 1 and being preferably composed of leather. The insole blank 30 is shown about three or four irons thick and has been cut or died out to approximately the shape desired in the shoe so that it conforms generally to the shape of the bottom of the last upon which the shoe is to be made. Fig. 2 is a transverse section through the forepart of the blank near the ball line portion thereof, as indicated at II—II in Fig. 1, this view illustrating at full size the width of the blank as compared to its thickness.

In addition to the insole blank 30, a strip of tape 32 (Fig. 5) is also provided, the tape being illustrated at twice size and being precoated on both sides with pressure-responsive cement which is indicated in Fig. 5 by stippling and the reference numerals 34 and 36. The strip of tape 32 is approximately ⅞ of an inch wide and is composed of fabric material such as canvas or Gem duck, the fabric being preferably of medium weight or thickness, for example, about 18 to 20 thousandths of an inch thick. The cement 34, 36 on the opposite sides of the tape 32 is a pressure-responsive cement such as rubber cement, latex or other cement comprising synthetic rubber-like materials. It may be applied to the tape in any convenient manner but preferably by machine and the cement is then allowed to dry. In commercial practice, the drying of the cement is usually accelerated by heat. After the cement has dried, the strip of tape may be rolled on a spool or reel until needed. Since the cement on the tape is pressure-responsive cement which does not adhere until it is put under pressure, the successive loops of tape on the reel will not adhere to each other with sufficient strength to be objectionable.

Besides the insole blank 30 and the double-coated tape 32, there is also provided, in accordance with the present method, a layer or strip of reinforcing material 38 (Fig. 9) which is precoated on one side only with pressure-responsive cement indicated by the reference numeral 40. The layer of material 38 may be precoated with pressure-responsive cement by any usual or convenient method, the sheet preferably being composed of relatively heavy fabric material such as canvas or Gem duck, although it may be composed of lighter and thinner fabric material, if desired. The reinforcing material is cut or died out to substantially the shape of the insole blank 30 although it is usually cut somewhat larger than the blank to permit it to be trimmed, as will appear hereinafter.

The next step in practicing the method, after the above-mentioned precoated materials have

been provided, is to apply an all-over coating of pressure-responsive cement to one surface of the insole blank 30 and to allow the cement to dry sufficiently for use in the process. The surface to which the cement is applied will usually be the outer surface of the blank, that is, the surface which will be nearer the outsole in the finished shoe and to which the sewing rib is to be attached. In the present case, this surface in the flesh surface on a leather insole indicated in Figs. 1 to 4, inclusive, by the numeral 41. The cement may be applied to the blank in any usual or convenient manner, for example, it might be applied manually with a brush or by machine. One machine which has been found advantageous in carrying out this part of the process is a coating machine of the type disclosed in an application for Letters Patent of the United States Serial No. 65,325, filed December 15, 1948 in the name of Harry Phillips (now Patent No. 2,567,234, granted September 11, 1951). As pointed out in that application, the machine is provided with a cement applying roll 42 (Fig. 3) and a pair of feed rolls 46 and 48 for feeding the insole blanks to the applying roll. The blanks are presented to the feed rolls from a table 50 and the amount of cement applied to the blanks by the roll 42 is controlled by a stripper roll 52 carried by an arm 54 and adjustable toward and away from the applying roll 42 to control the thickness of the film of cement thereon. As described in the application referred to, the applying roll and the stripper roll are driven in opposite directions. The pressure-responsive cement is contained in a tray 56 into which the applying roll dips. The coating of pressure-responsive cement applied to the outer or flesh face 41 of the insole blank is indicated in Fig. 4 by the reference numeral 57.

After the pressure-responsive cement 57 has been applied to the outer surface of the blank 30, the cement is allowed to dry so that the blank will not adhere to other members unless at least medium pressure is applied to the blank. The drying period is usually about one to two hours although it may be much less in some cases depending upon the particular kind of cement used. The customary practice is to apply the cement to a fairly large number of insole blanks at one time and then to stack the blanks on a table or rack and permit them to dry for the required period. In this way, a large quantity of blanks may be prepared for use in the method which may then be carried out without any delay caused by the present cementing operation.

The double-coated strip of tape 32 is next folded to form a preformed ribbed strip suitable for attachment to an insole to provide a sewing rib thereon. The folded strip is indicated generally at 66 in Fig. 6 in which it will be seen that the strip has been folded longitudinally along its medium portion to form an upstanding two-ply rib 68, a wide flange 70 extending laterally of the rib, and a narrower portion 72 projecting downwardly from the two-ply rib substantially in alinement therewith. This is the condition in which the ribbed strip 66 will usually appear after it has been folded to produce a ribbed strip suitable for attachment to the insole. It will be noted in Fig. 6 that the two-ply rib 68 is inclined slightly to the left or toward the wide flange 70, thereby producing a definite angle between the rib and this flange.

The strip of tape 32, precoated with pressure-responsive cement 34, 36, as described above, is folded to form what has been referred to herein

as a "single tape" ribbed strip. Since the tape is precoated with cement on both sides, it has also been referred to for convenience herein as a "double-coated" ribbed strip to distinguish it from other members used in the process which are precoated on one side only with cement, these latter members having been referred to herein as "single-coated" members. The double-coated strip **32** may be folded in any convenient manner to produce the ribbed strip **66**, for example, it may be folded by hand or by machine, the latter method being preferred. A machine which is especially adapted for carrying out this step of the method is a tape rib forming and attaching machine of the type disclosed in my copending application for Letters Patent of the United States, Serial No. 175,174, filed July 21, 1950. As disclosed in that application, the machine is adapted first to fold a single strip of precoated tape to form a "single tape" ribbed strip and then to attach the ribbed strip progressively to the outer surface of an insole or insole blank. The strip of tape **32** is drawn from a supply reel through a stationary folder (not shown) where it is folded progressively along its longitudinal median portion to form the two-ply rib **68** with one margin of the strip extending beyond the two-ply portion. The two-ply portion **68** then passes between a pair of rolls where a part of said two-ply portion is pressed forcibly together to form the rib, the marginal portions of the strip still remaining free of each other. A stationary finger then separates these extending marginal portions and the longer margin is bent over temporarily upon the two-ply portion to form a three-ply portion, a thin plate or blade extending between the margin and the two-ply portion to prevent them from adhering to each other. While bent in this position, the folded strip is subjected to relatively heavy pressure from a pair of flanged rolls, thereby forming a sharp permanent crease along the angle of the bend. The strip then passes progressively into a stationary guide **74** (Fig. 7) which turns the ribbed strip right side up and positions the marginal portions so that they extend laterally in opposite directions from the base or the rib and substantially at right angles thereto, as illustrated in Figs. 7 and 8.

Rearwardly of the guide **74**, the machine is provided with strip attaching mechanism including a presser and feed foot **76** comprising a pressing element **78** and a second pressing element **80**, the element **78** being yieldably mounted in a vertical guideway formed in the element **80**. As disclosed in the copending application, the unitary presser foot **76** is moved in a substantially elliptical path normal to the plane of the work piece by constantly operating eccentrics and further mechanism which need not be described herein, the element **78** engaging the narrower outer flange **72** of the ribbed strip and pressing it intermittently against the feather portion of the blank, and the element **80** engaging the wider inner flange **70** and pressing it against an inner or body portion of the blank. A rotary table **82** supports the insole blanks during the attaching operation, this table being fixed heightwise during the attaching operation so that any yielding is done by the presser foot rather than the table. The element **80** of the presser foot yields under the tension of one spring, and the element **78** yields separately under the tension of another spring so that the pressures applied to the opposite flanges of the ribbed strip **66** are separate from each other and depend upon the operative movement of the presser foot and the thicknesses of the portions of the work engaged respectively by the pressing elements.

The attaching machine is also provided with an edge gage **84** (Fig. 8) arranged to engage the edge face of the blank and guide it during the rib attaching operation. If heat is desired on the ribbed strip during its attachment to the insole blank, heat may be supplied through a pipe or tube **85** (Fig. 7) from any usual source such as a heating unit (not shown) adapted to blow hot air through the tube **85**. Since the ribbed strip forming and attaching mechanism is fully described in my copending application and since this mechanism forms no part of the present invention, a further description of it herein will not be necessary. It should be pointed out, however, that the single presser foot **76** feeds the insole blank and ribbed strip progressively across the table **82** and, while doing so, applies individual yielding pressures separately to the two flanges of the strip to cause them to become permanently attached to the outer surface of the blank **30** by reason of the pressure-responsive cement **57** on said surface coming into contact with the cement **36** on the lower surfaces of the lateral flanges **70** and **72**. It should be understood that it is within the scope of the invention to attach the ribbed strip to the insole blank by hand or some other apparatus or machine, the machine referred to herein being preferred because it is particularly adapted for accomplishing this operation.

The machine of my copending application is adapted to form and attach the single-tape double-coated ribbed strip **66** to the marginal portion of an insole blank rearwardly to approximately the heel breast line of the blank. It is also adapted to sever the ribbed strip from the reel or other source of supply in such a manner that the opposite end portions of the strip will be located in substantial alinement with each other widthwise of the insole, thereby completing the operation of attaching the ribbed strip to the insole blank. As pointed out above, since the strip is precoated on both sides with pressure-responsive cement **34**, **36**, the completed ribbed strip will not have to be coated with cement on its lower or exposed surface before it is attached to the insole blank. Moreover, after the ribbed strip has been attached to the insole blank, the outer surfaces of the flanges **70** and **72** and the outer or exposed surface of the two-ply rib **68** will have pressure-responsive cement thereon, as illustrated at **34** in Figs. 6 and 8.

The next step in the method of making insoles herein disclosed comprises attaching the layer or strip of sheet material **38** (Fig. 9) to the outer surface of the ribbed insole shown in Fig. 8, thereby reinforcing the insole and rib to complete the construction of the insole. As stated above, the layer or strip of sheet material **38** is preferably composed of relatively thick fabric material, such as canvas or Gem duck, and it has been precoated on one side only with pressure-responsive cement **40**, this material being the type generally used commercially for reinforcing Economy or other types of ribbed insoles. The sheet material is preferably cut to approximately the shape of the insole blank from the heel breast line forwardly before it is applied to the blank.

The sheet **38** is placed or "spotted" cement-side down upon the outer surface **41** of the insole, thereby bringing the pressure-responsive

cement 40 on said sheet into direct contact with the cement 57 on the outer surface of the insole and also into contact with the pressure-responsive cement 34 on the exposed surface of the inner flange 70 of the ribbed strip 66 and on the inner side of the two-ply rib 68. The sheet of reinforcing material 38 is wiped manually against the body of the insole and the marginal portion of the sheet, indicated in Fig. 10 by the numeral 86, is forced or "boned" into the angle between the inner side of the rib and the inner flange 70, the parts being shown on an enlarged scale in Fig. 10 to illustrate the operation more clearly. The marginal portion 86 of the reinforcing sheet will not at this time have been pressed forcibly against the inner side of the rib 68 and accordingly this marginal portion will still be loose or free of the rib, as illustrated in Fig. 10. Since the reinforcing sheet was died out approximately to the shape of the insole but a little larger in size, the marginal portion 86 of the sheet will extend upwardly a short distance above the rib 68.

The insole 30, in the condition illustrated in Fig. 10, is now presented to an insole reinforcing machine of the general type illustrated, for example, in United States Letters Patent No. 1,726,800, granted September 3, 1929, on the application of Frederic E. Bertrand. This well-known machine, as shown in the patent referred to, is provided with a pair of positively driven feed rolls and a pressure roll shaped to engage the reinforcing fabric on the insole and press it progressively, lengthwise of the rib, into the angle between the body of the insole and the rib. The arrangement of the mechanism is such that the marginal portion of the reinforcing material 38 will be pressed firmly against the inner side of the rib 68 to cause said marginal portion to become permanently attached to said inner side by reason of the pressure-responsive cement on the exposed surface of the rib and on the lower side of the reinforcing material. The operating rolls of the reinforcing machine, in conjunction with a work gage provided thereon, also position the reinforced rib at the desired angle relatively to the body of the insole. As illustrated in Fig. 11, this angle, in the present case, causes the rib to lean inwardly a few degrees from the feather portion of the insole, although this angle may be varied if desired.

The insole reinforcing machine is also provided with a knife adapted to trim the marginal portion 86 of the reinforcing material substantially flush with the top edge of the rib 68. Accordingly, after the insole 30 has been presented to the insole reinforcing machine, it will appear in the completed condition illustrated in Figs. 11 and 12 and will be ready for immediate use in a shoe. As shown in the figures last referred to, the completed insole 30 has the preformed ribbed strip 66 permanently attached to its marginal portion rearwardly to about the heel-breast line and the area between the portions of the rib at the opposite margins of the insole is reinforced with the fabric or canvas sheet 38 which also covers the inner side of the rib 68. The attachment of the ribbed strip 66 and the reinforcing material 38 to the insole blank 30 by cement alone in the manner described is sufficiently permanent to enable the insole to withstand the usual strains of the lasting and inseaming operations in constructing the shoe.

It will be noted in Figs. 11 and 12, that the base of the ribbed strip 66 directly below the two-ply 68, that is, the portion where the flanges 70 and 72 meet, is bonded directly to the insole, this result being attained by the way the ribbed strip was formed and the manner in which it was attached to the insole, that is, progressively preferably with the aid of the strip forming and attaching machine disclosed in the application above referred to. The procedure illustrated in Figs. 1 to 12, therefore, provides a method of making thin flexible insoles having sewing ribs attached thereto which eliminates delays which would ordinarily be necessary if the parts forming the insole had to be coated individually with cement at different stages of the method and the cement had to be allowed to dry between each successive cementing operation. Consequently, the illustrated method is faster than methods practiced heretofore and it is also cheaper to carry out. As pointed out above, the method definitely eliminates distortion or "strapping" of thin insoles due to shrinkage of the ribbed strip after it has been attached to the insole, this shrinkage being caused by wet cement applied to the strip to prepare it for the reinforcing operation.

In accordance with a modification of the present invention, illustrated herein by Figs. 13 to 19, inclusive, a slightly different procedure may be employed in producing thin flexible ribbed insoles which are of the same superior quality as those produced by the method previously described, this modified process likewise eliminating delays in manufacture and producing insoles having the features and advantages of those provided by the first-described procedure. As illustrated in Figs. 13, 14 and 15, the modified process comprises providing a sheet of reinforcing or backing material 38, a strip of tape 90 and a thin flexible insole blank 92 composed of leather or similar fibrous material, the sheet material 38 in this instance, instead of the tape, being procoated on both sides with pressure-responsive cement. The sheet of backing material preferably comprises a thin layer of loose weave fabric material, such as cotton or cheesecloth, although it might be composed of thicker materials, such as canvas or Gem duck, if desired. The cement on the upper surface of the backing material is indicated in Fig. 13 by the reference numeral 94 and that on its lower surface by the numeral 95. The strip of tape 90 is precoated on one surface only with pressure-responsive cement 96, as shown in Fig. 14.

The next step in the modified process of making ribbed insoles consists in coating the outer or rib-receiving surface of the insole blank 92 with cement 98 (Fig. 15) which covers the entire surface of the blank the same as in the previous method, the cement 98, as previously described, being a pressure-responsive cement such as rubber cement, latex or other cement composed of synthetic rubber-like materials. The cement 98 on the blank 92 is allowed to dry so that it will not adhere to other surfaces unless pressure is applied to effect such adhesion. The coating operation may be performed manually or with the aid of the insole blank coating machine referred to above.

The single-coated strip of tape 90 is next folded to produce a preformed single-tape ribbed strip, as described above, suitable for attachment to an insole to provide a sewing rib thereon. In the present case, however, since the strip of tape is precoated on one side only with pressure-responsive cement and constitutes a "single-

coated" strip as expained above, the cement-coated side of the strip is the one which is folded along its longitudinal median portion to produce a ribbed strip 100 (Fig. 16) having a two-ply upstanding rib 102, a wide lateral flange 104 and a narrower portion 106 projecting below the rib substantially in alinement therewith, the rib 102 slanting at a slight angle inwardly or toward the wide flange 104. As shown in Fig. 16, the pressure-responsive cement 96 previously applied to the tape will now be located on the lower surface of the flange 104 and the adjacent surface of the extension 106.

The double-coated sheet of reinforcing or backing material 88 (Fig. 13) is applied to the coated upper surface of the leather insole blank 92 so that the pressure-responsive cement 95 on said backing material will engage the cement 98 on the insole blank and permanently attach the backing material to the blank by reason of the engagement of the two cement-coated surfaces with each other. There are two methods in common use today for attaching all-over backing materials to insoles or insole blanks and either of these procedures may be utilized in the present method of making insoles. In accordance with one of these practices, a large sheet of backing material, double-coated in the present instance, is placed on a flat support or table and the insole blanks are placed thereon cement side down, after which the blanks and backing material are died out together as a unit to the exact size and shape desired in the finished insole, for example, in the well-known clicking machine. The insole with the backing material adhering thereto is then passed through the rolls of a rolling machine of any usual type to press the double-coated material firmly against the coated surface of the insole and cause it to become permanently bonded thereto.

In accordance with the other method of backing insoles or blanks with all-over sheet material, a layer or strip of the double-coated backing material is provided which is preferably slightly larger than the insole blank. The blank is laid cement side down on this strip to stick the two together and the blank with the strip temporarily adhering to its coated surface is then passed through the rolls of the rolling machine to bond the backing material permanently to the blank. The united parts are next presented to a conventional insole rounding machine in which the insole blank and backing material are rounded together to the precise shape desired in the finished insole. As indicated above, either of these two procedures may be utilized in the present method when covering the coated upper surface of the insole blank with the double-coated backing material and when transforming the roughly shaped blank into an insole which conforms accurately to the shape desired in the shoe. The backed or reinforced insole is shown in Fig. 17, after it has been died out or rounded to the desired shape. It will be seen that no appreciable amount of time will be lost in performing either of these backing operations since the cement on the insole blank has been dried sufficiently for use, and that on the backing material 88 is already dry and ready for attachment to the insole blank.

It might be pointed out in the interest of clearness that the words "insole" and "insole blank" as used herein have not been employed strictly in accordance with the accepted meanings of these terms in the shoe industry. These words have been used herein to designate respectively the insole members before and after the ribbed strip or the reinforcing or backing materials have been applied thereto rather than with reference to whether or not the insole members have been cut to the shape desired in the finished shoe, which are the meanings usually applied to these terms in the trade. Consequently, although the insole member 30 of Fig. 1 would probably be called an "insole" in the trade because it has already been cut to the shape desired in the finished shoe, it has been referred to herein as an "insole blank" until after the sewing rib has been attached, after which it has been called an "insole." In the modification of the method illustrated in Figs. 13 to 19, inclusive, the member 92 of Fig. 15 has been called an "insole blank" in the early stages of the process or until after the backing material has been applied thereto and, in such case also, until after the combined insole member and sheet material have been died out or rounded to the shape desired in the finished shoe, after which the shaped laminated member has been called an "insole" even though, in this instance, the ribbed strip has not yet been attached to provide the sewing rib thereon.

The next step in the present modification of the invention consists in attaching the single-coated preformed ribbed strip 100 of Fig. 16 to the cement-coated outer or exposed surface of the double-coated backing material 88 now permanently attached to the insole 92. As illustrated in Figs. 18 and 19, this is preferably accomplished, as in the previous method, with the aid of a ribbed strip forming and attaching machine of the type disclosed in my copending application, the ribbed strip passing downwardly through the guide 74 and being pressed progressively against the fabric backing material by the presser and feed foot 76, the combined insole and strip being fed across the table 82 of the machine during the attaching operation. Since the exposed upper surface of the backing material 88 was precoated with the pressure-responsive cement 94, and since the lower surfaces of the flanges 104 and 106 were likewise precoated with pressure-responsive cement 96, the ribbed strip will adhere permanently to the backing material merely upon the application of pressure by the presser foot 76. Accordingly, the ribbed strip 100 may be attached immediately to the backing material 88 and cut off at about the heel breast line of the insole, as described above, to complete the construction of the insole.

In the present modification of the invention, the insole 92 is not reinforced by canvas or Gem duck on the inner flange 104 or the inner side of the rib 102. However, since the backing material 88 extends across the full width of the insole, the effect is substantially the same except that the inner side of the two-ply rib 102 is not reinforced with an extra layer of material. In other words, the outer surface of the insole is reinforced transversely at least over the area extending between the portions of the rib located at the opposite margins of the insole, as in the previous method, and this surface and the ribbed strip are thereby strengthened widthwise of the insole to withstand the strains of the lasting and inseaming operations and the tension of the upper during the wearing of the shoe. Consequently, neither the insole nor the rib can stretch or yield widthwise under such tensions sufficiently to spoil the shape or fit of the shoe. Since the two-ply rib 102 is

strong enough to serve as a sewing rib without reinforcement, no harm will be done by not reinforcing the inner side of the rib to form a three-ply rib. In fact, some manufacturers prefer a relatively flexible rib rather than a stiffer reinforced rib, provided the attachment of the rib to the insole is strong, because a flexible rib increases the flexibility of the insole and shoe. The backed ribbed insole 92 produced by the modification of the method illustrated in Figs. 13 to 19, contains the features and advantages of the insole of Figs. 11 and 12 with respect to strength, durability and permanence of the rib attachment and, in addition, it has the further advantage of being somewhat more flexible than the other insole.

It will be understood, of course, that the insole 92 could be reinforced on its ribbed surface, if desired, with an additional layer of reinforcing material similar to the layer 38 of Fig. 11. Such reinforcement, however, would require a separate cementing operation in order to coat the outer surface of the inner flange 104 and the inner side of the rib 102 to receive the reinforcing material. Since the present invention seeks to avoid such cementing operations and thereby reduce the cost and speed up the production of ribbed insoles of the type herein disclosed, this reinforcing operation on the backed insole of Fig. 19 is not included in the method, particularly since the insole 92 is reinforced on its entire outer or ribbed surface by fabric material 68 so that it will be able to withstand the strains of lasting and other shoemaking operations as well as the insole illustrated in Figs. 11 and 12.

If it should be desired to economize further in practicing the present method, the all-over layer of reinforcing material 38 on the insole of Figs. 11 and 12 could be replaced by a strip of reinforcing material, this strip being precoated on one side only with pressure-responsive cement in the same manner as the all-over layer 38 and being of sufficient width to cover the inner side of the two-ply rib 68, the inner flange 70 and a portion of the insole body inwardly of this inner flange. Such a reinforcing strip may be attached to the ribbed insole in any usual or convenient manner, for example, it may be applied by hand or by an insole reinforcing machine of the type disclosed in United States Letters Patent No. 2,335,289, granted November 30, 1943 in the name of Norman E. Mariner. Since the cost of fabric reinforcing material, particularly heavy canvas or Gem duck, is an important factor in insole construction, the substitution of a reinforcing strip for the all-over reinforcing layer 38 of Fig. 9, would effect a substantial saving in the construction of the insole without detracting any appreciable amount from the strength of the insole or the other features herein set forth.

Although the invention has been described with reference to insole blanks composed entirely of leather or similar fibrous material, the method can obviously be carried out with insoles composed of materials other than leather or insoles composed partly of leather and partly of a different material such, for example, as artificial leather, fabric or the fibrous material known commercially as "Texon." In other words, the method is not restricted in its use to insoles composed entirely of one material but can be practiced with equally beneficial results on multiply or laminated insoles.

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

That improvement in methods of making insoles for shoes which consists in providing a thin flexible insole blank and a strip of tape which is precoated on both sides with pressure-responsive cement, applying pressure-responsive cement to the outer surface of said insole blank and allowing the cement to dry, folding the strip of tape upon itself lengthwise to form a ribbed strip suitable for attachment to an insole to provide a sewing rib thereon, said ribbed strip having pressure-responsive cement on all surfaces thereof, pressing the ribbed strip against the outer surface of the insole blank to attach the strip permanently thereto by reason of the pressure-responsive cement on said surface and on said ribbed strip, thereby producing a ribbed insole, and reinforcing said insole by pressing a sheet of conventional reinforcing fabric precoated on one side only with pressure-responsive cement against the outer surface of the insole and the inner surface only of the rib.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,026,225	Rollins	May 14, 1912
1,175,200	Thompson	Mar. 14, 1916
1,227,483	Murphy et al.	May 22, 1917
1,269,518	Bain	June 11, 1918
1,417,535	Littlefield	May 30, 1922
1,895,709	Emerson	Jan. 31, 1933
2,070,314	Poole	Feb. 9, 1937
2,288,448	Griswold	June 30, 1942
2,352,715	Jalbert et al.	July 4, 1944
2,361,941	Harrison	Nov. 7, 1944
2,398,277	Ayers	Apr. 9, 1946
2,398,760	Ayers	Apr. 23, 1946
2,458,500	Bertrand et al.	Jan. 11, 1949
2,498,751	Clark	Feb. 28, 1950
2,573,683	Bertrand	Nov. 6, 1951
2,623,306	Griswold	Dec. 30, 1952