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METHOD OF MAKING OUTSOLES

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Fig. 1.

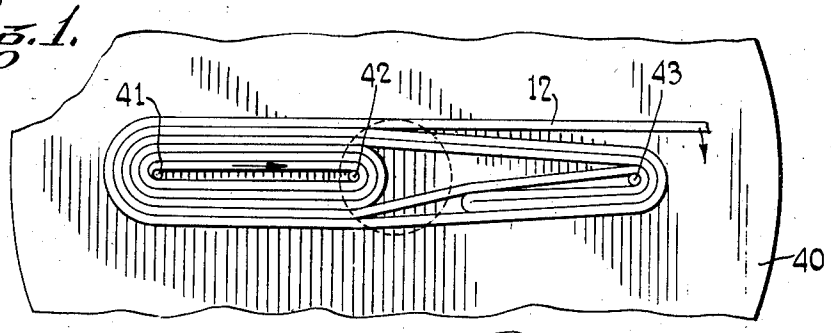


Fig. 2.

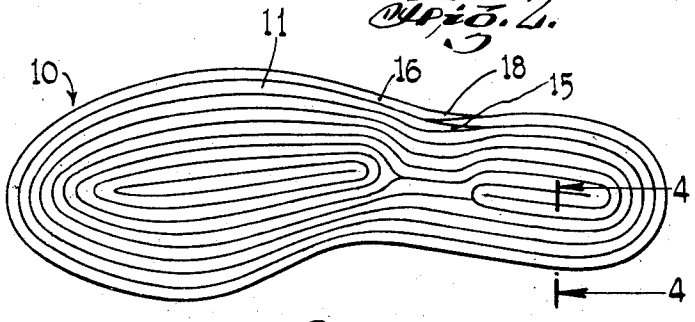


Fig. 3.

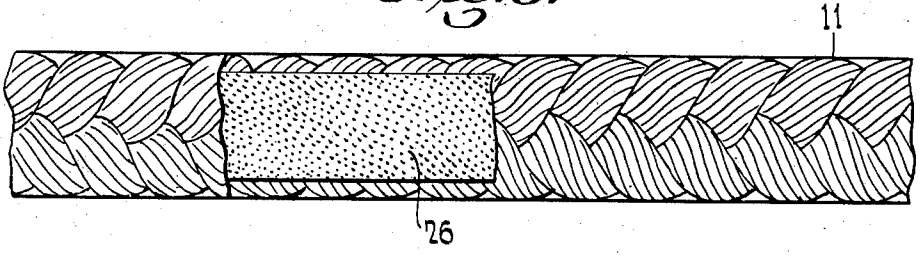


Fig. 5.

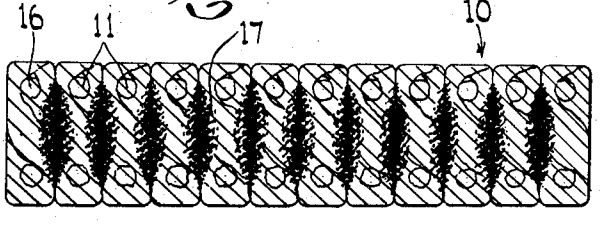
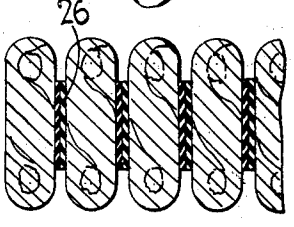


Fig. 4.



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Fig. 6.

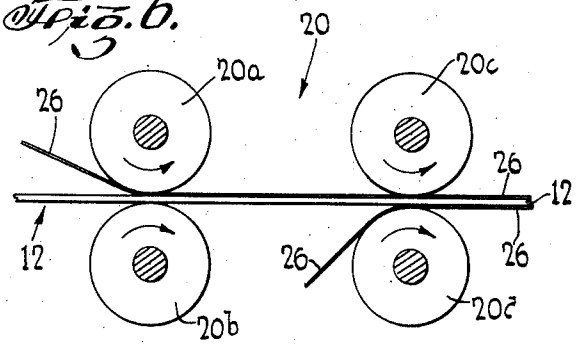


Fig. 7.

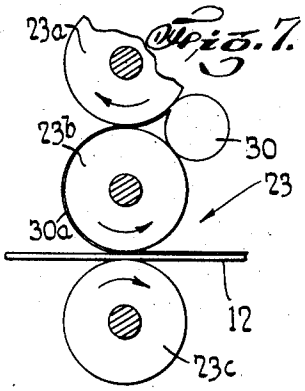


Fig. 9.

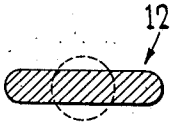


Fig. 10.

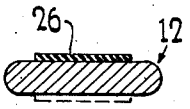


Fig. 11.

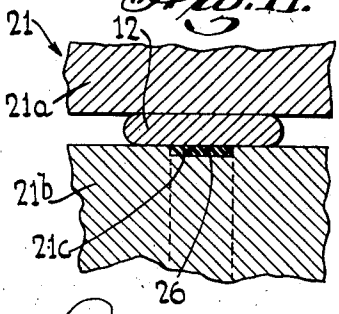


Fig. 12.

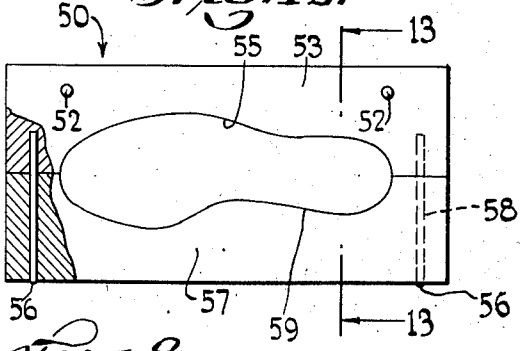


Fig. 13.

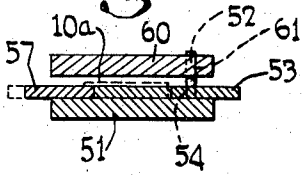


Fig. 8.

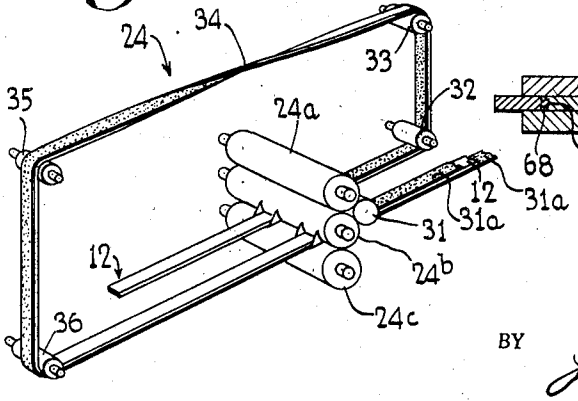
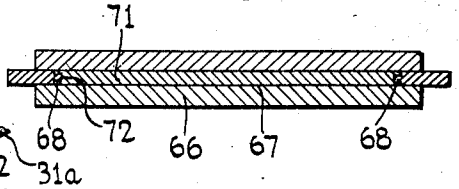


Fig. 15.



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Fig. 14.

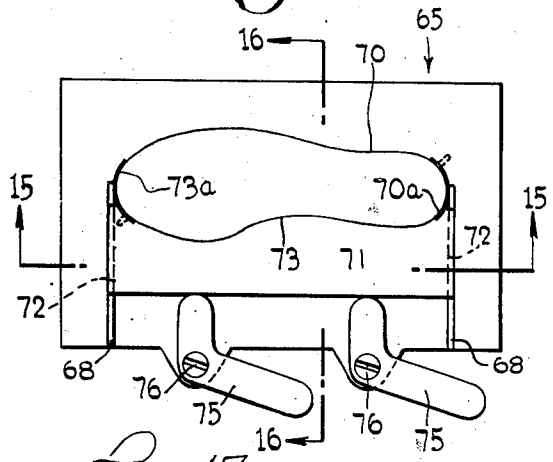


Fig. 16.

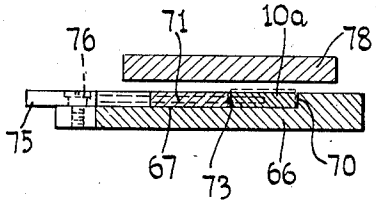


Fig. 18.

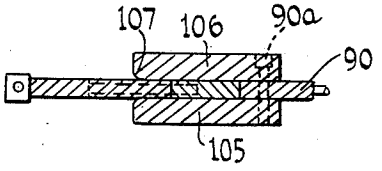


Fig. 17.

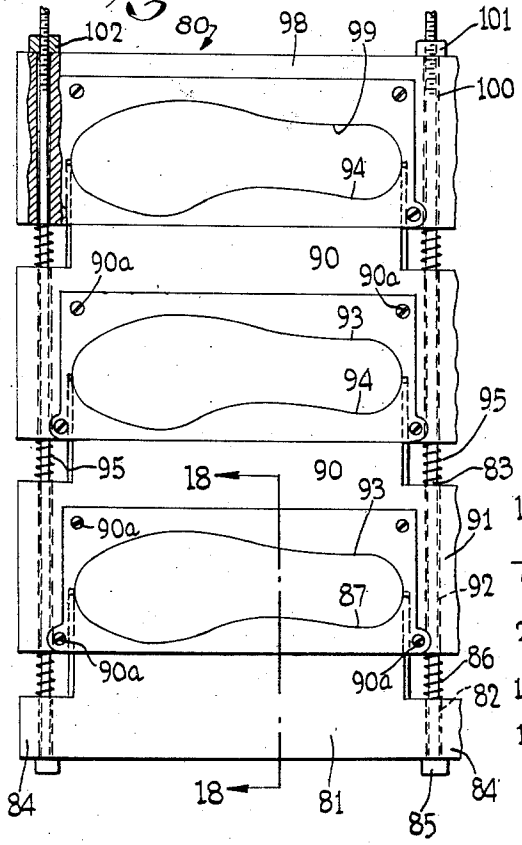


Fig. 19.

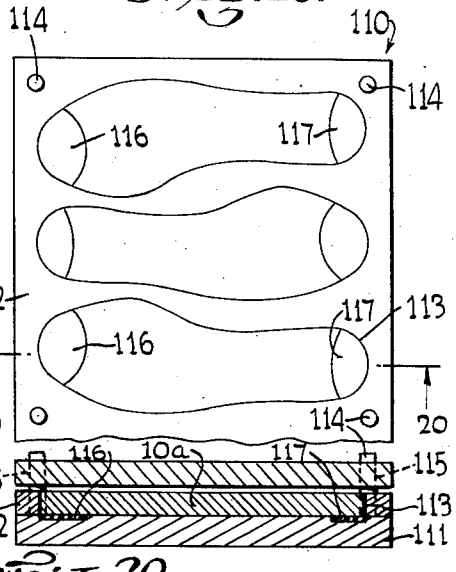


Fig. 20.

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Fig. 21.

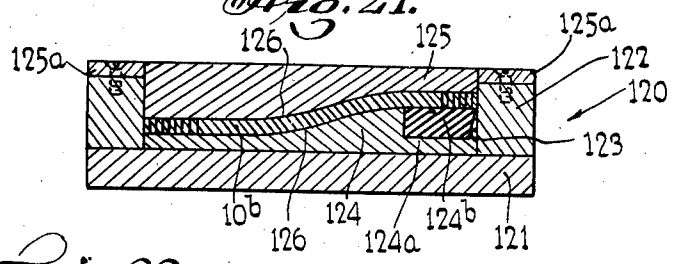


Fig. 22.

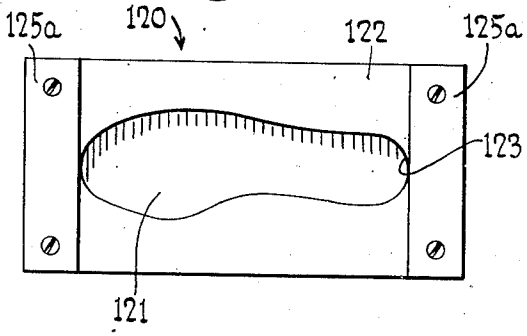


Fig. 23.

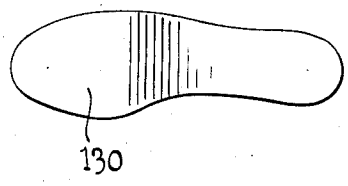


Fig. 25.

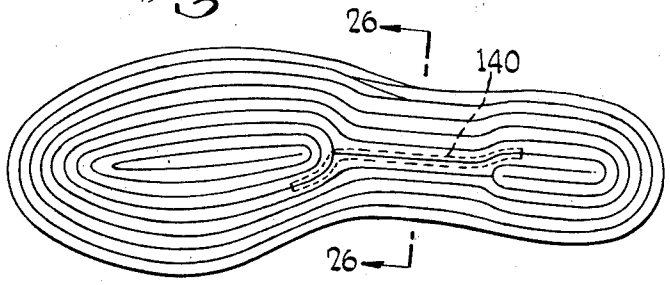


Fig. 24.

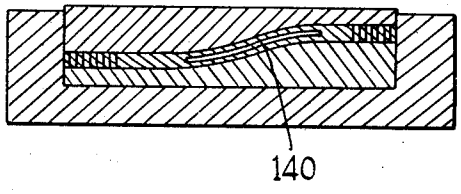
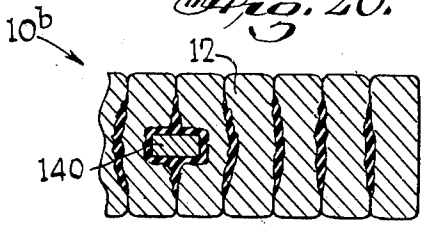


Fig. 26.



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Patented Nov. 7, 1944 2,361,938

UNITED STATES PATENT OFFICE

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METHOD OF MAKING OUTSOLES

Jon Gregg, Flemington, N. J., assignor to Lynne D. Gregg, Flemington, N. J.

Application July 5, 1941, Serial No. 401,179

3 Claims. (Cl. 12—146)

This invention relates to outsoles, and methods of making the same. It is particularly directed to outsoles for footwear, made from bands of braided fibrous material or flattened rope, tape or elongated strips or ribbons of jute, sisal, manila, cotton, rayon, "nylon" or other synthetic fibers or yarn, or animal fibers such as wool or horsehair, either woven or knitted or otherwise formed, or made of cork or leather or other flexible ribbon like material, wound into the shape of an outsole. The turns or windings or layers of such outsoles are in side by side relation with the edges thereof at the top and bottom of the sole, and have heretofore been stitched together to retain the shape of the outsole or held together by latex.

The difficulty with outsoles wherein the windings are held together by stitching or by latex, is that such outsoles will not hold their shape, but have a tendency to cup, and the windings tend to separate because the latex adhesive did not have sufficient strength. Furthermore, such outsoles often lose their original outline so as not to have a definite shape because movement of the layers relative to one another in the plane of the outsole was possible. Such outsoles further will also absorb and retain considerable moisture and permit the moisture to penetrate to the foot. Furthermore, the drying out of such moisture is a lengthy matter. Such outsoles have formerly been made mainly of jute because it is the most absorbent material for latex application and because latex will not stick well to sisal or manila fiber.

Furthermore, since the layers adhered by latex or stitched together are not under compression, not all shapes of outsoles could be obtained because the shape depended upon the layers. It is therefore an object of this invention to provide an outsole of the character described made by coating the fiber, braid, strip, tape or ribbon, with crude rubber provided with usual vulcanizing agents, or by frictioning in the rubber thereto before winding the same into the general shape of the outsole, and then placing the outsole in a mold and vulcanizing the rubber by means of heat and pressure to form an integral, unitary, blocklike outsole which will not go out of shape, and which is of definite shape and light, and which will absorb some moisture to make the outsole non-skid, and quick drying, but which will not allow the moisture to penetrate through to the foot. Such an outsole is flexible but will not cup and will not lose its preformed outline or dimensions, and can be made with sisal and manila or other fibers as well as jute, or of any other desired stripping. With such process, the uncured rubber will make a compact block in the curing operation so that the braid or strip will not separate. Such an outsole will have breathability because the rubber does not impregnate wholly through the fibers, thus permitting the foot to keep cool and also permitting the sole to be used in a shoe of definite shape and size and retain this shape and size permanently.

During the curing operation the layers are compressed and the rubber impregnates into the fibers so that the layers become part of the block and are not merely attached together, as when using latex adhesive.

Furthermore, such an outsole is not confined to any one wind for pre-shaping as the mold does the job of giving permanent shape to the outsole. Thus, the shape of the outsole is determined by the mold and not by the thickness or width of the band.

Furthermore, such outsoles may be shaped or arched by the mold to receive a heel of any type; and can also be made with a metal arch molded into the arch of the sole. Furthermore, such an outsole can be made with extra pieces of rubber molded thereto at the toe and heel to take up wear at the points where greatest wear is likely to occur, and a heel can also be molded thereto during the vulcanizing process. Furthermore, such a sole can be made with fiber materials which are easy to dye, whereas, prior methods were confined primarily to jute which is difficult to dye.

Further, when the outsole is removed from the mold, the layers do not expand to their original thickness and height, but remain in compressed form as the blocklike sole has permanent shape.

Yet another object of this invention is to provide a highly improved method of making outsoles, consisting in applying uncured rubber to a band, winding the band into the general shape of a sole, then semi-curing the uncured rubber in a mold. Footwear can be made with such an outsole by applying uncured rubber to the top surface of said sole and laying an upper thereto, and then curing the semi-cured rubber in the sole and the rubber on the top usrface of the sole.

An outsole made in accordance with this invention, will have exposed portions of fiber at the top and bottom of the sole with rubber in between. The rubber is harder than the fiber which is above and below the rubber. The fiber serves as an insulator of heat and is more comfortable and soft to step upon, as when a shoe made with such a

sole is worn on a bare foot. The fiber, it has been found, will mold to the foot, while the rubber gives body and firmness to the sole. Furthermore, the rubber will not hold to a wet surface but the fiber at the bottom of the sole will not slip, and that is an additional advantage of having the fiber extend beyond the rubber on the underside of the sole.

Yet a further object of this invention is to provide an outsole of the character described, made from a fiber strip coated on opposite sides thereof with rubber or having rubber frictioned into opposite sides thereof and wound continuously from the inside toward the outside of the sole and said sole having at the outside thereof, a second strip with rubber coated or frictioned into the inner side thereof only and forming the outermost turn or convolution in said outsole, so that there is no exposed rubber at the outer edges of said outsole. If desired, the outermost convolution may be made of decorative material; or a shoe upper may be vulcanized directly to the outermost convolution of the sole during the molding operation.

Another object of this invention is to provide a highly improved process of the character described, including the step of pre-shaping the outsole after it is wound and prior to placing the outsole in the vulcanizing mold.

Still a further object of this invention is to provide a highly improved process of the character described, which shall be relatively inexpensive to carry out, and which shall produce a highly efficient and cheap, durable and practical outsole.

Other objects of this invention will in part be obvious and in part hereinafter be pointed out.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the construction hereinafter described, and of which the scope of application will be indicated in the following claims.

In the accompanying drawings, in which are shown various possible illustrative embodiments of this invention,

Fig. 1 is a top plan view of a winding plate illustrating the method of winding the strip into the shape;

Fig. 2 is a top plan view of an outsole embodying the invention;

Fig. 3 is an enlarged partial view of pieces of braid coated with crude rubber prior to winding;

Fig. 4 is an enlarged, cross-sectional view taken on line 4—4 of Fig. 2, but showing the rubber before the vulcanizing operation;

Fig. 5 is a cross-sectional view similar to Fig. 4, but illustrating the outsole after the molding and vulcanizing operation;

Fig. 6 is a side elevational view illustrating the method of coating the fiber braid with rubber on both sides;

Fig. 7 is a side elevational view illustrating apparatus for frictioning rubber on one side of a strip of braid;

Fig. 8 is a perspective view illustrating apparatus for frictioning in rubber on opposite sides of a fiber strip;

Fig. 9 is a cross-sectional view illustrating a piece of flattened rope which may be used in making an outsole embodying the invention;

Fig. 10 is a view similar to Fig. 9, but showing the rubber coated to one side of the strip in full lines, and coated on the other side in dotted lines;

Fig. 11 is a cross-sectional view of calenders for coating one side of a fiber strip and illustrating a calender with an annular groove to receive the rubber for coating the fiber strip;

Fig. 12 is a top plan view illustrating a mold for pre-shaping the outsole after the outsole has been wound and before placing the outsole in the vulcanizing mold;

Fig. 13 is a cross-sectional view taken on line 13—13 of Fig. 12;

Fig. 14 is a top plan view of a vulcanizing mold to give permanent shape to the outsole;

Fig. 15 is a cross-sectional view taken on line 15—15 of Fig. 14;

Fig. 16 is a cross-sectional view taken on line 16—16 of Fig. 14;

Fig. 17 is a top plan view of a mold embodying the invention, and illustrating a modified construction;

Fig. 18 is a cross-sectional view taken on line 18—18 of Fig. 17;

Fig. 19 is a top plan view of still another mold embodying the invention, and illustrating another form of the invention;

Fig. 20 is a cross-sectional view taken on line 20—20 of Fig. 19;

Fig. 21 is a cross-sectional view of a mold for molding an outsole for use with a heel;

Fig. 22 is a top plan view of the mold;

Fig. 23 is a top plan view of the steel insert for the mold;

Fig. 24 is a view similar to Fig. 21, but showing a shank in the outsole;

Fig. 25 is a top plan view of the outsole shown in Fig. 24; and

Fig. 26 is a cross-sectional view taken on line 26—26 of Fig. 25.

Referring now in detail to the drawings, and particularly to Fig. 2 thereof, 10 designates an outsole embodying the invention. Said outsole may be made from an elongated flattened strip of fiber 11 wound in a manner hereinafter described, from the inside outwardly with the upper and lower edges of the strip at the top and bottom, and the flat side surfaces of the strip in vertical planes. The strip may be made of braided fiber cord as shown in Fig. 3, or of flattened rope, as designated by numeral 12 in Fig. 9, or of a tape or ribbon, and may be made of woven or knitted animal or vegetable fiber, such as jute, sisal, manila, cotton, rayon, "nylon," wool, horsehair or the like fibers. Cork, leather, composition, or any other flexible ribbon like strips may also be used in making the improved outsole in the manner hereinafter to be described.

The outer end of the strip 11 may terminate as at 15, within an outermost turn or convolution 16 made of a separate strip of the same or different material, such as would serve as a trim for the edge of the sole. The strip 11 has rubber on both sides thereof, vulcanized as shown at 17 in Fig. 5, whereas, the outermost strip 16 has rubber vulcanized to the inner side thereof only. The ends of the strip 16 overlap, as at 18, as shown in Fig. 2 of the drawings. The vulcanized rubber 17 preferably terminates short of the upper and lower ends of the strip, so as not to be exposed at the top or bottom of the outsole, as clearly illustrated in Fig. 5 of the drawings.

In making the outsole, crude rubber is coated to opposite sides of strips 11 or 12 and to one side of strip 16 by apparatus 20 or 21 shown in Figs. 6 and 11, respectively, or frictioned into said strips by apparatus 23 shown in Fig. 7, or apparatus 24 shown in Fig. 8.

The method of coating the strips with rubber will first be described:

The strip 11 is coated on opposite sides with rubber as indicated by numeral 26 in Figs. 3 and 4. The apparatus 20 for coating opposite sides of strips 11 (or 12) comprises a pair of calenders 20a and 20b between which the strip 11 (or strip 12) is fed together with a strip 26 of rubber. The rubber strip 26 is thus coated onto one side of the strip. The strip 12 then passes through another set of calenders 20c and 20d with a rubber strip 26 fed beneath the fiber strip, so as to coat the opposite side.

In Fig. 11, there is shown apparatus 21 comprising calenders 21a and 21b. The calender 21b is formed with a peripheral groove 21c into which the rubber strip 26 is fed to be coated onto one side of the fiber strip. If both sides of the strip 12 are to be coated, the strip is fed through another pair of calenders with the upper calender peripherally grooved, the rubber strip being fed into the groove of the upper calender for application to the opposite side of strip 12.

The rubber may be frictioned into the strip 12 instead of being coated thereon by apparatus shown in Fig. 7. The apparatus 23 of Fig. 7 comprises a pair of calenders 23a, 23b rotating in opposite directions, and a calender 23c rotating in a direction opposite to the direction of rotation of the calender 23b. A wad of rubber 30 is fed between the calenders 23a and 23b, the rubber forming a sheet 30a around calender 23b. The strip 12 is fed between the calenders 23b and 23c, so that the rubber 30a is frictioned into the strip 12. For this purpose, the calenders 23b and 23c must be rotated at different speeds and the distance between the calenders 23b and 23c should be substantially equal to the thickness of the strip 12.

The thickness of the rubber strip may be varied by regulating the distances between the calenders 23a and 23b. The width of the rubber strips may be determined by suitable knives adjacent the calenders, as is well known in the art.

In Fig. 8 there is shown apparatus 24 for frictioning in rubber to opposite sides of strip 12. The apparatus 24 comprises calenders 24a and 24b rotating in opposite directions and a calender 24c rotating in the same direction as calender 24a. A wad of rubber 31 is fed between the calenders 24a and 24b forming a wide sheet passing around the calender 24b.

The strip 12 is fed between the calenders 24b and 24c which rotate at different speeds in opposite directions. A sheet 31a of rubber which rolls around the calender 24b is frictioned into the strip and said strip 12 then passes over an idler roller 32 upwardly and over an idler roller 33, and is thereafter twisted as at 34, and then passes downwardly over another offset idler roller 35 and under another idler roller 36 and again passes between the calenders 24b and 24c so that the rubber sheet 31a is frictioned into an opposite side of the strip 12.

It will be noted that the strip 12 becomes offset after it is twisted and thus the portions of the strip being first fed between the calenders 24b, 24c and subsequently fed between said calenders are in parallel relation.

The strips 11 and 12 with the rubber coated thereto or frictioned therein may be wound on a rotary table 40 in the well known manner to produce the general shape of an outsole. The table 40 is horizontal and rotates about its axis and has fixed thereto upstanding pins 41, 42 and 43.

The strip 12 with rubber on opposite sides thereof starts adjacent pin 41 and then is wound several turns around pins 41, 42 spirally and then wound rearwardly about pin 43 and therebeyond and then again back around pin 41. The doubled up portion of the strip which is beyond pin 43 is folded back as shown in Fig. 1, and the strip 12 is then wound around pins 41 and 43 several times. The portion of the strip which is disposed around pins 41 and 42 forms the sole portion of the outsole, and the portion around the pin 43 forms the heel portion of the outsole, and the intermediate portion is the shank portion of the outersole. The winding of the strip on table 40 may be conventional and is well known in the art. However, in accordance with the present invention, the winding terminates one convolution short of the complete outsole, and the outermost convolution 16 which is a separate strip, has rubber coated or frictioned to the inner side thereof only as illustrated in Fig. 2.

It will be noted that the width of the strip 26 of rubber coated to the strip 12, or the width of the strip 31a, is preferably less than the width of the strip 12. As a matter of fact, the width of the rubber coating or the rubber frictioned into the braid or rope strip should be somewhat less than the eventual width of the vulcanized rubber 17, because the crude rubber will flow and increase in width during the vulcanizing process. It is, of course, understood that the coating or frictioning in of the rubber is accomplished with the use of crude rubber compounded with the usual vulcanizing agents. When the strips 11 or 12 and 16 are fully wound, the outsole may be placed in a mold 50 shown in Fig. 12 of the drawings, for pre-shaping.

The mold 50 comprises a bottom plate 51, from which there extend upwardly dowel pins 52. On plate 51 is a mold section 53 formed with openings 54 through which the dowel pins pass. Mold section 53 has a cut-out 55 at one edge thereof conforming to half the longitudinal outline of the outsole. Extending from mold section 53 are a pair of parallel pins 56. On plate 51 is the second mold section 57 formed with through openings 58 slidably receiving the pins 56. Mold section 57 has an inner cut-out or edge 59 having the shape of the other longitudinal edge of the sole. Thus, the edges 55 and 59 are complementary and together have the outline of the outsole.

The wound outsole which will be designated by numeral 10a, before molding, is placed on plate 51 and between the mold sections 53 and 57. Plate 57 may then be pressed towards plate 53 to compress the partly finished outsole 10a for pre-shaping the same. On plates 53, 57 is a top plate 60 to receive the dowel pins 52. Plate 60 may also be pressed downwardly to pre-shape the outsole member 10a prior to placing the same in a mold for the vulcanizing process. This pre-shaping step may be omitted if desired.

The outsole 10a with or without the pre-shaping, may then be placed in a mold 65 for a vulcanizing process under pressure and heat. One mold for carrying out such vulcanizing process is shown in Fig. 14, designated by numeral 65. The mold 65 comprises a bottom plate 66 formed with a recess or depressed surface 67. At the side edges of the depressed surface 67 are parallel dove-tailed tongues 68. At the rear of the depressed surface 67 is an edge 70 conforming to

the contour or outline or half the longitudinal edge of the finished outsole.

Slidably mounted on the depressed surface 67 of plate 66 and between the parallel dove-tailed tongues 68, is a mold section 71 having dove-tailed grooves 72 at the side edges thereof to slidably receive said tongues. The mold section 71 has an edge 73 conforming to the other half of the longitudinal outline of the outsole and is complementary to the edge 70. The outsole 10*a* is placed beneath the mold edges 70, 73. Mold section 71 may be pressed toward the edge 70 by means of bell crank levers 75 pivoted to plate 66, as at 76. A top plate 78 may be pressed downwardly against the top of the outsole 10*a*. Heat may be supplied in any suitable manner. Thus, the heat and pressure causes the rubber on the strips 11 (or 12) and 16 to vulcanize, forming a block in which the strips are embedded to form a unitary outsole of predetermined and definite shape. The layers of the band are integrated in the block. Said layers are compressed during the molding operation and do not expand again to their natural shape. The rubber flows during the curing to impregnate deeply into the fibers. Thus, the layers are not only merely adhered together, but, become part of a unitary blocklike outsole. The layers cannot be separated as the band would tear before the rubber would separate under tension.

Attached to the toe portion of edge 73, is a strip spring 73*a* curved inwardly at its outer end and projecting beyond mold portion 71, and adapted to engage the toe portion of edge 70, to prevent formation of a ridge at the toe of the outsole. Similarly, a strip spring 70*a*, fixed to the heel portion of edge 70, is curved inwardly at its free end and extends beyond edge 70 and engages heel portion of edge 73.

The vulcanized rubber will not be exposed at the top or bottom of the outsole, but will penetrate the windings, so that they cannot separate and the entire outsole 10 formed by the vulcanizing process is in the form of a block of definite shape which will not cup or lose its shape, so that said outsole may be used for making shoes of definite sizes.

The outsole will have breathability because the rubber does not form a complete diaphragm through the middle of the outsole, permitting air to pass through the fibers. Nevertheless, the vulcanized rubber portion 17 will be embedded in the fibers and will serve to hold back moisture from passing entirely through the outsole, while permitting absorption at the bottom to make the outsole anti-skid.

In Fig. 17 there is shown a mold 80 embodying the invention and illustrating a modified form thereof. The mold 80 comprises a plate 81 formed with parallel through openings 82, through which extend elongated clamp pins 83. Plate 81 has outwardly extending wings 84, through which the pins 83 pass. The pins 83 have heads 85 contacting the plate 81. On the pins 83 are coil compression springs 86 contacting the wings 84. Plate 81 has an edge 87 conforming to half the longitudinal edge of the finished outsole, and thus constitutes one mold section.

Slidably mounted on the pins 83 is a second plate 90 having wings 91 formed with longitudinal through openings 92, through which the pins pass. Plate 90 has an edge 93 at one end complementary to the edge 87, and at the other end an edge 94, similar to the edge 87. On the pins 83 are any suitable number of similar members 90. Between each of the members 90 there is interposed a pair of coil compression springs 95 received on the pins 83.

At the end of the series of intermediate mold plates 90, is an end mold plate 98 having an edge 99 similar to the edge 93. Plate 98 also has through openings 100 through which the pins 83 pass. The pins 83 are formed with screw threaded portions 101 to receive nuts 102 which may be screwed thereon to tighten up all the mold sections. Upon unscrewing the nuts 102, the mold sections 98 and 90 may be slidably moved along the pins 83 to loosen the molds. A bottom plate 105 may be placed beneath all the mold plates.

Each of the plates 90 is provided with upstanding dowel pins 90*a*, on which there is mounted a top plate 106 which may have a curved forward edge 107. When the nuts 102 are loosened, all the mold sections are spread apart and the outsoles 10*a* may be dropped in-between the complementary sets of edges 87, 93 and 94, 93 and 94, 99. Thereafter, the mold plates may be tightened by means of the clamp pins, and pressure applied to the plates 105, 106 and heat also applied for the vulcanizing process.

In Figs. 19 and 20 there is shown a mold 110 illustrating a further modification and comprising a bottom plate 111 and a plate 112 thereon formed with mold openings 113 for the outlines of the finished outsoles. The bottom plate 111 may be provided with dowel pins 114 passing through openings in plate 112. Plate 111 may be formed with shallow recesses 116 and 117 to receive biscuits of crude rubber located adjacent the toe and heel portions of the outsoles. The outsoles 10*a* may be dropped into the mold openings 113. A top plate 115 may then be applied and pressed down which together with heat, will cause the crude rubber biscuits and the crude rubber coatings or rubber frictioned into the wound strip to be vulcanized to the windings.

It will be noted that the outsole 10*a* is thicker than the finished outsole 10, and is reduced in height or thickness by the pressure during the molding and vulcanizing process.

It will be noted that there is no provision for overflow of rubber in the mold. The outline of the sole is such that it can be dropped into the mold, but is of a height greater than the mold, and the compression of the mold reduces the height of the sole, and as the rubber flows during the curing operation, the rubber penetrates the fibers and does not overflow from the mold.

In Fig. 21 there is shown a mold 120 for molding an arched outsole adapted to receive a heel. The mold 120 may comprise a bottom plate 121 on which is mounted a plate 122 formed with a cut-out 123 having the shape of the finished outsole. Within the opening 123 are complementary mold sections 124 and 125 which may be cut from the block to produce the opening 123. Such block may be sawed longitudinally along the complementary edges 126 to form a two part mold. The outsole 10*a* may be dropped onto the mold member 124 and then mold member 125 may be applied under pressure and together with heat. This process produces an arched outsole 10*b* which is lifted at the rear to permit attachment of a heel beneath the heel portion of the outsole. Platen stops 125*a* may be screwed to the top of plate 122 to prevent the outsole from being crushed beyond a predeter-

mined amount. Mold section 124 may also be formed with a recess 124a to receive any suitable heel 124b to be molded to the outsole.

In Fig. 22 there is shown plate 122 from which the steel block 130 is cut at the same time forming the opening 123. The steel plate 130 is sawed along the edges 126 to form a two part mold which may be reinserted into the opening 123 for the molding operation.

During the molding operation, there may be inserted into the outsole, a steel shank 140. The steel shank 140 may have the shape shown in Fig. 25 of the drawings, so as to fit in between the windings of the strip 12. The shank 140 is preferably located half way between the top and bottom of the outsole 10b, so as to be hidden from view. Said steel shank is arched longitudinally as shown in Fig. 24 of the drawings.

If desired, the rubber coated onto or frictioned into the wound strips may be semi-cured instead of being fully vulcanized while the outsole is being molded. Thereafter, the top surface of the outsole may be coated with uncured rubber and then a usual shoe upper may be laid to the sole; and the shoe may then be subjected to complete vulcanization by heat alone, to attach the upper to the sole.

Instead of using uncured rubber, it will be understood that synthetic rubber, such as "neoprene" or plastic compositions, such as Vinylite may be employed, it being a dominant feature of the invention to employ moldable or vulcanizable material to the band, and to then mold or vulcanize such material after the band has been wound into the shape of a sole, and to apply pressure during the molding operation to obtain a sole of predetermined shape which will retain its shape after coming out of the mold.

It will thus be seen that there is provided a device in which the several objects of this invention are achieved, and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiments above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A process for making an outsole which comprises pressing a preformed strip of thermoplastic material of predetermined dimension and in tacky condition to at least one side of an elongated strip of flexible material of a width substantially equal to the thickness of the outsole and greater than the width of said strip of thermoplastic material, so that said strip of thermoplastic material is positioned between and spaced from the edges of said strip of flexible material, winding the laminated strips so formed into the shape of an outsole, and applying heat and pressure to said outsole so as to cause said thermoplastic material to soften and unite the convolutions of said strips.

2. A process of making an outsole, consisting in forming an elongated strip of vulcanizable material in tacky condition, then pressing said strip to a side of an elongated strip of flexible material of a width equal to the thickness of the sole to be made, to cause the first strip to stick to the strip of flexible material, then winding said strips to form the general shape of an outsole, and then semi-curing the curable material.

3. Process for making an outsole which comprises pressing a preformed strip of vulcanizable material of predetermined dimension and in tacky condition to at least one side of an elongated flat strip of flexible material of a width substantially equal to the thickness of the outsole and greater than the width of said strip of vulcanizable material, so that said strip of vulcanizable material is positioned between and spaced from the edges of said strip of flexible material, winding the laminated strip so formed into the shape of an outsole, and applying heat and pressure to said outsole so as to cause the vulcanization of said vulcanizable material and to unite said strips.

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