March 12, 1935. A. BATES 1,993,954

SHOEMAKING

Filed Dec. 14, 1931 2 Sheets-Sheet 1

Fig. 1.

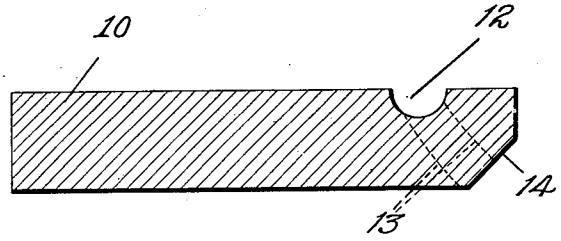


Fig. 1a.

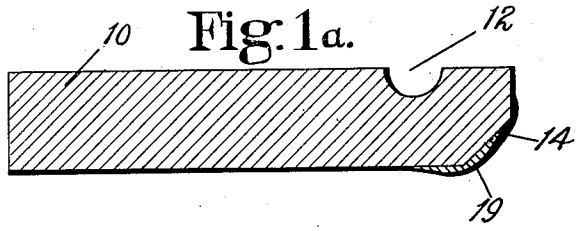


Fig. 2.

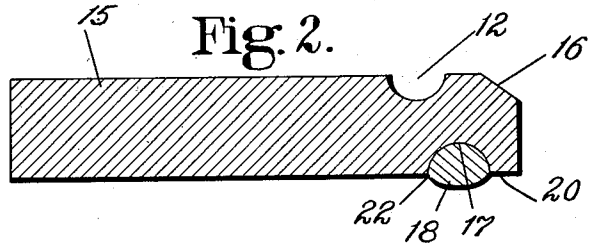
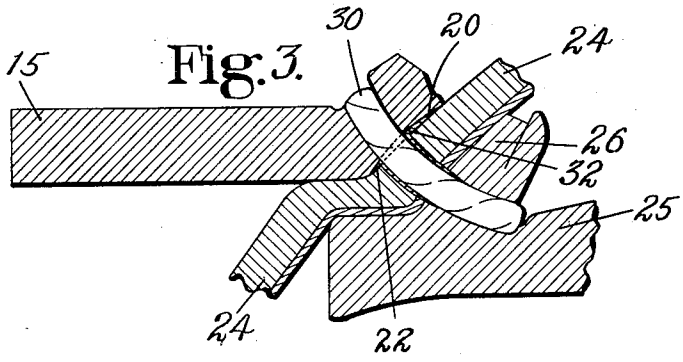


Fig. 3.



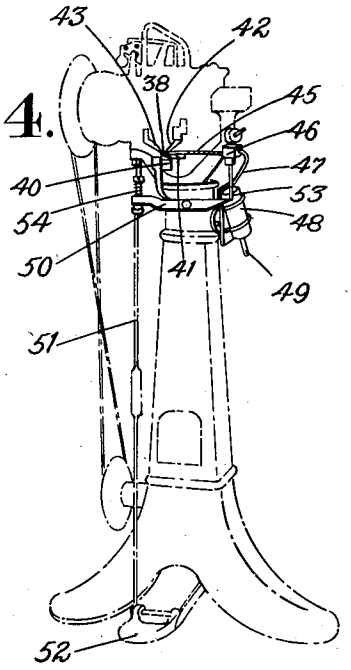
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Filed Dec. 14, 1931 2 Sheets-Sheet 2

Fig. 4.



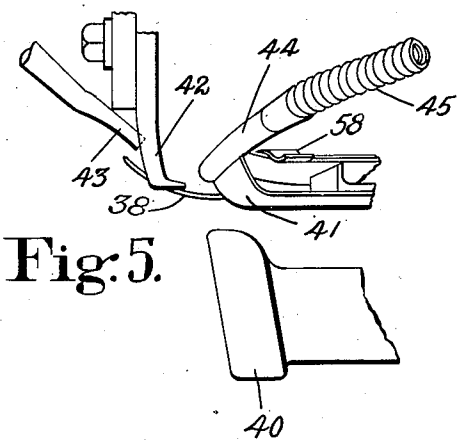
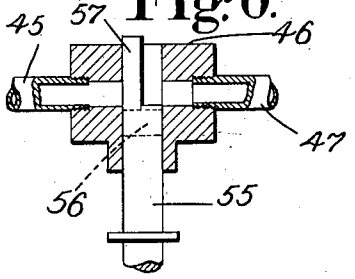


Fig. 5.

Fig. 6.



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Patented Mar. 12, 1935 1,993,954

UNITED STATES PATENT OFFICE

1,993,954

SHOEMAKING

Arthur Bates, Leicester, England, assignor to United Shoe Machinery Corporation, Paterson, N. J., a corporation of New Jersey

Application December 14, 1931, Serial No. 580,794
In Great Britain December 17, 1930

9 Claims. (Cl. 12—142)

This invention relates to the manufacture or repair of boots and shoes, hereinafter referred to simply as shoes, for convenience, and is particularly but by no means exclusively concerned with welt shoes, that is those which have a strip, known as the welt, generally of leather but sometimes embodying other materials as well, connected most usually by a sewn seam, known as the inseam, of linen or like waxed or lubricated thread to the upper and a lip or rib of the insole of the shoe, the welt being also connected, usually by another sewn seam, to the outer or wearing sole of the shoe.

Shoes so made with welts provide normally a construction adapted to resist to a high degree the penetration into their interiors of moisture during wear, partly at any rate on account of the fact that there is, in such shoes as normally made, no direct penetration from the outsole (where that is not backed by the heel) through to the inner surface of the insole by fastenings of the nature of seams or by the means used (usually needles) to produce such seams, or by fastenings of the nature of nails. However, moisture tends to enter the "crease", or angle between the exterior of the upper and that surface of the welt which is uppermost when the shoe is worn, and such tendency has been heretofore recognized, many special forms of welt or pieces additional to ordinary forms of welt, frequently of or containing waterproof material such as rubber or the like, having been proposed. Such special forms of welt, known generally as "storm" welts, usually embody some convex or angular portion designed to fill the crease above indicated, while the pieces additional to ordinary welts have usually taken the form of strips of leather or rubber sewn in with the welt and between it and the upper. Such strips often include an enlarged edge forming a "bead" which fills the crease angle.

While shoes made with some of the special welt strips or with the additions indicated usually give satisfactory results as regards their waterproof qualities, the manufacture of shoes for general, ordinary wear does not often allow of the use of such adjuncts on the grounds of expense, appearance or otherwise and it is an object among the several objects, of the present invention to provide for obtaining improved waterproof qualities in shoes made in such a way that their welts have the ordinary appearance. However, as will become apparent, the present invention is applicable with advantage to whatever type of welt may be employed, since it will be appreciated that once moisture enters the crease as far as the actual line of contact between the upper and the welt (or welt crease filling member if such be present) there is always some possibility of that moisture creeping further towards the interior of the shoe by passing through the holes or perforations made in the upper by the act of sewing the inseam. When the insole is tacked to the last, as is common in shoemaking, the tack holes facilitate the passage into the interior of the shoe of any moisture which gets beyond the inseam.

Once the upper and welt have been secured together it is by no means easy to get material, which will efficiently seal the stitch holes in the upper, into the desired region where the surfaces of the welt and upper are already in permanent, if not at that time waterproof, contact and it is therefore easy to understand the lack of success of such attempts as have been made to seal the crease of a shoe by merely injecting material into the crease angle at some period after the attachment of the welt, the more so as the resulting coating will not always adhere permanently to the upper or welt.

With the above points in view, an important characteristic of the present invention, considered in respect to one of its several method aspects, resides in providing a coating or surface deposit on one or both of the abutting surfaces of the upper and a bottoming member, such as a welt or a sole member, before said parts are secured together, a material adapted while in a liquid, semi-liquid, plastic, or pasty state to become effective to seal holes which are made in the upper in the act of attaching the bottoming member to the shoe upper. Sealing at the region indicated may be obtained by material applied to the welt before the latter is attached to the shoe and, according to the preferred manner of practicing the invention, the material is heated so that the sealing is effected during and as a consequence of the operation of sewing the welt to the shoe.

Other features of the invention relate to welting, as an article of manufacture, specially prepared for purposes such as indicated, and to improved methods of sealing seams which unite parts of shoes.

The above and other of the several objects and characteristics of the invention will become apparent from a consideration of the following detailed descripton, given by way of example and with reference to the accompanying drawings, of convenient forms of welt, methods of and devices for shoemaking according to the present invention.

In the drawings,

Fig. 1 is a magnified cross section of a welt of a form commonly used in shoe manufacture, the dotted lines indicating the region of the welt through which the inseam passes;

Fig. 1*a* similarly is a cross section of one form of welt according to the present invention;

Fig. 2 similarly is a cross section of another form of welt according to the present invention;

Fig. 3 shows diagrammatically the deformation of a welt of the form shown in Fig. 2 which results from attaching that welt to a shoe by a welt sewing machine;

Fig. 4 shows in outline by broken lines a well-known form of welt sewing machine, a few parts which are adjacent to the attaching point in the machine, and including the needle, devices for guiding a welt and devices for melting a coating or band thereon, being shown in full lines;

Fig. 5 is a view, on a larger scale than that of Fig. 4, showing a welt guide provided with a nozzle for air ejection and parts associated therewith; and

Fig. 6 is a view on an enlarged scale of an air control valve shown in Fig. 4.

In carrying the present invention into effect, in one way, welting, made either in continuous length or in separate pieces each long enough to make the welt for one shoe, has a band of thermoplastic material or substance, shown at 19 in Fig. 1*a*, deposited on or coated on to that surface of the welt which will be uppermost when the shoe is being worn and over a width substantially equal to or slightly wider than that portion of the surface of the welt which will be drawn into contact with the shoe upper when the welt is attached by the usual inseam sewing. This band may be thickest at its central portion. The coating material may be applied with a hand tool or brush but may be more conveniently applied by passing the welt through a coating device which may embody a small tank containing molten thermoplastic material which is lifted by a wheel for applying a band of coating to the welt, this latter being guided by lateral guides, so that the coating is applied to the desired width of the welt surface. The wheel may have a serrated or knurled edge and the welt may be fed over it and under a pressing wheel so that hot molten wax is pressed and ironed against the welt.

There will now be described with reference to Figs. 1 to 3 of the drawings a preferred form of welt adapted to be coated with sealing material before it is attached to a shoe. As has been indicated Fig. 1 shows an ordinary form of welt. This welt 10 is grooved at 12 and corner beveled at 14, the principal function of the groove 12 being to house the thread of the welt attaching inseam which, if of usual chain-stitch form, is doubled on that face of the work. The corner bevel 14 is made to facilitate close bedding of that portion of the welt against the shoe upper when the welt is attached, the stitches of the seam passing through the welt approximately between the dotted lines 13.

In the embodiment of the invention shown in Fig. 2 the groove 12 is retained in the welt 15 and a bevel 16 is preferably formed adjacent thereto, and an additional groove 17 is cut on the other face of the welt into which is applied a band 18 of sealing material which may be thermoplastic or otherwise, but will be thermoplastic if the welt is to be attached in the special manner later to be described.

According to the nature of the sealing material it may suffice merely to fill the groove 17 level with the welt surface or to apply more substance which, before the welt is attached, projects outwardly as a bead beyond the welt surface, as shown.

Both forms of welt illustrated respectively in Figs. 1*a* and 2 embody the present invention and may be used in carrying out the present novel method in its broader aspects but the welt illustrated in Fig. 2 is not claimed specifically herein but is claimed in a copending application, Serial No. 594,850, filed February 24, 1932, in the name of Roland A. Lineham.

The act of fastening to a shoe a welt of the form shown in Fig. 2 (and prepared as described with reference to that figure for application to a shoe) by a welt sewing machine produces a result shown by Fig. 3 in which is shown the upper material 24 of the shoe with its usual lining, the insole 25 with its rib or lip 26, and the waxed thread forming the stitches of the inseam 30. A principal effect of the drawing of the welt, upper and insole lip tightly together during this sewing operation is to bend the marginal portion 20, which in the unsewn welt forms one retaining wall of the groove 17, round towards that face of the welt in which is the groove 12, that is, the face which is uppermost as it is being attached to the shoe by usual welt sewing machines. As the portion or lip 20 is thus bent the curved contour of the groove 17 is flattened out, the material of the portion 20 and that at the opposite corner 22 of the groove being pressed firmly into contact with the shoe upper 24. The material 18 is effectively prevented by the contact of these projecting rib-like portions of the welt with the upper from escaping unduly laterally in any considerable quantity from between those areas of the welt and upper which are drawn by the sewing against one another and that material is therefore largely forced, by the flattening out of the contour of the groove 17, to flow through the holes made by the needle in drawing the thread 30 through the work and about the stitches, besides forming a seal all along the inseam at the region indicated at 32 which also surrounds the points of entry of the needle and thread into the upper. The groove 17 is shown as semi-circular but it will be understood that other formations of groove may be used.

With regard to the sewn welt shown in Fig. 3, although the surface of the welt between the portions 20 and 22 is indicated as slightly concavely curved, in practice, especially when the welt is attached by thread strongly tensioned, this surface may be entirely flattened out against the upper or even forced to a slightly convex curvature if the portion of the upper against which it is drawn has a concave curvature. The use however of a coating that is plastic or only semi-fluid when the welt attaching operation is performed may ensure by mere presence of the coating in quantity beyond that which is forced into the stitch holes that some of this coating be left as a continuous band of sealing material along the inseam between the welt and upper from stitch to stitch, the surface of the welt between the points 20 and 22 remaining concave to some degree, as indicated in Fig. 3.

A welt of the special form shown in Fig. 2, or of any other form suitably coated with thermoplastic substance, such as that shown in Fig. 1*a*, may be sewn to a shoe by any usual welt sewing machine, and the coating or surface deposit may be rendered plastic or tacky by heat applied at

one small locality progressively along the length of the welt as the sewing progresses as will be hereinafter described. Alternatively a welt with a thermoplastic coating may be attached to the shoe with the coating in a cold and therefore relatively solid condition. In such a case (or even where the coating has been soft during sewing) the material of the coating may be caused to become tacky after the welt sewing operation, and preferably before the outsole is attached, by placing the shoe in an upright position, as worn, and warming it so that the band of thermoplastic material becomes sufficiently softened to cause it to adhere to the surfaces between which it is confined and thus complete the seal.

Nowadays welt shoes are sometimes placed in a drying plant before sewing on the outsoles and, in carrying out the present invention, the heat of such a drying treatment may be availed of for effecting the sealing subsequent to the inseam sewing operation.

In employing a thermoplastic coating or band as indicated above it may be convenient to use a wax which is at least compatible with any employed in finishing the welt and sole edge surfaces of the shoe, and to use also wax of the same color as that intended to be used for such finishing operation, since in such case any of the coating substance which may show on the welt surface, after the latter has been attached to the shoe beyond the actual angle of the crease, will, if on any heating of the shoe (bottom down) as referred to above it does not sink into and disappear in the crease, then amalgamate with the wax employed in the subsequent finishing operations.

A thermoplastic material which however has been found to have desirable qualities for the purposes of the invention in that it does not require an undue degree of heat to become sufficiently tacky, is not brittle when cold and has good adherence generally to finished leather surfaces such as those of uppers and the surfaces of welts is one containing a large proportion of asphalts and a small porportion of resin; for instance:—

	Parts (by weight)
Air blown asphalt	60
Chatterton's compound	10
Resin (colophony)	30

"Chatterton's compound" is a well-known insulating substance made of guttapercha, resin and tar.

In making welts prepared so as to provide for inseam sealing, in some instances the sealing material may be caused to impregnate a fibrous thread which is then preferably applied to the welt while the sealing material is in a liquid or semi-liquid condition. For example thermoplastic sealing material which may be of the composition above indicated may be used in molten condition to impregnate loosely twisted wool, as used for knitting, by drawing the latter through a bath of the material. The impregnated wool may then be applied while the impregnant is soft to a welt strip which may be of usual form (but is preferably of the nature of that above described with reference to Fig. 2 so that the length of wool is received in a groove) and the combined unit of welt strip, wool and sealing material subsequently used in welting a shoe.

Figs. 4 to 6 illustrate devices adapted for dealing with that particular instance among methods according to the present invention which involves the use of welt prepared beforehand with a coating or band of thermoplastic material which is to be rendered tacky as the fastening of the welt to a shoe progresses. In Figs. 4 and 5 is indicated in dotted outline a welt sewing machine of a well-known commercial type and of the general construction disclosed in Letters Patent of the United States No. 1,099,326, Topham, June 9, 1914, the needle being shown at 38, the back gauge at 40, the welt guide at 41, the channel guide at 42 and the looper at 43. Attached to the upper side of the forward end of the welt guide is a nozzle 44 which is connected by a pipe 45 to a valve 46. The pipe 45 is flexible to allow of the usual movement of the welt guide during sewing. The valve 46 controls the passage of air from a pipe 47 leading from a heating device 48 (conveniently containing electrical heating coils) fixed to the side of the machine column. A pipe 49 leading to the device is connected to any convenient supply of air under pressure. In order to prevent the welt from contacting with the heated nozzle and pipe 45 a shield 58 may be fitted upon the welt guide 41.

The purpose of the valve 46 is to ensure that heated air shall be ejected by the nozzle only while actual attachment of the welt is being performed since its ejection at other times might result in overheating of parts of the machine adjacent to the sewing point, of the sewing thread, or of the work as that is positioned in the machine prior to the starting of a sewing operation. Means are provided therefore for the simultaneous control of the machine operation and of the air supply. As shown, such means may comprise a lever 50 pivoted to the front side of the machine head. One end of this lever embraces the rod 51 by which the machine clutch is controlled from a treadle 52 in normal operation and the other end of the lever 50 is arranged to actuate a rod 53 connected to the valve plunger.

Since in welt sewing it is usual for the machine operator to control in some degree the speed of the machine by pressing more or less upon the treadle 52, a yielding connection in the form of a spring 54 is provided upon the rod 51. This spring ensures that the flow of air to the nozzle will continue so long as the treadle is depressed either fully or only sufficiently to cause the machine to be driven at a low speed, with the clutch slipping, and that the air will be shut off only when the treadle is fully released as the machine is to stop.

In Fig. 6 the valve 46 is shown in detail, the valve plunger 55 is moved up and down by the rod 53 so as either, when raised, to bring the bore 56 in line both with the pipe 47 which leads from the heating device 48 and the pipe 45 which leads to the nozzle 44 or, when lowered, to bring the reduced portion 57 of the plunger opposite the pipe 47 and allow the heated air to pass upwardly into the atmosphere.

When a coating on a welt (or the complementary face of the upper) other than a thermoplastic one is employed for sealing according to the invention such coating may be applied close to the point at which the welt is attached to the shoe, for instance, where the coating is applied actually to the welt, through a nozzle ending at a suitable point in the welt guide. Or again a non-thermoplastic coating previously applied may be rendered tacky, for example by the application of a

solvent for the coating, through a nozzle at the location indicated. Furthermore the attachment of a welt may be by an operation otherwise than by sewing, an example of welt attaching otherwise than by sewing being that of stapling in which process the provision of a band of waterproof substance between a welt and the upper serves to render waterproof the line of a seam which has less continuity generally than that of a sewn seam.

Certain advantages are presented by attaching by sewing a coated welt to a shoe while the coating is in a tacky condition, as the result of heat in the case of a thermoplastic coating, because in such case the sewing thread tends in passing through the coating to draw it into the holes made in the upper and thus to enhance the sealing effect.

Reference has been made above to the fact that this invention is not exclusively concerned with welt shoes. In such connection it may be convenient here to point out that, in many classes of shoes, sewn seams are used which penetrate all the parts forming the shoe bottom, for instance in what is known as a McKay shoe a seam penetrating an insole, the margin of the upper and an outsole or middle sole is habitually employed. The sealing of such a seam by the application prior to the sewing of a band of sealing material either to the upper margin or to the outsole or middlesole along the sewing line or to both, and by subsequent softening where necessary of such material, provides an example of shoe seam sealing according to the invention in other than welt shoes.

Having thus indicated the nature and scope of the invention and having described in detail how it may be carried out, what I claim is:

1. A method of making a welt shoe which includes a ribbed insole, an upper and a welt which method comprises applying to the welt in the region where the inseam is to be formed a normally non-plastic material which may be rendered plastic by heat, heating said material, forming holes through the welt, the upper and the insole rib, uniting said parts by an inseam having stitches passing through said holes, drawing said parts tightly together, and thereby causing said material while plastic to flow about the stitches to seal the inseam.

2. A method of making a welt shoe which includes a ribbed insole, an upper and a welt which method comprises providing one of the abutting surfaces of said parts with a thermoplastic material in the region where the inseam is to be formed and then sewing the parts together by an inseam and thereby substantially preventing escape of said material from said region and forcing it to flow about the stitches to seal the inseam.

3. A method of uniting parts of shoes which comprises providing thermoplastic sealing material upon one or both of the parts, heating said material and then securing the parts together by a seam passing through said parts and simultaneously causing said material to flow about said securing means to seal the seam.

4. A method of uniting parts of shoes which comprises providing sealing material upon one of the parts to be united, heating said material to render it plastic and capable of flowing and, while said material is still in that condition, forming holes through the parts and stitches passing through said holes and drawing said parts tightly together and thereby forcing said material to flow about said stitches in said holes to seal the seam.

5. A method of uniting parts of shoes which comprises providing a coating of sealing material upon one or both of the abutting surfaces of the shoe upper and a bottoming member to be united and then uniting the parts by a seam and simultaneously causing said material to become effective as a seal for the seam.

6. A method of producing shoes having sealed bottoming seams which comprises providing a surface deposit on one or both of the abutting surfaces of the shoe upper and a bottoming member, before said parts are secured together, consisting of a material adapted while in a liquid or plastic state to become effective to seal holes made in the upper by the act of attaching the bottoming member to the upper and then securing said parts together by stitches passing through said holes.

7. A method of producing shoes having sealed bottoming seams which comprises providing on one of the abutting surfaces of the shoe upper and a bottoming member, before said parts are secured together, a surface deposit of a material normally of a non-plastic nature but which may be rendered plastic by heat, applying heat to said material and while it is plastic attaching a bottoming member to the upper by stitches and simultaneously forcing said material to flow about the stitches to seal the seam.

8. A method of producing shoes having sealed bottoms which comprises providing on one of the abutting surfaces of the shoe upper and a bottoming member, before said parts are secured together, a normally non-adhesive material, forming holes through said parts, securing said parts together by stitches passing through said holes, and simultaneously causing said material to flow about the stitches to seal the seam in and between said holes.

9. For the production of shoes having sealed bottoming seams, an article of manufacture consisting of a strip of welting having, upon that face of it which contacts with the shoe upper, thermoplastic, welt-seam sealing material.

ARTHUR BATES.