June 2, 1936. J. H. RICHARDSON 2,042,483

ATTACHMENT OF SOLES TO SHOES

Filed Oct. 16, 1934 2 Sheets-Sheet 1

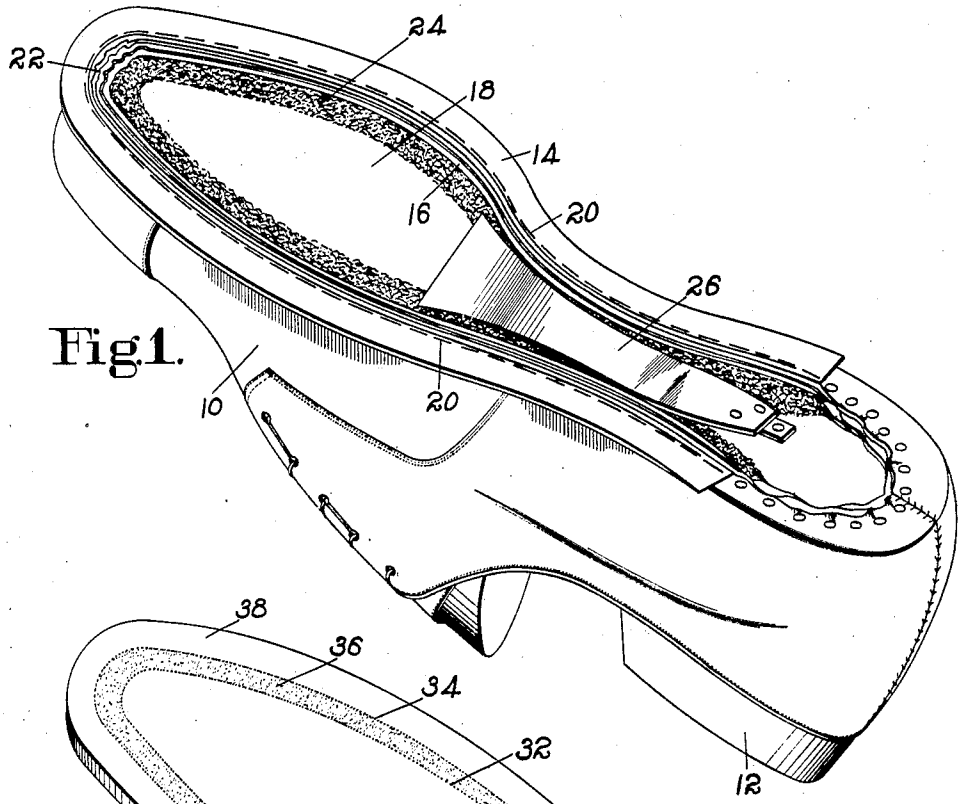


Fig.1.

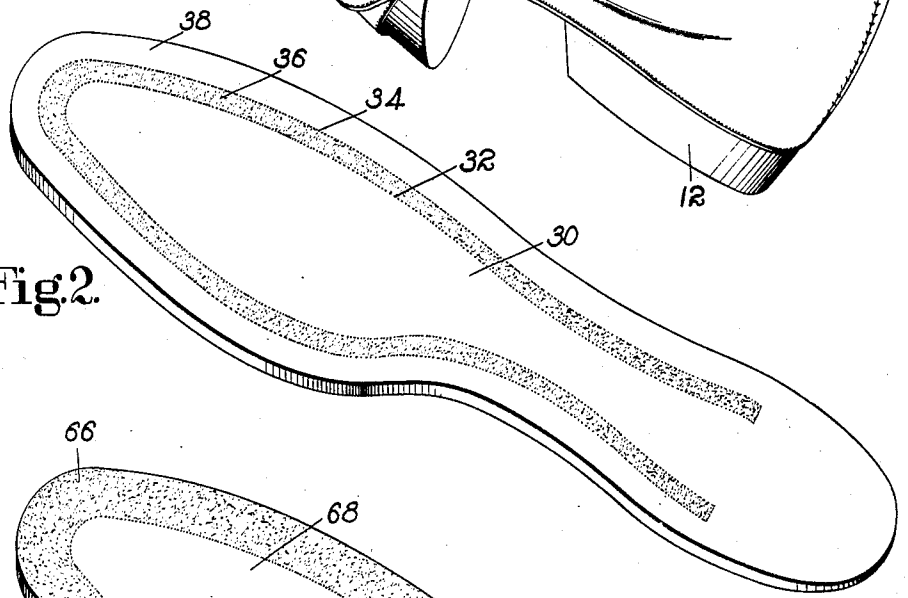


Fig.2.

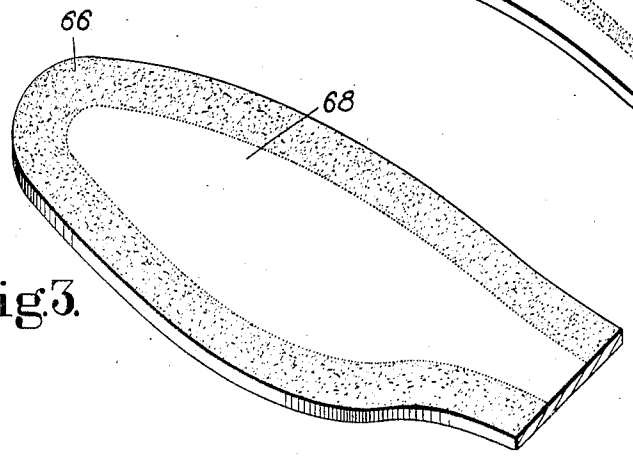


Fig.3.

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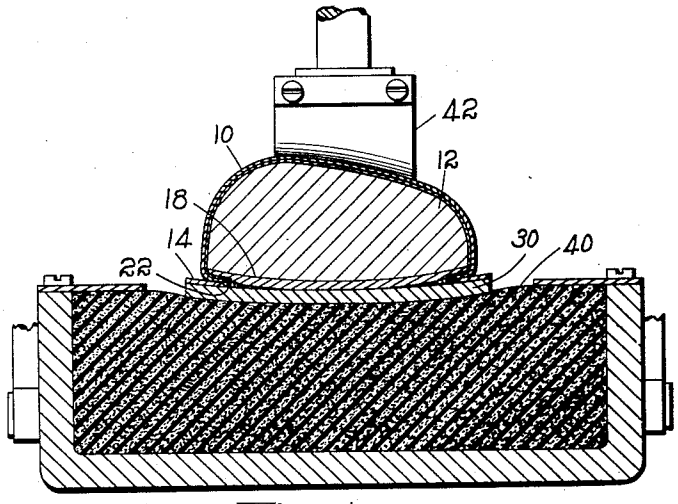


Fig.4.

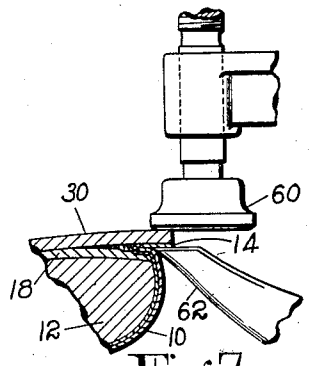


Fig.7.

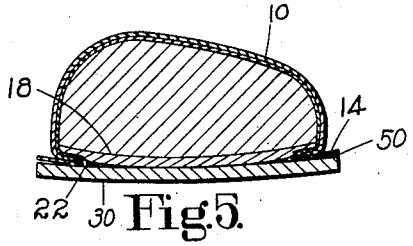


Fig.5.

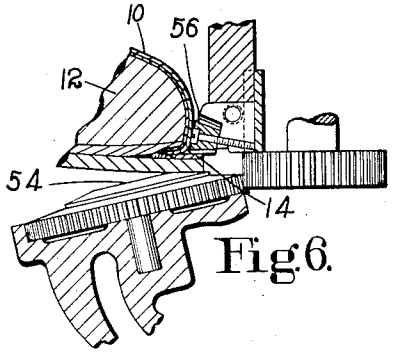


Fig.6.

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Patented June 2, 1936

2,042,483

UNITED STATES PATENT OFFICE

2,042,483

ATTACHMENT OF SOLES TO SHOES

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Application October 16, 1934, Serial No. 748,511

8 Claims. (Cl. 12—142)

This invention relates to improvements in the manufacture of shoes and is illustrated herein with respect to the cement-attachment of outsoles to welted shoes.

For some years past a number of different shoe manufacturers have made welted shoes having cement-attached soles. The soles of most of these have been trimmed quite closely. When it has been attempted to make in this way shoes the soles of which have a substantial extension, for example such as that which is typical of men's Goodyear welt shoes, difficulties have been encountered by reason of the fact that the upper of the shoe and the last do not support the outwardly extending portion of the welt adequately when the sole-attaching pressure is applied. Therefore, the sole is not pressed against the welt with sufficient force to insure a satisfactory bond between the sole and the welt unless means other than the shoe and the last is utilized to back up the welt and to hold it against displacement by the sole-attaching pressure.

It is an object of the present invention to obviate the necessity for the use of any such means for backing up or supporting the welt during the performance of the sole-attaching process. With this in view I propose to utilize a "pressure-responsive" cement between the outsole and the portion of the welt which lies exterior to the surface of the shoe bottom produced by the inseam trimming operation, pyroxylin or other suitable type of cement being used between the surface produced by the inseam trimming operation and the corresponding portion of the outsole. Thus, when pressure is applied to the suitably prepared outsole and shoe in the manner usual in cement-attaching outsoles to shoes, a secure bond is formed between the surface produced by the inseam trimming operation and the corresponding portion of the outsole. After the shoe has been removed from the sole attaching machine, sufficient pressure is applied, preferably progressively, to the welt and the marginal portion of the outsole to cause the pressure-responsive cement securely to bond those parts together.

It should be understood that the method referred to above is capable of considerable variation within the scope of my invention, as will be pointed out more fully hereinafter. Furthermore, in some of its broader aspects the invention is not limited to the manufacture of shoes welted in accordance with Goodyear welt methods since some, at least, of the advantages of the invention may be obtained in the manufacture of shoes welted in other ways.

Regarded from another point of view, my invention includes, as an article of manufacture, an improved welted shoe characterized by the attachment of an outsole to the surface resulting from the inseam trimming operation by pyroxylin or other cellulose derivative cement and to the portion of the welt exterior to that surface by pressure-responsive cement.

With the above and other objects in view, the invention will now be described with reference to the accompanying drawings and pointed out in the claims.

In the drawings,

Fig. 1 is a perspective view of a welted shoe prepared for the attachment of an extension-edge outsole in accordance with my invention;

Fig. 2 is a perspective view of an outsole prepared for attachment to a shoe such as that of Fig. 1;

Fig. 3 is a perspective view of the forepart of an outsole prepared in a different manner for attachment to a shoe such as that of Fig. 1;

Fig. 4 is a cross-sectional view through a shoe and a pad of a cement sole attaching machine, illustrating a step in the attachment of an outsole to a shoe by the method of my invention;

Fig. 5 is a cross-sectional view of the shoe of Fig. 4 after it has been removed from the cement sole attaching machine; and

Figs. 6 and 7 are sectional views illustrating the application of pressure progressively to the welt and the marginal portion of the sole of the shoe after it has been removed from the sole attaching machine.

In the manufacture of welted shoes having cement-attached extension-edge soles in accordance with my invention the operations to and including the welting and inseam trimming are preferably performed substantially in accordance with the practice usual in the manufacture of Goodyear welt shoes. A welt is chosen sufficiently wide to provide for the desired extension of the sole and the inseam is trimmed as closely as practicable, thereby minimizing the amount of bottom filler required and conducing to the production of a shoe having a relatively flat sole.

A shoe lasted and inseam-trimmed in this manner is shown in Fig. 1, the shoe having an upper 10 assembled and lasted on a last 12 and provided with a welt 14 held to the marginal portion of the upper 10 and to the lip 16 of an insole 18 by an inseam 20. If the inseam is sewed by the well-known Goodyear welting machine it will be chainstitched, having the loops of the stitches lying upon the surface of the welt and the single

thread of the stitches in the gutter at the base of the lip of the insole. If preferred, however, a chainstitch seam may be used with the single thread of the stitches lying upon the surface of the welt, or a lockstitch seam may be used. After the welting operation has been performed, the welt may be beaten, and slashed if necessary, in accordance with usual practice, after which the inseam is trimmed as close as practicable to the stitches, leaving a flat surface, indicated at **22**, a quarter of an inch, more or less, wide and consisting of the edge surfaces of the lip of the insole, of the layers of the upper materials and of the welt. The surface **22** may be beaten or rolled if desired, in order to compact and flatten the shoe bottom. As illustrated in Fig. 1, the shoe is provided with plastic bottom filler **24** of usual character and with a shank piece **26**.

Preparatory to cement-attaching the outsole to the shoe the exposed surface of the welt **14** and the surface **22** of the shoe bottom resulting from the inseam trimming operation are roughed, for example with a rotating wire brush. An outsole **30**, illustrated in Fig. 2, is provided of a size and shape suitable for the shoe to which it is to be attached, the marginal portion of the outsole being roughed over an area extending, as shown in Fig. 2, from the edge of the outsole to the dotted line indicated at **32**, or over a somewhat wider area, in accordance with the practice usual in preparing soles for cement-attachment.

The surface **22** of the shoe bottom produced by the inseam trimming operation is now coated with a cellulose derivative cement, preferably pyroxylin cement, which is allowed to dry. Then the surface of the welt extending from the outer edge of the welt approximately to the stitches of the inseam is coated with a pressure-responsive cement. By this I mean a cement of such a nature that surfaces coated with it will adhere to each other substantially instantaneously when brought together under pressure after the cement has dried to such a condition that it is no more than tacky or has passed from the tacky to the non-tacky condition. Examples of such cements are water-dispersed rubber cement, commonly spoken of as latex adhesive, rubber cement composed of rubber dissolved in benzol, naphtha or an equivalent organic solvent, and cement comprising essentially a solution or dispersion of polymerized chloroprene available under the trade-name "DuPrene".

Similarly, the portion of the outsole corresponding to the surface **22** of the shoe bottom produced by the inseam trimming operation and extending, as illustrated in Fig. 2, from the line **32** to the line **34**, is coated with pyroxylin or other suitable cellulose derivative cement indicated at **36** and preferably of the same character as the cement on the surface **22** of the shoe bottom. After this has dried, the area extending between the outer edge of the band of dried pyroxylin cement and the edge of the sole, indicated at **38** in Fig. 2, is coated with pressure-responsive cement.

After the pressure-responsive cement on the sole and shoe bottom has dried at least to a tacky stage, the cellulose derivative cement on the surface **22** of the shoe bottom is treated with a suitable softener, preferably a softener having a high viscosity such as that disclosed in United States Letters Patent No. 1,959,321, granted May 15, 1934, on an application filed in the name of Walter H. Wedger, or No. 1,959,324, granted on the same date on an application filed in the name of Frederick S. Bacon. Such a softener, by reason of its viscosity, will stay where it is put and will not flow over the pressure-responsive cement to any serious extent. The softener may be put on the area **36** of the sole as well as or instead of on the surface **22** of the shoe bottom, though I regard it as generally preferable to apply it only to the surface **22**.

The outsole is now applied to the shoe bottom and the shoe and sole are placed under pressure in a cement sole attaching machine of any preferred type, preferably, however, a machine the sole receiving pad of which is of resilient but relatively firm or hard rubber or other suitable composition, as indicated at **40** in Fig. 4, in which view the shoe and sole are shown as being held under pressure between the pad **40** and a hold-down **42**. It will be observed that by reason of the relatively unyielding nature of the pad **40** there is substantially no tendency to roll the welt and the marginal portion of the sole toward the shoe upper, though the area of the sole indicated at **36** in Fig. 2 is forced solidly against the surface **22** produced by the inseam trimming operation.

When the cement has set sufficiently to permit the removal of the shoe from the sole attaching machine, it will be found that the sole is fast on the shoe bottom, though its marginal portion is not securely bonded to the outer portion of the welt. Indeed, the two may be actually out of contact with each other, as indicated at **50** in Fig. 5. Accordingly, pressure is now applied progressively to the welt and the marginal portion of the sole without rolling the marginal portion of the sole and the welt toward the upper, at least at the forepart of the shoe. For this purpose the marginal portion of the sole and the welt are passed, for example, between the work support **54** and the roll **56** of a welt indenting machine of the type disclosed in United States Letters Patent No. 1,351,064, granted August 31, 1920, on an application filed in the name of John H. Rigby, thereby causing the pressure-responsive cement to bond the welt **14** securely and permanently to the marginal portion of the outsole **30**. This leaves the marginal portion of the sole and the welt substantially in the general plane of the outsole, at least at the forepart of the shoe. It should be understood that it is not essential to the practice of my invention that the pressure which is at this time applied to the welt and the marginal portion of the sole should be applied by means of a machine of the type disclosed in the Rigby patent. It may, as indicated in Fig. 7, be applied by pounding the sole with a reciprocating tool **60** while the welt is supported on the table **62** of a welt beating machine of the character disclosed in United States Letters Patent No. 598,727, granted February 8, 1898, on an application filed in the names of Zachary T. French and William C. Meyer; or this pressure may be applied by any other suitable means. Indeed, it is not essential that this pressure be applied progressively, though this is, I believe, the most convenient and satisfactory way to apply it.

The method outlined above may be varied by omitting the application of the pressure-responsive cement until after the shoe has been removed from the cement sole attaching machine. Thus, with the shoe in the condition illustrated in Fig. 5, the pressure-responsive cement may

be inserted in the crevice 50 between the welt 14 and the marginal portion of the sole 30. After the shoe has stood long enough for the bulk of the solvent to evaporate from the cement, pressure is applied to the welt and the marginal portion of the sole, as described in the preceding paragraph.

A further variation in the practice of my process utilizes pressure-responsive cement as the only sole attaching medium. In this case a wider band of pressure-responsive cement is used, indicated at 66 in Fig. 3 as applied to the sole 68. This band 66 is wide enough to extend over the entire area which will contact with the welt and with the surface 22 of the shoe bottom produced by the inseam trimming operation, and those portions of the shoe bottom are also coated with pressure-responsive cement. When most or all of the solvent has evaporated, the shoe and sole are brought together and placed in the sole attaching machine. The pressure of the machine is adequate to cause a secure bond between the surface 22 of the shoe bottom and the corresponding portion of the outsole. Thereafter, when the shoe has been removed from the cement sole attaching machine, the welt and the marginal portion of the outsole are caused to adhere securely to each other by means of pressure applied, for example, by machines of the character indicated in Figs. 6 and 7.

After the outsole has been cement-attached to the shoe bottom as described above, the edge of the sole may be trimmed, the heel attached, and the shoe finished in accordance with any desired or suitable shoemaking practice.

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

1. That improvement in methods of manufacturing shoes which comprises positioning and pressing an outsole on the bottom of a welted and inseam-trimmed shoe with cement between the surface of the shoe bottom produced by the inseam trimming operation and the corresponding portion of the surface of the outsole and also between the portion of the welt exterior to the surface produced by the inseam trimming and the corresponding portion of the outsole, applying pressure to the shoe and outsole and thereby securely bonding the outsole to the surface produced by the inseam trimming, and thereafter applying pressure progressively to the welt and the marginal portion of the outsole and thereby securely and permanently bonding those parts to each other.

2. That improvement in methods of manufacturing shoes which comprises positioning and pressing an outsole on the bottom of a welted and inseam-trimmed shoe with activated cellulose derivative cement between the surface of the shoe bottom produced by the inseam trimming operation and the corresponding surface of the outsole, holding the shoe and sole under pressure while the cement is setting without rolling the marginal portion of the sole and the welt toward the shoe upper at the forepart of the shoe, thereafter introducing pressure-responsive cement between the welt and the marginal portion of the outsole, and applying pressure to the welt and the marginal portion of the outsole and thereby bonding those parts securely and permanently to each other without rolling them toward the shoe upper at the forepart of the shoe.

3. That improvement in methods of manufacturing shoes which comprises positioning an outsole on the bottom of a welted and inseam-trimmed shoe with activated cellulose derivative cement between the surface produced by the inseam trimming operation and the corresponding portion of the outsole and with pressure-responsive cement between the outsole and the portion of the welt exterior to the surface produced by the inseam trimming, maintaining the shoe and sole under pressure until the cellulose derivative cement has set sufficiently to hold the sole properly in place on the shoe bottom, and thereafter applying pressure to the welt and the marginal portion of the outsole thereby securely and permanently bonding to each other the portions of the outsole and the welt exterior to the inseam.

4. That improvement in methods of manufacturing shoes which comprises positioning and pressing an outsole on a welted and inseam-trimmed shoe bottom with pressure-responsive cement between those parts thereby securely bonding the outsole to the surface of the shoe bottom produced by the inseam trimming, and after said pressure has been released applying pressure to the marginal portion of the outsole and the welt thereby securely and permanently bonding those parts to each other without rolling them toward the shoe upper at the forepart of the shoe.

5. That improvement in methods of manufacturing shoes which comprises positioning an outsole on the bottom of a welted and inseam-trimmed shoe with pressure-responsive cement between the sole and the welted and inseam-trimmed portion of the shoe bottom, pressing the sole on the shoe bottom and thereby, because of the slight projection of the inseam-trimmed portion of the shoe bottom, securely bonding the sole to said portion of the shoe bottom, and after said pressure has been released applying pressure progressively to the welt and the marginal portion of the outsole without moving them at the forepart of the shoe substantially from the general plane of the sole, thereby securely and permanently bonding to each other the portions of the outsole and welt exterior to the surface produced by the inseam trimming.

6. That improvement in methods of manufacturing shoes which comprises preparing a shoe upper with a welt secured by an inseam to the marginal portion of the upper and the lip of an insole, inseam trimming the shoe, preparing an outsole for cement-attachment to the bottom of the shoe, applying pressure-responsive cement to the prepared marginal portion of the attaching face of the sole, to the surface produced by the inseam trimming operation and to the sole-engaging surface of the welt, positioning the sole on the shoe bottom and applying pressure to the shoe bottom thereby bonding the outsole to the surface of the shoe bottom produced by the inseam trimming operation without rolling the marginal portion of the sole and the welt toward the shoe upper, and, after said sole attaching pressure has been released, applying pressure to the marginal portion of the outsole and the welt without moving them toward the shoe upper, at least at the forepart of the shoe, thereby securely and permanently bonding to each other the portions of the outsole and welt exterior to the surface of the shoe bottom produced by the inseam trimming operation.

7. That improvement in methods of manufacturing shoes which comprises preparing a lasted shoe with a welt secured by an inseam to the marginal portion of the upper and the lip of an

insole, inseam trimming the shoe, preparing an outsole for cement-attachment to the bottom of the shoe, applying pressure-responsive cement to the prepared marginal portion of the attaching face of the sole, to the surface of the welted and lasted upper produced by the inseam trimming operation and to the sole-engaging surface of the welt, positioning the sole on the shoe bottom and applying pressure to the shoe bottom through a pad of such a nature as to cause it to conform to the longitudinal and transverse curvature of the shoe bottom but rigid enough so that it will not roll the marginal portion of the sole and the welt toward the shoe upper, thereby bonding the outsole to the surface of the shoe bottom produced by the inseam trimming operation, and, after said sole attaching pressure has been released, applying localized pressure progressively to the marginal portion of the outsole and the welt without moving them at the forepart of the shoe substantially from the general plane of the sole, thereby securely and permanently bonding to each other the portions of the outsole and welt exterior to the surface of the shoe bottom produced by the inseam trimming operation.

8. A shoe having a welt secured to the marginal portion of its upper and to a lipped insole by an inseam, the inner edge of the welt and the surplus material of the upper and the lip of the insole having been removed by an inseam trimming operation, the shoe having an outsole attached permanently to the surface resulting from the inseam trimming operation by cellulose derivative cement and to the portion of the welt exterior to the surface produced by the inseam trimming by pressure-responsive cement.

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