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W. H. WEDGER

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METHOD AND STEP-PRODUCTS FOR USE IN SECURING TOGETHER PIECES OF STOCK

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Fig. 1.

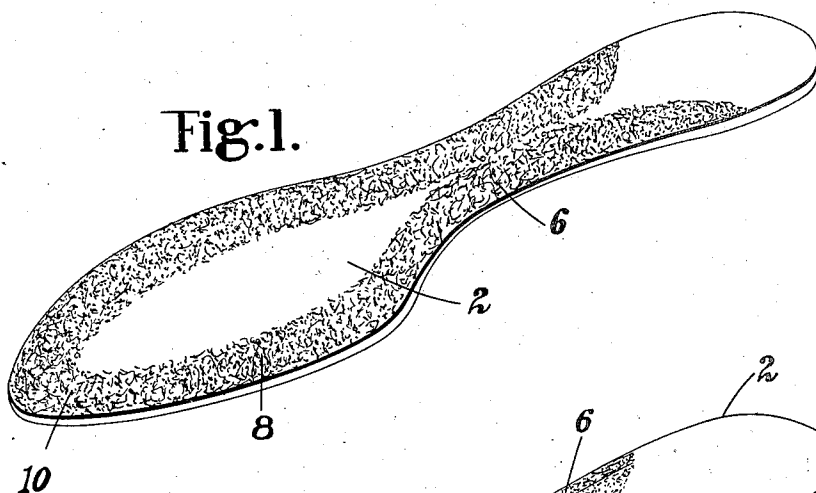


Fig. 2.

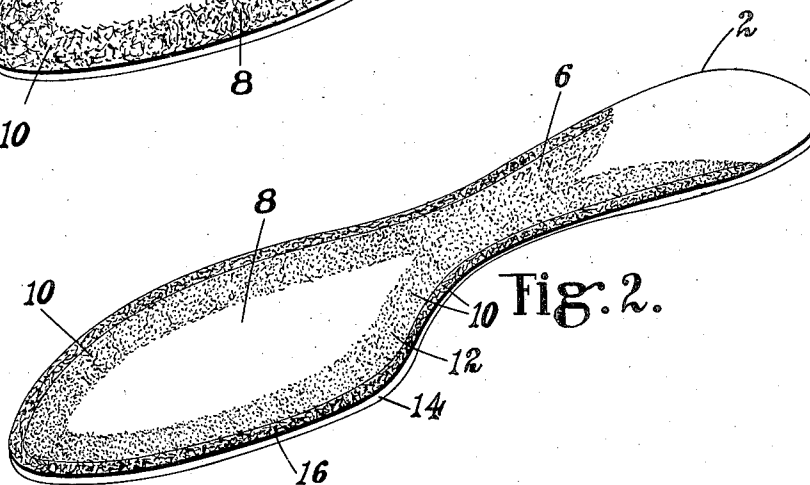
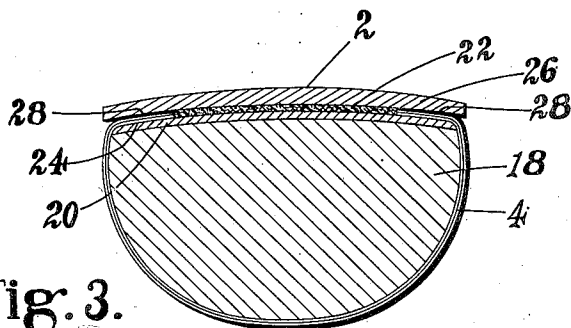


Fig. 3.



INVENTOR

Walter H. Wedger
By his Attorney
Harlow M. Davis

UNITED STATES PATENT OFFICE

1,959,322

METHODS AND STEP-PRODUCTS FOR USE
IN SECURING TOGETHER PIECES OF
STOCK

Walter H. Wedger, Belmont, Mass., assignor to
Boston Blacking & Chemical Co., Boston, Mass.,
a corporation of Massachusetts

Original application December 29, 1931, Serial
No. 583,773. Divided and this application Feb-
ruary 3, 1933, Serial No. 655,077. In Canada
May 16, 1932

22 Claims. (Cl. 12—142)

This invention relates to improvements in the securing together of pieces of stock by means of cement which is applied to one or more of the pieces of stock, permitted to dry, and activated or cut substantially immediately prior to the placing of the pieces of stock in juxtaposition under pressure. The invention includes novel methods of activating or cutting such dried cement, and novel step-products produced in the practice thereof. The invention is disclosed herein with particular reference to the manufacture of shoes wherein the soles are permanently secured to the overlapped portions of their uppers by pyroxylin cement, though it should be understood that the invention in various of its phases is in no way limited to use in shoe manufacture.

The present application is a division of my co-pending application Serial No. 583,773, filed December 29, 1931, for Methods and composition for use in securing together pieces of stock.

In the manufacture of shoes wherein the soles are cement-attached to the uppers it has been the practice to apply pyroxylin cement to the bottom surface of the shoe upper and to the cooperating marginal portion of the attaching surface of the sole, and to permit the cement to dry. The cement on one or both of the shoe parts subsequently has been activated or cut with a softener, the shoe parts then assembled and placed under pressure which is maintained while the cement is setting or becoming sufficiently adhesive to hold the shoe parts together without the aid of external pressure. Ordinarily the activation of the cement has been accomplished by applying a cement-solvent or softener with a brush to the cement-coated surfaces of the upper and sole, or the cement upon the sole only has been activated by brushing the softener on the cemented area of the sole or by dipping the cement-coated surface of the sole into a cement-solvent.

While many million pairs of shoes have been manufactured in accordance with the aforementioned practices, such practices have frequently been accompanied by certain undesirable results, for example staining and soiling of one or both of the shoe parts, due in part to lack of control over the softener. Thus, staining and soiling of the shoe uppers have frequently occurred as a result of "squeeze-out" of the softener or cement softened thereby, and as a result of the presence of the softening medium at the edge, particularly, of the sole.

It is an object of the present invention to provide an improved method of applying a softening medium by the employment of which the

dangers and difficulties heretofore encountered will be substantially reduced and the production of clean shoes with securely attached soles will be assured. As illustrated herein, this is accomplished by activating no more of the surface of hardened cement on a piece of stock than it is desired shall adhere to another piece of stock. More particularly, this object is accomplished by applying to a predetermined limited area of the hardened cement on the sole and/or shoe bottom a softener which, as disclosed herein, is preferably of a viscous or plastic nature. When the cement on the sole, for example, is to be softened, the softening composition is applied thereto, preferably in the form of a relatively narrow strip or ribbon the outer margin of which is spaced inwardly slightly from the edge of the sole and the thickness of which need not be greater than that sufficient to insure the softening of the frequently uneven layers of cement on the sole and shoe bottom. Thus, when the sole and upper are brought into assembled relation under pressure the slight displacement or flowing of the softening composition and/or softened cement which then takes place is sufficient only to bring the softener about to the outer edge of the area over which attachment of the sole to the shoe upper is desired. The predetermined positioning and control of the flow of the softener under pressure make possible the practical elimination of "squeeze-out" and all danger of smearing the shoe upper with softener and/or softened cement.

In another aspect the invention contemplates a step-product conveniently used in the practice of the method above described and comprising a sole having upon its attaching face a coating of dried cement and a layer of softener covering only a limited portion of said coating of cement on the sole.

In the drawing,

Fig. 1 is a perspective view of a sole to which cement has been applied as a step in the practice of the method of my invention;

Fig. 2 is a perspective view of the sole after application of the softening composition thereto and illustrates the step-product referred to; and

Fig. 3 is a transverse sectional view taken through a shoe the sole of which has been secured to the upper by the method of my invention.

As a specific example of the manner in which my invention may be practiced in the manufacture of shoes, the overlapped portion of the shoe upper and the marginal portion of the sole are roughened or scoured. Pyroxylin cement is then applied to the sole and the overlapped portion

of the shoe upper in any suitable manner and is permitted to dry. The cement may desirably be applied, as illustrated in Fig. 1, to the marginal portions of the shank 6 and forepart 8 of the sole 2 in the form of a strip or ribbon 10 of suitable width by a sole-cementing machine such, for example, as that disclosed in United States Letters Patent No. 1,928,693, granted October 3, 1933, on an application of A. S. Johnson. Cement may conveniently be applied to the marginal portion of the shank and forepart of the shoe bottom by a shoe bottom cementing machine, such as shown in an application for United States Letters Patent, Serial No. 574,833, filed November 13, 1931, in the name of Wilbur L. MacKenzie.

When it is desired that the sole be molded or conformed, the cement-coated sole is mulled or tempered, and shaped. If a relatively long period of time elapses between the sole-conforming or molding and the sole-attaching operations, the sole may be brought again into temper just prior to the sole-attaching.

Before the application of softener to the sole, whether or not the sole is conformed or molded, the sole is preferably mulled or tempered in order to make the same more flexible, and to reduce the tendency of the sole to pull away from the upper after the release of the sole-attaching pressure.

The composition with which the cement is cut or softened may be of any suitable character, since the invention is not limited as to the nature of the activating medium. In a preferred embodiment of the invention, however, the composition comprises a relatively small amount of nitrocellulose dissolved in a volatile solvent to form a composition of relatively high viscosity as compared to the solvents heretofore used, but of a substantially lower viscosity than that of the usual pyroxylin cements. This softening composition may be progressively applied to the sole 2 in the form of a uniform ribbon 12 (Fig. 2) of less width than the marginally located cement 10 and disposed on the cemented area 10 with the outer margin of the ribbon 12 spaced inwardly from the peripheral edge 14 of the sole 2 to leave a narrow band of unactivated cement 16 adjacent to the edge of the sole. The striping of the cement with the softening composition conveniently may be accomplished by means of a machine similar to that shown in said United States Letters Patent No. 1,928,693 of A. S. Johnson.

As quickly as possible after the completion of the progressive or other application of the softener to the sole, and preferably within from 5 to 10 seconds thereafter (although the period may be two or three times longer), the sole and shoe are brought into assembled relation and placed under pressure and the pressure maintained until the cement has set sufficiently or become sufficiently adhesive to hold the sole and shoe upper together after the pressure has been released. The shoe parts may be brought into assembled relation and maintained under pressure conveniently in a cement sole-attaching machine such as that shown in United States Letters Patent No. 1,897,105, granted February 14, 1933, on an application of Milton H. Ballard.

The relationship of a shoe upper and sole after assembly and after the application and release of pressure is illustrated in Fig. 3 wherein is shown a last 18 and insole 20 over which the upper 4 is lasted. Filler 22 of felt or other suit-

able material is disposed on the insole 20 between the overlapped portions 24 of the upper. The outsole 2 which is cemented to the overlapped portions 24 of the upper extends outwardly somewhat beyond the overlapped portions of the upper. The areas 28 over which the sole 2 and upper 4 are cemented together are indicated in this figure by heavy lines in Fig. 3 which may also be taken as indicating the sole-attaching cement, but are shown, for convenience of illustration, as of exaggerated thickness. The absence of softening composition and/or cement from the non-overlapped portion of the shoe upper adjacent to the sole should be noted. This advantageous condition is believed to be due, first, to the non-activation in the first instance of the cement on the peripheral portion 16 of the sole, and second, to the non-displacement of the softener and/or softened cement laterally and outwardly substantially beyond the outer boundary of contact of shoe upper and sole.

An example of a softening composition which I find suitable for use in the practice of the above method comprises 40 grams on the dry basis of nitrocellulose of a nominal 1100-seconds viscosity (the viscosity of the commercial 1100-second product ranges from about 1000 to about 1200 seconds), 18 cc. of denatured alcohol (used to wet the nitrocellulose to make it safe to handle) and 900 cc. of acetone. The viscosity of this composition at 25° C. I have determined to be about 50 on the McMichael scale when a disk of 6 cm. diameter and a wire of #22 B. & S. gauge is employed and the disk is rotated at 19 R. P. M. This viscosity comes within the range of about 1000 to 1500 centipoises.

The viscosity-characteristic of the nitrocellulose itself is referred to in terms of seconds in accordance with usual commercial practice, this viscosity being determined as described on pages 277-278 of a bulletin of the American Society for Testing Materials entitled "Tentative Specifications and Tests for Soluble Nitrocellulose", issued 1929, revised 1930. Further, the numerical value of the viscosity of the nitrocelluloses referred to herein, unless otherwise designated, relates to the present day commercial products the actual viscosities of which vary within limits in the neighborhood of plus or minus 10%.

There may be present in the softening composition other ingredients than those previously mentioned. Thus, for example, in some instances, small quantities of a plasticizer, such as dibutyl phthalate, may be employed. Also in some instances, diluents, for example, hydrocarbons such as pentane, hexane, or benzol, may be present in the softening composition.

While I have specifically illustrated my invention in connection with nitrocellulose or pyroxylin cements and softening compositions, the invention may likewise be practiced with the aid of other cellulose derivatives, such as cellulose acetates, ethyl cellulose, benzyl cellulose or other cellulose esters or ethers. Furthermore, while I have illustrated my invention in connection with the use of a softener containing a nitrocellulose solvent and high viscosity nitrocellulose, it should be understood that the invention is not limited to the use of a softener of this type, but may be practiced with the aid of any suitable medium for activating cement.

Having thus 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 securing together pieces of stock which comprises applying adhesive cement to the pieces of stock to be united, permitting said cement to dry, applying a cement activator to a limited portion of the cemented area on one of said pieces of stock, and placing the pieces of stock together under pressure whereby the pressure causes limited flowing of the activator thereby increasing slightly the area of activated surface, and uniting said pieces of stock over said increased area.
2. That improvement in methods of securing together pieces of stock which comprises applying cellulose derivative cement to the meeting surfaces of the pieces of stock, permitting said cement to dry, applying a layer of substantial thickness of a viscous liquid activator to a limited area of the cemented surface of one of said pieces of stock, bringing said pieces of stock into contact, and applying sufficient pressure to spread said activator over the area to be united.
3. That improvement in the method of manufacturing shoes wherein cement is applied to the marginal portions of a shoe bottom and a sole, the cement permitted to dry and subsequently activated, and the parts brought into juxtaposition under pressure, comprising applying to the dried cement on the sole a ribbon of softener the outer margin of which is spaced inwardly slightly from the edge of the sole and the thickness of which is not substantially greater than that sufficient to insure the softening of uneven layers of cement on the sole and shoe bottom, and bringing the sole with the cement thereon thus activated and the shoe bottom into juxtaposition under pressure.
4. That improvement in methods of manufacturing shoes which comprises applying pyroxylin cement to the marginal portion of an outsole and to the marginal portion of a shoe upper, permitting said cement to dry, activating the inner portion of the marginal layer of cement on one of said shoe parts, and bringing said sole and shoe upper together under pressure thereby, by displacement under pressure, activating the cement lying further toward the margin of said shoe parts, and maintaining the pressure while the cement is becoming more adhesive.
5. That improvement in the cement-attaching of soles to shoe uppers characterized by the activation in the first instance of only the inner portions of the cement on the outsole and upper, and the displacement of the activating medium over the remainder of the cement to be activated by bringing the parts together under pressure.
6. That improvement in methods of manufacturing shoes which comprises applying adhesive cement to the meeting surfaces of a shoe upper and a sole, permitting said cement to dry, applying a plastic activating medium to a limited area of one of said meeting surfaces, bringing said surfaces into contact under pressure thereby, by displacement under pressure, increasing the area of activated cement, and maintaining the pressure while the cement is becoming more adhesive.
7. In the attaching of an outsole to a shoe upper, the steps which comprise applying adhesive cement to the outsole, causing said cement to dry, and thereafter softening said cement over an area substantially uniformly smaller than the area to be cemented to the shoe upper and bringing the sole with the cement thereon thus softened and the shoe upper into juxtaposition under pressure.
8. That improvement in methods of securing soles to shoes which comprises applying pyroxylin cement to the overlapped marginal portion of a shoe upper and to the marginal portion of the attaching face of a sole which is to be secured thereto, activating only the inner portion of the marginal layer of cement on the sole, and bringing the sole and upper into juxtaposition under pressure.
9. That improvement in methods of securing soles to shoes which comprises applying cellulose derivative cement to the overlapped marginal portion of a shoe upper and to the marginal portion of the attaching face of a sole which is to be secured thereto, permitting the cement to harden, progressively applying softener to said marginally disposed cemented surface of the sole and in the form of a strip of controlled magnitude and of less width than said cement, bringing the shoe upper and sole into assembled relation, and applying pressure.
10. That improvement in methods of securing soles to shoes which comprises applying cement to the overlapped marginal portion of a shoe upper and to the marginal portion of the attaching face of a sole which is to be secured thereto, permitting the cement to harden, progressively applying softener to the marginally disposed cemented surface of one of said shoe parts in the form of a strip of controlled magnitude and of less width than said cement, bringing the shoe upper and sole into assembled relation, and applying pressure.
11. That improvement in methods of manufacturing shoes which comprises applying pyroxylin cement to the bottom face of a shoe upper and to an outsole and, after said cement has dried, applying a softener of heavy body to an area of the outsole substantially uniformly smaller than the area to be cemented to the upper, bringing said shoe upper and outsole together, applying sufficient pressure therebetween to spread said softener over the remainder of the portion of the cemented area of the outsole to be united to the upper, and maintaining said pressure until the softened cement has become sufficiently adhesive to hold the shoe upper and outsole together in joined relation.
12. That improvement in methods of manufacturing shoes which comprises applying adhesive cement to the bottom surface of a shoe and to the attaching surface of a sole, permitting said cement to dry, applying to the dried cement on the sole a softener of sufficient viscosity to remain substantially in its applied position until pressure is applied thereto, limiting the application of said softener to an area slightly smaller than and conforming to the shape of the shoe bottom to be cement-attached to the sole, and bringing the sole and shoe into juxtaposition and under mutual pressure.
13. That improvement in methods of manufacturing shoes which comprises applying adhesive cement to the bottom of a shoe and to the attaching face of a sole to be secured thereto and, after the cement has dried, applying to the cement on the sole over an area slightly and substantially uniformly smaller than the cement-coated area of the shoe bottom a softener of such plasticity that it will remain in its applied position until pressure is applied thereto and will flow uniformly when pressure is applied thereto, bringing the sole and shoe bottom into juxtaposition, and applying pressure.

plying pressure to the shoe and sole until the shoe and sole will remain in assembled relation without external pressure.

14. That improvement in methods of manufacturing shoes which comprises applying pyroxylin cement to the meeting faces of the outsole and the shoe upper, permitting said cement to dry, applying a strip of a viscous solution of high viscosity nitrocellulose in a volatile solvent to one of the cemented surfaces with the outer margin of said strip spaced substantially uniformly from the peripheral edge of the shoe part, bringing the shoe parts together, and holding them together under pressure while the cement is becoming more adhesive.

15. That improvement in methods of securing soles to shoes which comprises applying nitrocellulose cement to the overlapped marginal portion of a shoe upper and to the marginal portion of the attaching face of a sole which is to be secured thereto, permitting the cement to harden, applying to the surface of the hardened cement on the sole a coating of a viscous solution of nitrocellulose in a low boiling solvent, the edge of which coating is spaced a substantially uniform short distance from the edge of the sole, bringing the shoe parts into juxtaposition, and applying pressure.

16. That improvement in methods of securing a sole to a shoe which comprises applying pyroxylin cement to at least one of the parts, permitting the cement to harden, applying to the surface of the hardened cement on at least one of the parts, and inwardly of the outer margin of said cement, a ribbon of predetermined uniform magnitude of a viscous solution of nitrocellulose having sufficient plasticity substantially to retain its shape on the hardened cement, and bringing the sole and shoe together under pressure.

17. That improvement in methods of securing a sole to a shoe which comprises applying cement to at least one of the parts, permitting the cement to harden, applying to the surface of the hardened cement on at least one of the parts, and inwardly of the outer margin of said cement, a strip of predetermined uniform magnitude of a viscous softener having sufficient plasticity substantially to retain its shape on the hardened cement, and bringing the sole and shoe together under pressure.

18. That improvement in methods of securing a sole to a shoe which comprises applying a cellulose derivative cement to at least one of the

parts, permitting the cement to harden, applying to the surface of the hardened cement on at least one of the parts, and inwardly of the outer margin of said cement, a strip of predetermined uniform magnitude of a viscous solution of a cellulose derivative having sufficient plasticity substantially to retain its shape on the hardened cement, and bringing the sole and shoe together under pressure.

19. That improvement in methods of securing a sole to a shoe which comprises applying a cellulose ester or ether cement to at least one of the parts, permitting the cement to harden, applying to the surface of the hardened cement on at least one of the parts, and inwardly of the outer margin of said cement, a strip of predetermined uniform magnitude of a viscous solution of a cellulose ester or ether having sufficient plasticity substantially to retain its shape on the hardened cement, and bringing the sole and shoe together under pressure.

20. That improvement in the method of manufacturing shoes wherein cement is applied to the marginal portions of a shoe bottom and a sole, the cement permitted to dry and subsequently activated, and the parts brought into juxtaposition under pressure, characterized by the stripping of the dried cement on one of said shoe parts, inwardly of the outer margin of said cement, with an activator just prior to the bringing of the shoe parts into juxtaposition and under pressure.

21. That improvement in methods of manufacturing shoes which comprises applying pyroxylin cement to the marginal portion of the bottom surface of a shoe upper and to the marginal portion of a sole, permitting said cement to harden, softening a portion of the cemented surface of the sole spaced substantially uniformly inwardly of the edge of the sole with a solution of nitrocellulose in a low boiling solvent of a viscosity of about 1000 to 1500 centipoises, bringing the shoe parts into juxtaposition, and applying pressure.

22. A step product consisting of a sole ready for immediate attachment to a shoe by adhesive cement, said sole having upon its attaching face a dried coating of cement, and an active coating of a softener of high viscosity upon the cement entirely within a boundary line spaced a short distance inward from the edge of the cement on the sole.

WALTER H. WEDGER.

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