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METHOD OF TEMPORARILY ATTACHING INSOLES TO LASTS

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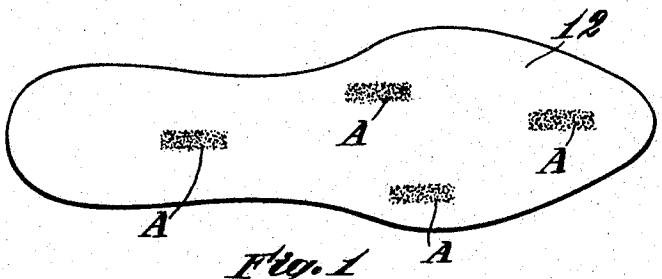


Fig. 1

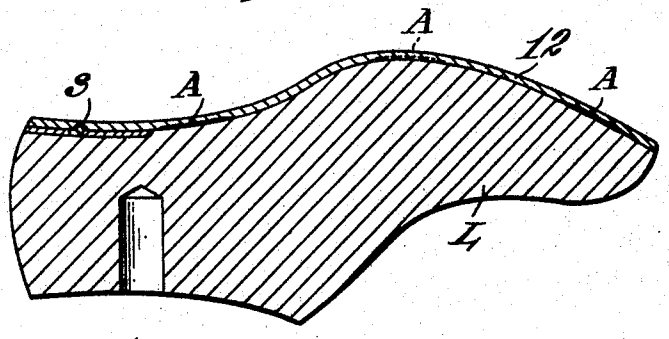


Fig. 2

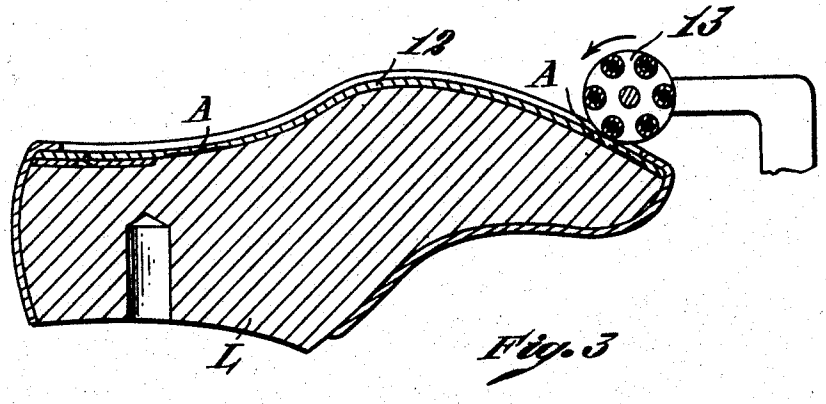


Fig. 3

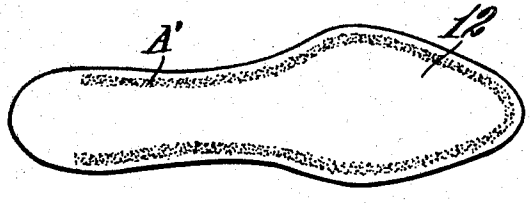


Fig. 4

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METHOD OF TEMPORARILY ATTACHING INSOLES TO LASTS

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3 Claims. (Cl. 12—142)

This invention pertains to the manufacture of footwear and more especially to a novel method of temporarily attaching an insole to a last bottom as a step in the assembling operation.

In preparing for lasting, the insole and upper are assembled upon a last and held in place by temporary tacks driven through the insole and through the rear end of the upper into the wooden last. At some time subsequent to the lasting these tacks should be pulled out. The tacks used to attach the upper to the last may be removed at any time after lasting, but the insole tacks must be removed before the outer sole (or a middle sole if used) is applied. If, by reason of carelessness, the insole tacks are not removed at the proper time in the operation, they can not be removed at all, and, if not removed, they make the pulling of the last very difficult. More important, their points project up through the insole into the interior of the completed shoe and (even though the points may be bent or flattened down) constitute a defect in the shoe and cause great discomfort to the wearer.

Although the desirability of replacing the customary insole tacks with some other means of temporarily securing the insole to the last has long been recognized, and though many attempts have been made to solve the problem, none of the prior suggestions, so far as is known to me, has proven practical, and the use of tacks for the purpose is still substantially universal.

The solution of the problem is made difficult by the fact that whatever temporary attaching means may be employed, it must be such that, after the shoe has been lasted, the bond between the last and insole may be broken so as to allow the last to be pulled freely from within the shoe and without discoloring or otherwise appreciably damaging the insole and without leaving vestiges of the fastener means to disfigure the upper surface of the insole or to cause discomfort to the wearer. Since the last fits very snugly within the lasted shoe, there is no room for attaching devices which would occupy any substantial amount of space; on the other hand, the attachment must be sufficiently strong to withstand the severe lateral stresses imposed upon the insole during lasting and which tend to shift the insole transversely of the last bottom; and for practical reasons the fastener means employed must not require radical modification of the last. Moreover, because of the highly competitive nature of the shoe industry, manufacturing costs must be kept at a minimum and any suggested means for attaching the insole (to be acceptable) must not appreciably exceed the cost of inserting and removing the customary tacks.

With the above requirements in view, the present invention provides a very simple, inexpensive and reliable method of temporarily attaching insoles to last bottoms whereby the disadvantages incident to the employment of tacks are wholly avoided.

The invention will be more fully described in the following more detailed description and by reference to the accompanying drawings wherein

Fig. 1 is a top view of a simple type of insole ready for application to the bottom of the last, after being prepared in accordance with the present invention;

Fig. 2 is a longitudinal section through a last, showing the insole of Fig. 1 attached thereto;

Fig. 3 is a diagrammatic, longitudinal section through a last having the attached insole and with the lasted upper, and indicating the step of disintegrating the insole-attaching adhesive; and

Fig. 4 is a view similar to Fig. 1 but illustrating a slight modification.

According to the present method, the insole is temporarily secured to the last by means of a strong, quick-setting adhesive which provides a powerful bond adequate to hold the insole in place in opposition to the lateral shifting forces applied during lasting, but which is of a nature such that, some time after it has set, the film of adhesive, interposed between the last and the insole becomes brittle, crystallizes and is easily disintegrated when subjected to rapidly repeated blows, thus completely destroying the bond between the insole and last. This adhesive is applied as a coating to the upper surface of the insole in any appropriate way, for example, by the use of a brush, an ejector nozzle or a spray. It is applied to so much of the area of the insole as may be required to provide the desired bond, it usually being sufficient to apply it to relatively small spaced areas, preferably located at those portions of the insole at which the customary insole tacks are inserted. However, the adhesive may be applied at any desired location, for example, along the margin of the insole or over its entire surface.

The insole may be placed in contact with the last bottom immediately after the application of the adhesive and while the latter is still sticky. Alternatively, the adhesive may be allowed to set after its application to the insole and may then be activated just before or just after the insole has been applied to the last. The activation may, for example, be accomplished by the use of infrared heat energy or by the use of a high frequency electrical field.

After the shoe has been lasted, and at any time prior to the last-pulling operation, the insole is subjected to shock vibration, for example, by hammer blows or by the use of a rotary beater, thus pulverizing the now crystallized and brittle adhesive so that the adhesive bond is broken and the insole is freed from the last. The last may now be pulled, leaving the insole unblemished and devoid of any projections which might cause discomfort to the wearer or which would detract from the appearance of the inside of the completed shoe.

It is contemplated that ordinary rosin (a product of the turpentine industry) may be employed as the adhesive.

Another adhesive, known as Du Pont Formula No. 72, suitable for the purpose, and supplied by E. I. Du Pont de Nemours Company has the following approximate formula:

	Per cent
Non-heat-reactive 100% phenol/formaldehyde resin	90
Plasticizer	5
Toughening agent, such as vinyl acetate	5
	100

As above suggested, the adhesive in its sticky condition is applied to that surface of the insole 12 (Fig. 1) which is to be the upper surface of the insole in the completed shoe. The adhesive may be applied to relatively small spaced areas A (Fig. 1) of the insole corresponding, for example, to usual places where the insole tacks are inserted, or, as illustrated in Fig. 4, the adhesive area A' may extend along the margin of the insole. These suggested locations are merely by way of example, it being noted that in the practice of the present invention the location of the attaching means (adhesive) is not in any way dependent upon the location of other parts, for example, the lasting margin, whereas the permissive place of insertion of fasteners like tacks is limited by the location of other elements of the shoe structure.

In accordance with one embodiment of the invention, the insole 12, with the spots A of sticky adhesive, is applied directly to the bottom of the last L and is pressed firmly against the last bottom, for example, by subjecting the last and insole to the action of a conventional sole-conforming machine. It may be desirable, in some instances, to provide the heel plate of the last with a projecting spur or spurs S (Fig. 2) to assist in preventing lateral shift of the rear end of the insole. Since the heel end of the last is swung upwardly preparatory to last pulling, the use of such spurs is permissible. The quickly setting adhesive which, in the case of rosin, is thermoplastic when applied to the insole, hardens and crystallizes

to form a bond which firmly binds the insole to the last and holds the insole in place during lasting. Before attempting to pull the last, the insole is subjected to vibration or shock, for example, to a series of very rapid blows. Merely as an instance of means useful for the purpose, a rotary beater 13 (Fig. 3), of a type customarily employed in laying channel flaps or for smoothing the bottom of an outer sole may be employed, or a vibrating hammer, or similar device may be used, with the result that the now brittle, crystallized adhesive is pulverized, the adhesive bond being broken and thus freeing the insole so that the last may readily be pulled out of the shoe.

In accordance with another embodiment of the invention, the spots or other areas A of adhesive are permitted to set before the insole is applied to the last, and the insoles thus provided with now non-tacky adhesive may then be stacked up for future use. When they are to be applied to the last, the adhesive is first activated, for example, by exposing it to infrared rays, and when it has become sticky the insole is applied to the last and the operation proceeds from then on in the same way as above described.

It should be noted that in order that the adhesive may perform its desired functions in holding the insole in place, it must initially have very substantial bonding strength, since it must resist the tendency of the insole to slip sidewise on the last during the lasting operation.

Furthermore, and very important, the adhesive must be of a type which does not leave an objectionable deposit or coating upon or cause discoloration of the insole. In the shoe trade, the appearance of the upper surface of the insole in the finished shoe is a matter of real importance, in so far as the quality characteristics of the shoe are concerned. Thus, any type of adhesive which stains or discolors the insole, or which would leave the insole greasy or slimy, or which might become sticky so as to adhere to the wearer's stocking, or which might have any injurious effects from chemical or other action on the wearer's foot, would not be permissible nor acceptable. It is also obvious that no adhesive could be employed which would require the application of high temperature in order to release the insole from the last. Most of the materials used in making a shoe are seriously injured by exposure to high temperatures, and thus adhesives which would require the application of substantial heat to break the adhesive bond would not be acceptable. Adhesives of the type above refererd to, fully meet the requirements since the adhesive bond may be broken by mechanical shock and does not require the application of solvents or high temperature. Since the adhesive is reduced by the mechanical shocks to the state of a very fine powder, the latter may easily be removed from the interior of the shoe, for example, by vacuum or by an air jet and which, even if allowed to remain in the shoe, is substantially invisible and has no harmful or undesirable effects. It may here be noted that even though the adhesive bond may remain until after the attachment of the outer sole, it is still possible to free the insole from the last by subjecting the shoe to vibration treatment such as above described.

While desirable procedures have herein been suggested in the practice of the improved method, it is to be understood that the method is broadly inclusive of any and all modifications falling within the terms of the appended claims.

I claim:

1. That method of temporarily attaching an insole to a last bottom preparatory to the operation of lasting which comprises as steps, bonding the insole to the last by a heated coating of a thermoplastic, crystallizing setting adhesive which provides an adequate bond when it first sets, sufficient to withstand the lateral stress imposed upon the insole during the lasting operation, but which, although interposed between the inner sole and last bottom, crystallizes and becomes brittle at a stage in the shoe making process prior to the application of the outer sole, and, before the application of the outer sole, subjecting the insole to a succession of blows to thereby reduce the adhesive to powdered form.

2. That method of temporarily attaching an insole to a last bottom preparatory to the operation of lasting which comprises as steps, bonding the insole to the last by a coating of heated rosin which provides an adequate bond when it first sets, sufficient to withstand the lateral stress imposed upon the insole during the lasting operation, but which, although interposed between the inner sole and last bottom, crystallizes and becomes brittle at a stage in the shoe making process prior to the application of the outer sole, and, before the application of the outer sole, subjecting the insole to a succession of blows to thereby reduce the rosin to powdered form.

3. That method of temporarily attaching an insole to a last bottom which comprises as steps, applying to the upper surface of the insole a heated coating of a thermoplastic, crystallizing setting adhesive which, subsequent to setting, becomes brittle and crystallizes so that it is readily pulverized by exposure to shock, allowing the adhesive to set, thereafter heating the adhesive to make it tacky, placing the adhesively coated surface of the insole in contact with the last bottom, and subsequent to the lasting operation, and after the adhesive has set and become brittle, pulverizing the adhesive thereby to free the insole to the last.

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