April 17, 1945. M. W. TETLOW 2,373,922

METHOD OF ATTACHING SOLES TO SHOES

Filed May 11, 1944 4 Sheets-Sheet 1

Fig. 1

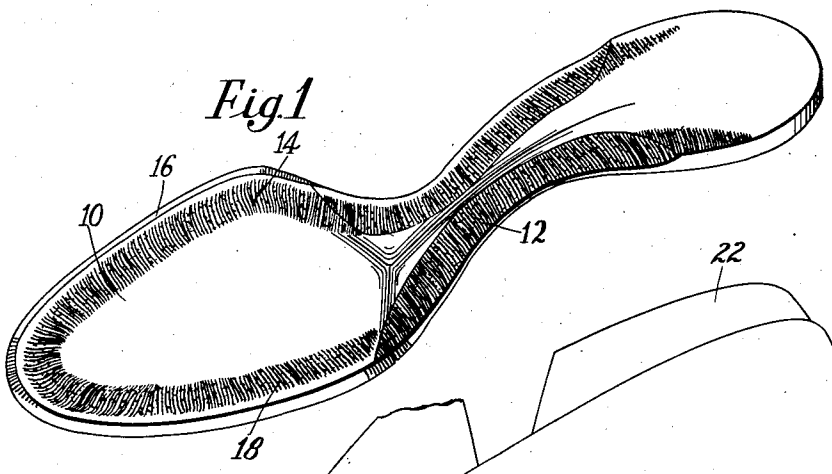


Fig. 2

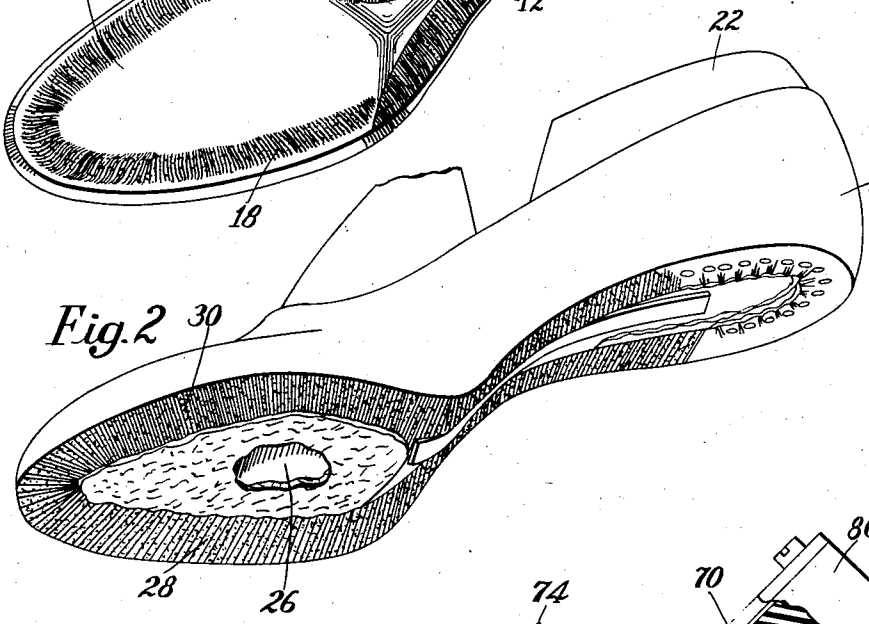
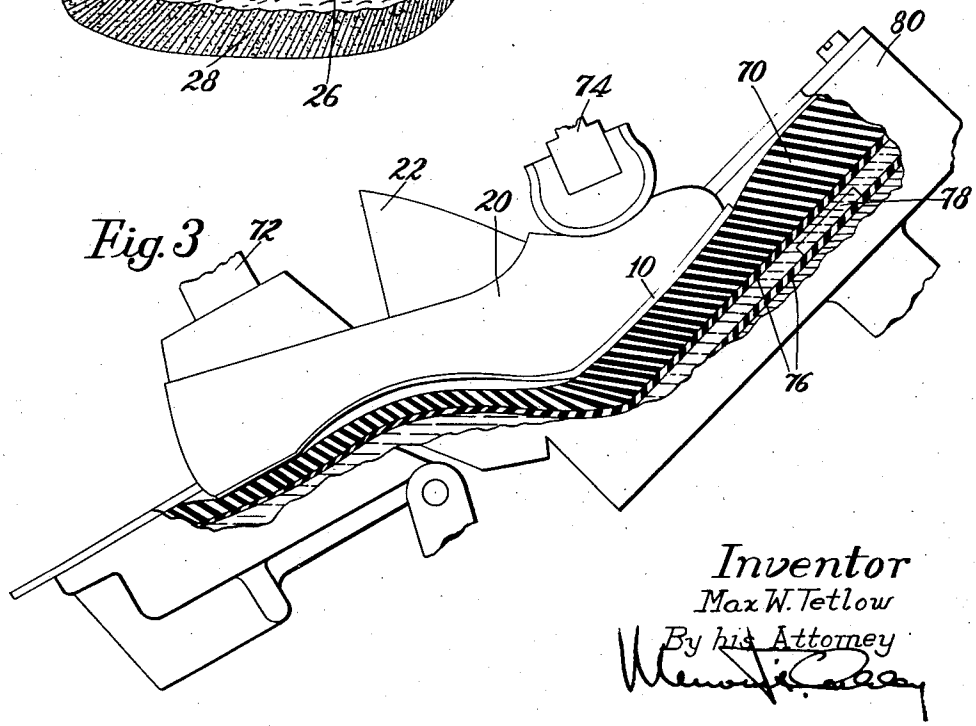


Fig. 3



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Fig. 4

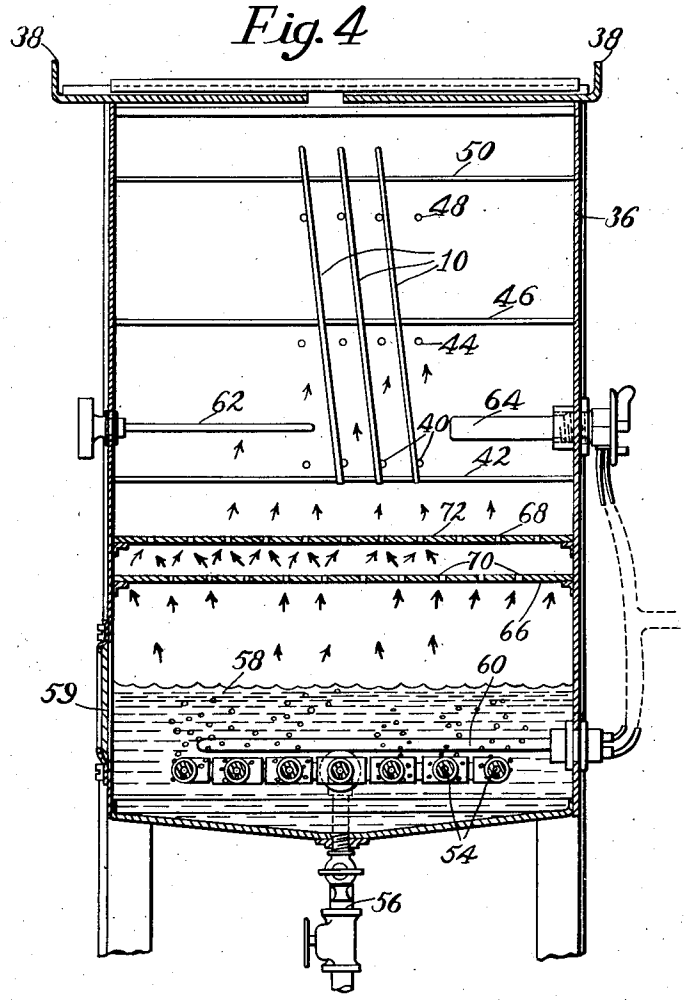
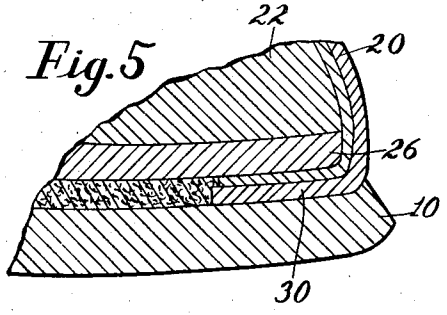


Fig. 5



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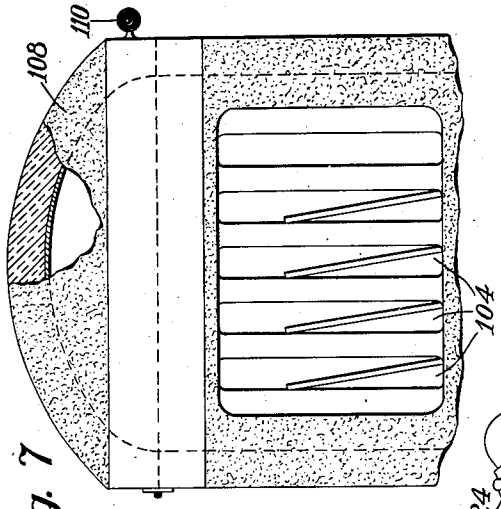


Fig. 7

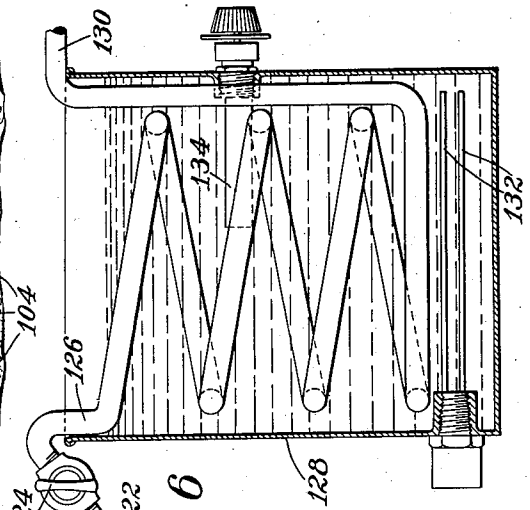
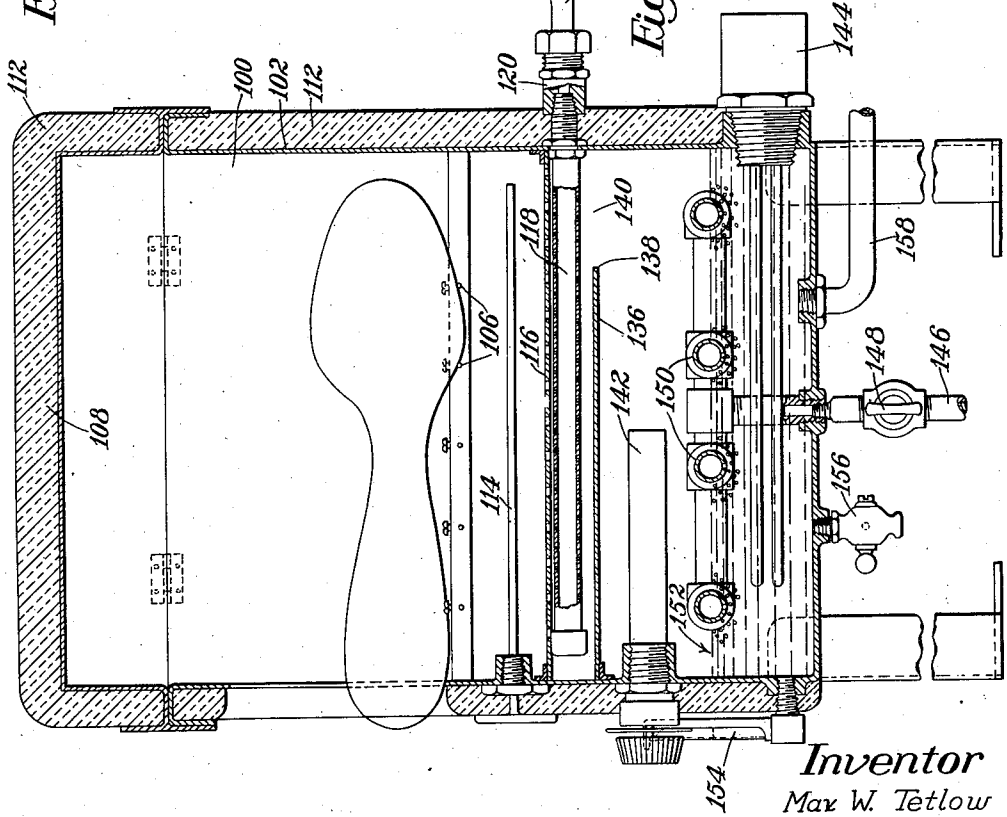


Fig. 6



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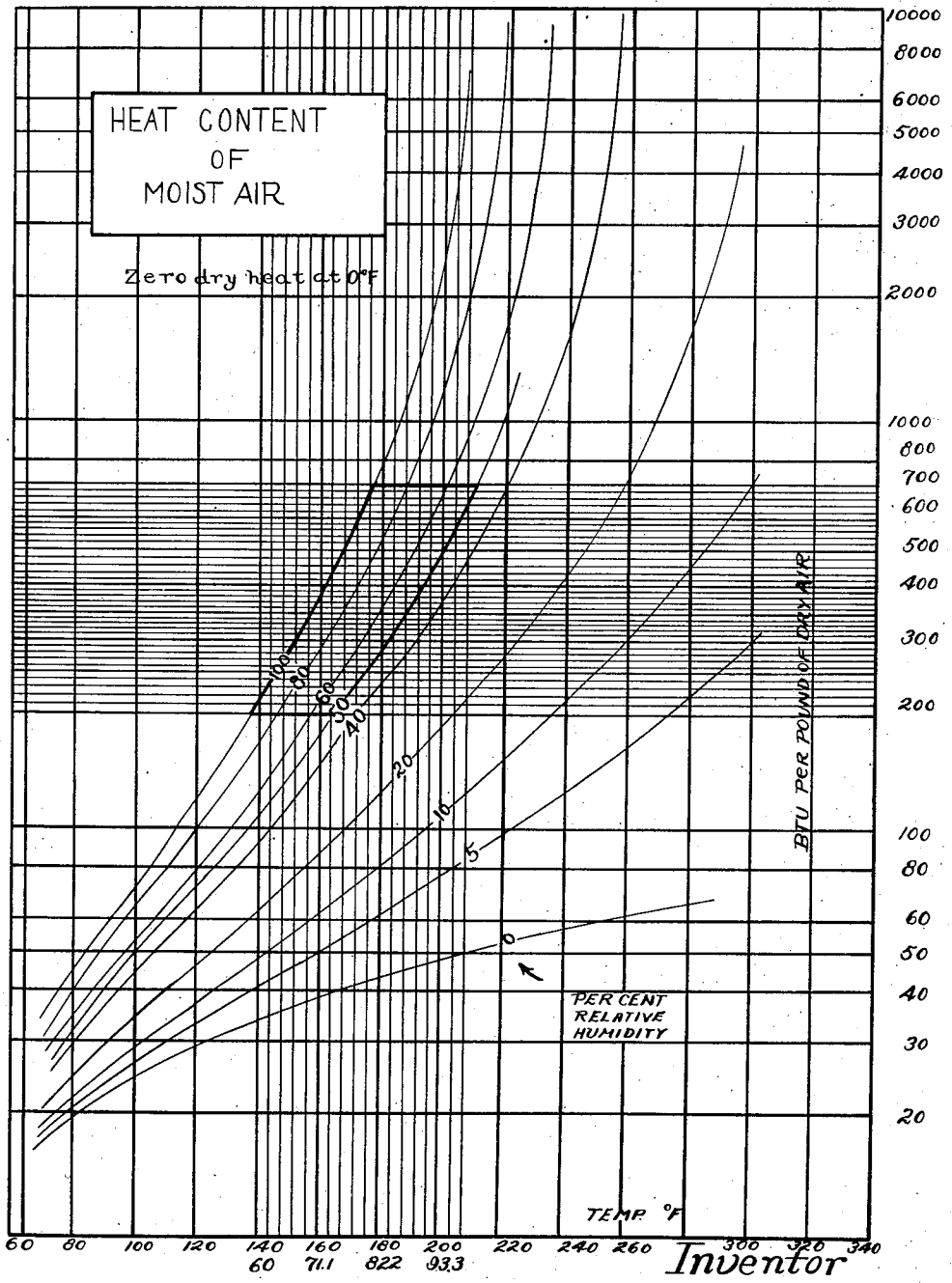


Fig. 8

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Patented Apr. 17, 1945 2,373,922

UNITED STATES PATENT OFFICE

2,373,922

METHOD OF ATTACHING SOLES TO SHOES

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Application May 11, 1944, Serial No. 535,025

10 Claims. (Cl. 12—142)

This invention relates to shoe manufacture and more particularly to the permanent attachment of outsoles to shoe uppers by means of polymerized chloroprene. This application is a continuation in part of my application Serial No. 424,877, filed December 30, 1941.

In United States Letters Patent No. 2,061,296, granted November 17, 1936, upon the application of Walter H. Wedger, there is described a process of attaching outsoles to shoe uppers by means of polymerized chloroprene. In said patented process, the outsole and the shoe upper are brought together under sole-attaching pressure while the polymerized chloroprene previously applied to said shoe parts is in adhesive condition which may be from about one to six hours or more after the application of the polymerized chloroprene cement. In the practice of such process, the sole-cementing and other shoe factory operations must be timed within reasonably close limits in order that the cement on the outsoles may be in an adhesive condition when the uppers are ready for sole attaching. Furthermore, with such process it is necessary to see that the outsoles are attached during the same working day that they are coated with cement because ordinarily the adhesiveness of the cement thereon is considerably reduced after the cement-coated outsoles have stood over night.

In United States Letters Patent No. 2,087,878, granted July 20, 1937, upon the application of Walter H. Wedger, there is described an improvement over the earlier Wedger patent wherein polymerized chloroprene on the outsole which has lost its adhesiveness in substantial degree is temporarily restored to normal adhesiveness and the operation of attaching the outsile to the shoe upper performed while the outsole is in such condition of temporary restoration to adhesiveness. This temporary restoration to normal adhesiveness is accomplished by applying to the surface of the polymerized chloroprene cement on the outsole before said polymerized chloroprene has become entirely cured a material which may be selected from certain organic liquids which will swell and activate the cement. When the polymerized chloroprene is in attaching condition, that is to say, when the excess or a major portion of the swelling material has been dissipated but the plastic polymer is still in swelled condition, the outsole and shoe upper are brought into juxtaposition and placed under attaching pressure.

If the sole-attaching operation is carried out while the leather is not in temper or "dry," the sole will "spring back" upon release of the sole-attaching pressure due to the normal resilience inherent in dry sole leather, and the margin of the sole wrapped up over the feather line of the shoe by the conformable pad of the usual attaching press will tend to return to its initial position when the pressure is relieved. The result is that the polymerized chloroprene cement is stretched slightly to form a great number of short threads spoken of as "legs" which appear as a heavy line in the crease of the shoe between the marginal portions of the sole and upper. To make a short time dwell effective for proper sole attachment and to avoid the above-mentioned "leggy" condition it is necessary that the sole be attached while in sufficient temper to render it substantially inert.

Objects of the present invention are to provide improvements in the process of attaching outsoles to shoe uppers with polymerized chloroprene whereby the use of organic liquids for temporarily restoring the cement to adhesiveness may be eliminated, whereby the leather of the soles may be brought into a substantially uniform and desirable condition of temper or inertness for the sole-attaching operation and whereby the cemented soles may be activated substantially irrespectively of the lapse of time since they were cemented, that is, within a week or more.

A further object is to condition the leather of the soles adequately for the sole-attaching operation without requiring unnecessary delay in carrying out subsequent shoe manufacturing operations.

In the accomplishment of the above and other objects, I have discovered that polymerized chloroprene coated leather outsoles wherein the cement has dried beyond the tacky stage may be successfully treated with water-vapor-laden air of certain characteristics to activate the cement and simultaneously to inert the leather of the sole sufficiently for sole attaching, the water vapor content, contrary to expectation, having no deleterious effect on the cement bond obtained. The atmosphere to which the sole is subjected in accordance with this invention conforms to all of the following requirements, namely, it is laden with water vapor at a temperature in the neighborhood of 140° F. to 206° F., is of 50% to 100% relative humidity, and has a heat content of from 200 to 700 B. t. u. per pound of dry air.

In carrying out my invention, therefore, a solution of polymerized chloroprene is applied to the attaching surface of a leather outsole and a major portion of the solvent is allowed to evaporate. An

atmosphere is provided which is at a temperature in the neighborhood of from 140° F. to 206° F., which is laden with water vapor to the extent of 50% to 100% relative humidity, and which has a heat content of from 200 to 700 B. t. u. per pound of dry air. The outsole is subjected to such an atmosphere for a time sufficient to activate the cement, which may be, for example, from ten to sixty seconds, whereupon the outsole is immediately brought into juxtaposition with a shoe upper whose attaching surface is provided with a layer of polymerized chloroprene. The outsole and shoe upper are then pressed firmly together.

In referring to the hot air as vapor laden, the word "vapor" is to be understood in its technical sense, that is, as indicating that the water is in a gaseous phase and substantially unmixed with water in the liquid phase.

In the practice of this invention, the cement is activated in a very short time, namely in as little as ten seconds. Simultaneously the leather of the sole is rendered substantially inert. The sole-attaching pressure may be relieved in a very short time, for example, after a dwell of as little as five to eight seconds.

The practice of the invention is highly advantageous in that the cement is uniformly activated and therefore better contact and more uniform adhesion to the shoe bottom may be obtained. Furthermore, the expense of providing and handling toxic solvent for activation is avoided. Moreover, the strength of the adhesive bond develops so rapidly that the use of a two-station machine is rendered feasible with resulting economy in the cost of machinery for sole attaching.

Where air of substantially 100% humidity is to be employed in the practice of the invention, I prefer to employ sole-treating apparatus such as that disclosed in United States Letters Patent No. 2,334,232, granted November 16, 1943, upon the application of Adoniram J. Wells. Where air of substantially less than 100% humidity is employed for the practice of the invention, a modified form of apparatus shown in Figs. 6 and 7 of this application may be employed, and indeed, even where air of substantially 100% humidity content is to be used the modified form of apparatus may be used.

In the drawings,

Fig. 1 is a perspective view showing the attaching face of an outsole that has had its marginal portion roughened, has had cement applied to the roughened portion except at its extreme outer edge, and has been conformed;

Fig. 2 is a perspective view of a shoe the overlasted portion of the upper of which has been roughened and has had cement applied thereto; it shows also a shank piece and filler;

Fig. 3 is a view, partly in section, showing a shoe and its sole held under pressure on a conformable pad;

Fig. 4 is a sectional view of apparatus for treating the sole to activate the cement and cause the sole to become inert;

Fig. 5 is a sectional detail of a completed shoe;

Fig. 6 illustrates a modified form of apparatus to be used in practising the invention by which the relative humidity in the sole-treating chamber may be varied and controlled;

Fig. 7 is a front elevation, partly broken away, of the upper part of the apparatus; and

Fig. 8 is a chart showing the heat content of moist air and illustrating the conditions of temperature, humidity and heat content contemplated by the invention.

In carrying out this invention in a preferred manner, a leather sole **10** (Fig. 1) is rounded and its shank reduced at **12**. The marginal portion **14** of the sole is next roughened and at that time it should be dry, that is, should contain not over five to ten per cent of moisture, that being regarded as a "dry" condition. The sole is therefore insufficiently in temper to be inert.

Good results have been obtained by applying to the marginal portion **14** of a dry sole polymerized chloroprene cement of substantially the composition disclosed in the Wedger Patent No. 2,087,878 hereinbefore referred to. It is to be understood, however, that other cements composed wholly or in part of rubber or synthetic rubber-like materials may be employed.

The cement may be applied by hand but better results are obtained by a sole-cementing machine such as that disclosed in Letters Patent of the United States No. 2,073,647, granted March 16, 1937, on an application filed in the name of Carl A. Newhall, by which the cement may be accurately applied, leaving the extreme outer portion **16** of the margin uncemented. The cement is indicated by stippling **18** in Fig. 1.

In Fig. 2 is represented a shoe **20** on a last **22**. The upper **20** of the shoe is lasted over an insole **26** in any usual manner. The overlasted marginal portion of the upper is roughened and cemented, the roughening being indicated by parallel lines at **28** and the cement by stippling at **30**. The cement, which is like that applied to the sole, may be applied by hand with a brush. It is preferable, however, to employ mechanical means such, for example, as is disclosed in Letters Patent of the United States No. 2,100,341, granted November 30, 1937, on an application filed in the name of W. L. MacKenzie, or in Letters Patent of the United States No. 2,177,666, granted October 31, 1939, on an application filed in the names of W. L. MacKenzie and E. S. Nokes. About one hour should be allowed to elapse after application of the cement to the sole or shoe before the cement on the sole is activated for attachment to the shoe. The cement on the shoes, after drying, remains in condition for activation and attachment by the present method for a long time and on the soles even for a materially longer time.

Activation of the cement by heat and conditioning of the sole for attachment to the shoe are effected in an apparatus similar to that disclosed in the hereinbefore-mentioned Wells patent which, as illustrated in Fig. 4, comprises a casing **36** which is closed except at the top where it is provided with slides **38** which may be opened for introduction of the soles and then partially closed. The soles **10** are supported in the casing by two series of crossed wires **40**, **42** at their lower ends and by other crossed wires **44**, **46** between their ends, still other crossed wires **48**, **50** being provided at the upper ends of the soles. The soles are thus held separated so that both surfaces of each sole are exposed to the hot vapor-laden air generated below the soles.

To generate the vapor-laden air, a series of connected tubes **54** is provided near the bottom of the casing **36** to which compressed air from any suitable source is supplied by a pipe **56**. On the lower side of the tubes **54** are small orifices through which the air is forced, the air bubbling up through water with which the lower portion of the casing is filled to a level indicated at **58** visible through a window **59**. Just above the tubes **54** and

immersed in the water is arranged an electric immersion heating unit 60 which heats the water, the temperature of the vapor-laden air being indicated by a thermometer 62 located in the vapor-laden air passing up through the casing to the upper portion thereof where the soles 10 are located. In the casing 36 at about the same level as the thermomenter 62 is an adjustable thermostat 64 by which the temperature of the vapor-laden air is controlled and maintained at a predetermined point.

In order that the vapor-laden air may be substantially free from water in a liquid state, there is provided between the water level 58 and the sole-supporting wires 40, 42 a series of baffles shown as a pair of perforated plates 66, 68 spaced from each other, the holes 70 in one plate being in staggered relation to the holes 72 in the other. The baffles catch any water globules caused by the splashing or spraying of the water by the passage of the air through it. The holes allow the water to return by gravity to the lower part of the casing and permit the passage of the vapor-laden air through them. For this purpose the holes are sufficiently large to avoid any capillary effect.

The slides 38 are so adjusted that the opening between them will permit the passage of the volume of air introduced through the tubes 54 and so that there will be an outward current of hot vapor-laden air through the opening. Even when the slides are moved farther apart temporarily to permit the introduction of another sole the outward current will prevent exterior relatively cold and dry air from entering the casing to condense and liquefy the vapor.

While the temperature of the vapor-laden air may be varied from 154° F. to 172° F. to meet different conditions, it may be assumed, for example, that the temperature of the vapor-laden air is set for 154° F., that treatment of a sole in the apparatus for twenty seconds at 154° F. will activate the cement, and that the sole is in such condition that in that time it will simultaneously be rendered comparatively limp by the vapor treatment. The operator will then place a sole in the apparatus through the opening between the slides 38 and after ten seconds will place another sole in the apparatus. Then, after ten seconds, he will remove the first sole and insert a third. The first sole is immediately placed in proper relation to the shoe 20, both being located on a sole-pressing pad 70 and pressure applied to the shoe through abutments 72, 74 which engage respectively the forepart of the shoe and the top of the cone of the last 22. This operation requires about ten seconds and it is then time to introduce a fourth sole in the apparatus and remove the second for attachment to its shoe, which is done on a second pressing apparatus located beside the first. The first shoe is now released, a fifth sole placed in the apparatus and the third sole removed for attachment on the first press which is now free. This procedure allows each sole to be subjected to the action of the hot vapor-laden air for the required time (twenty seconds) and enables the operator to attach a sole every ten seconds, each sole being left under pressure for ten seconds or longer.

If the condition of the soles is such as to moisture content or as to natural resistance of the leather that a longer treatment in the hot vapor-laden air is desirable to put it in proper condition for attachment to a shoe, the operator has only to keep three or more soles in the apparatus instead of two. The subjection of the cement for a longer time to the heat activation has no deleterious action on the bond obtained because twenty seconds is sufficient to bring the temperature of the cement up to the activating temperature for which the apparatus is set and its temperature will increase but slowly if it stays longer in the apparatus while the absorption of the vapor by the sole is progressive, since the longer it stays in the apparatus the more water vapor it absorbs though the rate of absorption diminishes.

Any suitable shoe press may be employed for attaching the shoe and sole but excellent results are obtained by the use of a machine of the type disclosed in Letters Patent of the United States No. 2,301,205, granted November 10, 1942, upon an application of Sidney J. Finn, in which, as shown diagrammatically in Fig. 3, pressure is first applied by the abutments 72, 74 to sink the shoe in the pad 70 which is of yielding material such as rubber, and thereafter an inflatable pad 76 beneath the pad 70 is inflated, for example, by forcing water into it through an opening 78. Both pads are preferably enclosed in a pad box 80. The uniform pressure applied to the shoe by inflation of the pad insures that all parts of the sole will be forced against the shoe bottom about its periphery. The initial pressure of the abutments 72, 74 insures that the shoe will be pressed against the sole to shape the pad 70 to the shoe bottom and prevent relative movement of the shoe and sole, while the uniform pressure applied by inflation of the pad 76 to force the sole against the shoe insures that all portions of the periphery will be brought into conformity to the shoe and sole and that the formation of the desired feather line at the juncture of the sole and upper will be obtained. The resulting shoe is indicated in the sectional view of Fig. 5 where it will be seen that the marginal portion of the sole is turned up in proper relation to the feather line of the shoe.

Activation at the press, as is done by the present method, has distinct practical advantages over the prior solvent activation which must be done an hour or more before placing the shoe and sole in juxtaposition and applying pressure. Since the sole, after activation, is immediately applied to the shoe and pressed thereon, the troublesome necessity of activation at a predetermined time prior to sole attachment is obviated.

Should the method described be unsatisfactory or fail, because of hardness of the leather, to produce the desired edge contour of the sole, the sole, either before or after conforming, may be subjected to an edge-turning operation in accordance with the method disclosed in Letters Patent of the United States No. 2,209,406, granted July 30, 1940, on an application of William P. Le Rette. By this method, a sole of refractory or insufficiently tempered leather may have the resistance to bending and the resiliency of its marginal portion so reduced that it will conform to the desired shoe bottom contour and remain substantially in the shape imparted to it under sole-attaching pressure. It is to be understood that the sole-conforming and edge-turning operations herein referred to as desirable under certain conditions are not essential and that soles of leather of some tannages and containing sufficient moisture, say ten to twelve per cent, may be satisfactorily attached by the present method when subjected to the action of hot vapor-laden air in a flat condition.

In the apparatus above described, the relative humidity of the atmosphere in which the soles

were treated is normally from 95% to 100%, that is, near saturation. Although this apparatus has proved satisfactory under some conditions, it has been found that, to meet all conditions, variation and control of the relative humidity as well as the temperature is desirable. Various conditions affect the results obtained by this method, for example—

(*a*) The time of exposure of the soles to the activating atmosphere;

(*b*) The temperature of the activating atmosphere;

(*c*) The relative humidity of the activating atmosphere;

(*d*) The amount of water in the sole, that is, its dryness;

(*e*) The grade of the sole, that is, whether the leather is hard or soft; and

(*f*) The initial temperature of the sole.

The first three conditions should be handled in the appratus; the others are independent of the apparatus but conditions (*e*) and (*d*) may be taken care of by varying (*a*), (*b*) and (*c*).

The rate of heating of the sole and the cement thereon and the rate of absorption of moisture by the sole depend on the number of heat units in the sole-treating atmosphere. Each unit of water, in passing from the liquid to the gaseous state at the same temperature, absorbs a large number of heat units and conversely, in passing from a gaseous to a liquid state, it gives up a large number of heat units without change of temperature.

The amount of heat in a vapor-laden atmosphere is usually expressed as the number of British thermal units per pound of dry air computed from the abritrary reference level of dry air at 0° F. The chart 8 shows the number of British thermal units in moist air at different conditions of temperature and relative humidity, and the area between the 100% R. H. line and the 50% R. H. Line, limited at the bottom by the 200 B. t. u. line and at the top by the 700 B. t. u. line, indicates the variations of these three factors which are available for the practice of the present method. This area is enclosed by a heavy line on the chart.

In the following table the first two columns give the temperature in centigrade and Fahrenheit respectively, the third gives the values of the relative humidity (R. H.), and the fourth the British thermal units. The table gives selected values of the three variables within the range indicated on the chart as available. However, it is to be understood that any values of the variables within the area indicated on the chart are available for use in this method.

Temperature		Percent R. H.	B. t. u.
° C.	° F.		
60	140	100	210
68	154	70	220
68	154	80	250
68	154	100	320
78	172	50	230
78	172	60	280
78	172	80	400
78	172	100	600
80	176	50	250
80	176	60	320
80	176	80	460
80	176	100	680
94.4	202	50	600
94.4	202	60	700

In carrying out the present method, in which the sole-treating atmosphere is varied by controlling the temperature of the vapor-laden atmosphere between 140° F. and 206° F., varying of the relative humidity from 50% to 100% and varying of the British thermal units in the atmosphere from 200 to 700, the following apparatus may be employed.

A chamber **100** containing the sole-treating atmosphere is in the upper portion of a casing **102** in the front of which is a series of vertical slots **104** (Fig. 7) through each of which a sole may be passed endwise into the chamber **100**. The width of the slots **104** is such that the soles will be held substantially upright, their lower edges being supported by wires **106** extending across the bottom of the sole-treating chamber **100**. The top of the chamber is closed by a hinged lid **108** having a handle **110** by which it may be lifted to inspect the interior of the casing. As shown in Fig. 7, the inner surface of the lid **108** is cylindrical so that any moisture condensing on that surface will not drip on the soles but will tend to run toward the sides of the casing. The top, side and rear walls of the casing are covered with insulating material **112**. Just below the wires **106** is a thermometer **114** which indicates the temperature of the sole-treating atmosphere as it enters the chamber **100**. Below the thermometer is a baffle plate **116** similar to the plate **86**, the plate **116** extending across the casing and being provided with several lines of quarter inch openings spaced about one-half inch apart. Below the plate **116** is a pipe **118** which, along its upper side, is provided with a series of small openings (for example $\frac{1}{32}$ of an inch) arranged about one-half inch apart. The pipe **118** is connected by a union **120** to a pipe **122** which is connected through a valve **124** to the delivery end of a heating coil **126** immersed in an oil bath contained in a suitable vessel **128**. The entering end **130** of the coil is connected to a suitable source of compressed air. The oil in the vessel **128** is heated by an electric immersion heating unit **132** near the bottom of the vessel the current to which is controlled by a thermostat **134** immersed in the oil in the vessel **128**. Thus, dry air at any desired temperature, depending upon the temperature for which the thermostat **134** is set, may be passed inside the casing through the pipe **118** and allowed to pass up into the treating chamber **100**. Below the air pipe **118** is a partial partition **136** extending from the front of the casing to a point **138** where it stops, leaving a passage **140** by which hot vapor-laden air may pass up into the chamber **100** along with the air from the pipe **118**. Hot vapor-laden air is generated in the bottom of the casing in much the same manner as in the apparatus first described. **142** is a thermostat by which the supply of current to an electric immersion heating unit **144** is controlled. A pipe **146** similar to **56** having a control valve **148** leads to a series of pipes **150** similar to the pipes **54** but, instead of being completely immersed in the water, are only about half submerged, the water level being indicated at **152** which may be observed in a water glass **154** at the front of the casing. A drain cock **156** is provided in the bottom of the casing and a water supply pipe **158** is connected with means, such as a chicken-feed apparatus, for maintaining the water at the proper level.

By the apparatus last described, the relative humidity of the atmosphere in the sole-treating chamber **100** may be varied and controlled. By opening the valve **124** and/or closing the valve **148** and/or increasing the temperature of the air

entering at 118, the relative humidity may be decreased, and by opening the valve 148 and/or closing the valve 124 and/or decreasing the temperature of the air entering at 118 the relative humidity may be increased. The thermostat 134 provides means for maintaining the hot dry air at the desired temperature and the thermostat 142 provides means for maintaining the hot vapor-laden air at the desired temperature. The temperature of the mixture, as indicated by the thermometer 114, may be varied by adjustment of either or both thermostats. Thus, the optimum conditions for practicing the present method may be obtained.

It is common practice in the cement attaching of soles, prior to the operation of sole attaching, to mold or conform the outsole to a shape substantially like that of the shoe bottom to which it is to be attached. Before conforming or molding, the outsoles are dipped in water to soften them to such a condition that they will readily assume the required shape under pressure. With the solvent application process, it is necessary, in order to avoid an extra operation of wetting the soles, to keep such tempered soles in a humidified atmosphere from the time they are conformed or molded until they are ready for sole attaching. In practicing the method of this invention, it is not necessary that the soles be kept in a humidified atmosphere after they have been molded or conformed. It is preferred that these soles should come to the sole-attaching operation in a substantially dry condition. If such outsoles contain fairly large quantities of moisture, there is great danger in the sole-attaching process of marking the soles by reproducing on the outer face of the sole the irregularities of the shoe bottom, such as staples and nail heads when used. If the outsole in a substantially dry condition is treated by the apparatus disclosed, the shoe bottom, after attachment, will show a smooth unmarked condition.

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 attaching soles to shoes which consists in subjecting a sole which is insufficiently in temper to be inert and is cemented with rubber-like cement insoluble in water to the action of hot air laden with water-vapor free from condensed moisture simultaneously to activate the cement and to render the sole inert, then placing a similarly cemented shoe and sole in juxtaposition, and applying sole-attaching pressure.

2. That improvement in methods of attaching soles to shoes which consists in applying a solution of polymerized chloroprene cement to the sole-attaching face of a roughened shoe upper and to the roughened attaching face of a sole, allowing the major portion of the cement solvent to evaporate, then subjecting the sole to the action of hot air laden with water-vapor free from condensed moisture to activate the cement and render the sole inert, then placing the cemented surfaces of the shoe and sole in juxtaposition, and applying sole-attaching pressure.

3. That improvement in methods of attaching soles to shoes which consists in applying synthetic rubber-like cement to an outsole, allowing it to dry to an inactive condition, subjecting the sole to a current of air laden with dry water-vapor, the temperature being high enough to activate the cement and the vapor content being sufficient to render the sole inert in the time required to activate the cement, providing a shoe having rubber-like cement thereon, and attaching the sole to the shoe.

4. That improvement in methods of attaching soles to shoes which consists in roughing the overlasted upper of a shoe and the marginal portion of the attaching face of a sole and applying polymerized chloroprene cement thereto, allowing the cement to dry for an hour or more, then subjecting the sole to the action of hot air laden with water-vapor at a temperature of between 154° and 172° F. for a brief interval on the order of twenty seconds to activate the cement and render the sole inert, then placing the cemented areas of the shoe and sole in juxtaposition, and applying pressure to the shoe and sole for a time sufficient to shape the inert sole to the contour of the shoe bottom and to cause coalescence between the cemented surfaces to effect a permanent bond between the shoe and sole.

5. That improvement in methods of attaching soles to shoes which consists in roughing the overlasted upper of a shoe and the marginal portion of the attaching face of a sole and applying polymerized chloroprene cement thereto, allowing the cement to dry, then subjecting the sole to the action of hot air laden with water-vapor at a temperature of about 158° F. for a brief interval sufficient to activate the cement and render the sole inert, then placing the cemented areas of the shoe and sole in juxtaposition, and applying pressure to the shoe and sole to shape the inert sole to the contour of the shoe bottom and to effect a permanent bond between the shoe and sole.

6. That improvement in methods of attaching soles to shoes which consists in roughing the marginal portion of the attaching face of a sole, applying polymerized chloroprene cement to the marginal portion thereof, allowing the cement to dry, giving the attaching face of the sole a contour substantially complemental to that of the shoe bottom to which the sole is to be attached, roughing the overlasted upper of the shoe, applying polymerized chloroprene cement thereto, allowing it to dry, subjecting the sole to the action of air laden with water-vapor at a temperature and for a time sufficient to activate the cement and render the sole inert, then placing the cemented areas of the shoe and sole in juxtaposition, applying pressure to the shoe and sole to shape the inert sole to the exact contour of the shoe bottom and to effect a permanent bond between the sole and shoe, and after a brief interval releasing the pressure.

7. The method of attaching a leather outsole to a shoe upper which comprises applying to the attaching surface of a leather outsole a cement insoluble in water and which may be activated at temperatures in the neighborhood of 154° F. to 172° F., permitting said cement substantially to dry, and, while the leather of said outsole is insufficiently in temper to render it inert, subjecting said outsole to a water-vapor-laden atmosphere at a temperature in the neighborhood of 154° F. to 172° F. for a time sufficient simultaneously to activate the cement and render the sole inert, and immediately bringing said outsole into juxtaposition with a shoe upper whose attaching surface is provided with a layer of cement, and pressing the outsole and shoe upper firmly together.

8. The method of attaching a leather outsole to a shoe upper which comprises applying a solution of polymerized chloroprene to the attaching

surface of a leather outsole, allowing the major portion of the solvent to evaporate, and, while the leather of said outsole is insufficiently in temper to render it inert, subjecting said outsole to a water-vapor-laden atmosphere at a temperature in the neighborhood of 154° F. to 172° F. for a time sufficient simultaneously to activate the polymerized chloroprene and render the sole inert, and immediately bringing said outsole into juxtaposition with a shoe upper whose attaching surface is provided with a layer of polymerized chloroprene, and pressing the outsole and shoe upper firmly together.

9. The method of attaching a leather outsole to a shoe upper which comprises applying a solution of polymerized chloroprene to the attaching surface of a leather outsole, allowing the major portion of the solvent to evaporate, providing an atmosphere which is laden with water vapor to the extent of 50% to 100% relative humidity, which has a heat content of from 200 to 700 B. t. u. per pound of dry air and which is at a temperature in the neighborhood of 140° F. to 206° F., subjecting said outsole to such atmosphere for a time sufficient to activate the cement, immediately bringing said outsole into juxtaposition with a shoe upper whose attaching surface is provided with a layer of polymerized chloroprene, and pressing the outsole and shoe upper firmly together.

10. The method of attaching a leather outsole to a shoe upper which comprises applying a solution of polymerized chloroprene to the attaching surface of a leather outsole, allowing the major portion of the solvent to evaporate, providing an atmosphere which is laden with water vapor, varying the relative humidity between 50% and 70%, the heat content between 250 and 500 B. t. u. and the temperature of the treating atmosphere between 160° and 200° F. to produce the optimum conditions for tempering the sole and activating the cement, subjecting said outsole to such atmosphere for a time sufficient to activate the cement and render the sole inert, immediately bringing said outsole into juxtaposition with a shoe upper whose attaching surface is provided with a layer of polymerized chloroprene, and pressing the outsole and shoe upper firmly together.

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