

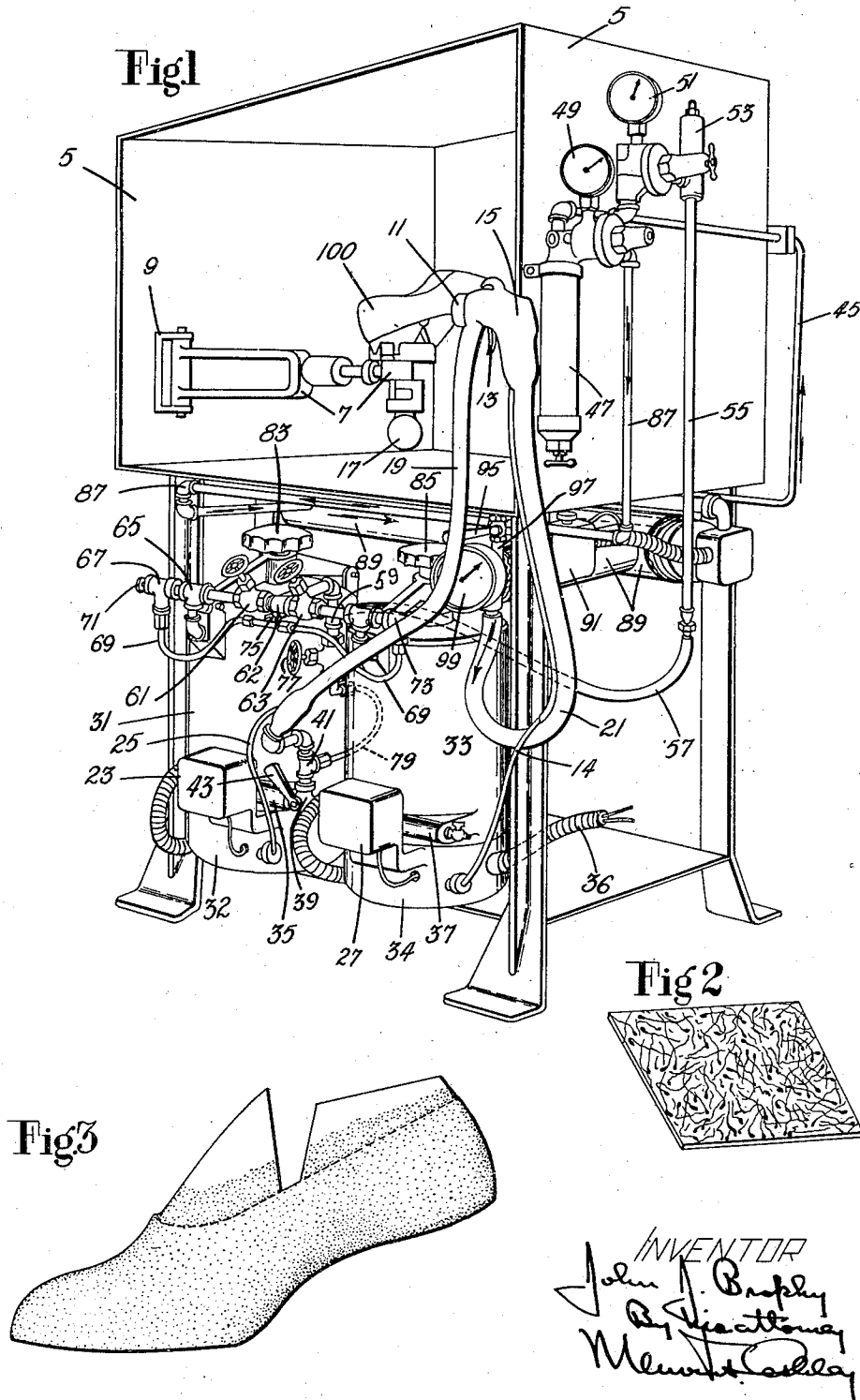
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COATED ARTICLE

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COATED ARTICLE

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This invention relates to temporary protective covers which, after having served their purpose, may be readily removed, and is herein set forth as a covered article such as a shoe or shoe part.

In the manufacture of shoes the display surfaces of certain parts, such for example as those which make up the upper and commonly consist of leather and/or fabric, are subjected to considerable handling and to contact with parts of machines during various shoemaking operations, whereby the uppers are liable to be stained and soiled. Temporary protective covers of two general types have been proposed and used to some extent, namely, preformed covers such, for example, as those made of paper, and covers in the form of coatings, such as those made in situ, for example, by spraying a coating of a substance, such as rubber latex, upon the uppers. The general object of the present invention is to provide a novel and improved cover or coating of the latter type.

To this end, a procedure may be used which comprises providing a colloidal solution of a vinyl resin and spraying the solution upon an article, the solution being a nearly saturated one at the spraying temperature, the particles of the spray being caused to lose solvent and become less sticky as they travel from their point of formation and are deposited upon the article so that they form a coating which adheres only lightly to the article. In case it is desirable to dispense with the use of a solvent, the resin is heated to melt it to a thin liquid and broken into a spray, the hot particles being very sticky at their point of formation but losing heat and stickiness as they travel to the article. In either case, there results a temporary protective cover or coating which adheres lightly to the article and may readily be peeled off when it has served its purpose.

Referring to the accompanying drawing,

Fig. 1 is an elevation of an apparatus by the use of which the method of the present invention may be practiced;

Fig. 2 is a fragment of a portion of a shoe upper over which the spray has passed once. In this figure the filaments of the spray have been greatly enlarged; and

Fig. 3 is an elevation of a lasted shoe, to the upper of which a protective coating has been applied.

The illustrated apparatus, which is designed particularly for use on a lasted shoe, comprises a generally rectangular compartment 5 open at one side in which the spraying is done. A support 7 for a lasted shoe 100, which is to be coated, is

pivotally carried by a bracket 9 which is fast to or integral with a wall of the compartment 5, said support being so constructed that the shoe may be swung and turned in various paths so as to permit all localities on the upper of the shoe to be exposed to a spray which emerges from a spray gun, the nozzle of which appears at 11 and the trigger at 13. The gun may be heated, if desired, by an electric heater to which current is supplied through a cable 14; and the heating element as well as the greater part of the gun is covered by heat insulating material 15 to permit the gun to be readily handled. As shown, the gun, which is not being used, is hung on a hook, not shown, carried by a wall of the compartment 5. In coating the upper of a shoe the operator holds the spray gun in one hand, while with the other he manipulates the support 7 by means of a handle 17 and causes the spray to travel over the upper. Depending upon the nature of the material of which the spray is formed and the nature of the upper of the shoe, the spray may be caused, if desired, to travel a plurality of times over the upper so as to build up a coating.

Leading into the spray gun are two flexible pipes 19 and 21 which conduct respectively the colloidal spray material or compound and the compressed air. Current is supplied to a heating element which surrounds the pipe 19 through a cable 25, this pipe and its heating element, as well as the pipe 21, being covered by heat-insulating material. A rheostat, not shown, provides means for controlling the temperature of the pipe 19.

There are provided two pots 31, 33 for the resinous material, either of which may be put into communication with the pipe 19 to supply heated material to the spray gun. To this end the outlet 35 of the pot 31 and the outlet 37 of the pot 33 are connected to a valve casing 39, which is also connected through a T 41 and various pieces of piping with the lower end of the flexible pipe 19. In the casing 39 is a valve which may be turned by means of a handle 43 to put either pot into communication with the pipe 19 or to shut off communication with either pot. Fast to or integral with the bottom of the pot 31 is an electrical heater 32, and a similar heater 34 is provided for the pot 33, current being supplied through a cable 36 and governed respectively by thermostats 23 and 27.

The compressed air, which is forced unheated into the upper portion of the selected pot 31 or 33 as well as that which is heated and supplied through the pipe 21 to the spray gun, enters from

a source of supply through a pipe 45. After passing through an air purifier 47, it divides and part passes through a pressure gage 49 and thence to the spray gun, while the other part passes through a pressure gage 51 and thence to the top of the selected pot 31 or 33. In the operation of the apparatus the air is ordinarily supplied to the spray gun at a pressure of 60 pounds per square inch and to the top of the selected pot at 50 pounds per square inch. The air, which passes through the pressure gage 51, passes through a safety valve 53 and thence through a rigid pipe 55 and a flexible pipe 57 to one branch of a T 59. The upper branch of the T 59 is connected through piping to a T 62, the two horizontal branches of which are in alignment, being connected respectively to the inlet of a valve 61 and to the inlet of a valve 63. The outlet of the valve 61 is connected to one of the horizontal branches of another T 65, the vertical branch of which is connected to piping which leads into the top of the pot 31. The other horizontal branch of the T 65 is connected to one of the horizontal branches of a third T 67, the vertical branch of which is connected to a small exhaust pipe 69. In the T 67 is a spring-pressed valve, not shown, which normally cuts off communication between the T 67 and the small exhaust pipe 69. This valve is provided with a stem having a head 71, the construction being such that pushing in the stem puts the space in the top of the pot 31 into communication with the exhaust pipe 69. One branch of the T 63 is similarly connected by piping to the top of the interior of the pot 33, and at the right hand end of this piping is a T 73, fitted, as is the T 67, with a spring-pressed relief valve having a head, not shown, like the head 71 and operating in the same manner as the head 71. The exhaust pipe 69 near its middle is connected by a fitting 75 to a flexible pipe, not shown, which leads up into the spray compartment. At the end of the day's work it is desirable to release the pressure upon the material in the pots and also to blow out of the pipe 19 and the spray gun the resinous material which they contain. At such times the valve 43 is turned to shut off connection from both pots to the pipe 19; the valves 61 and 63 are closed to cut off the flow of air to the tops of the pots; and the head of the relief valve in the T 67, as well as that of the corresponding relief valve in the T 73, is pushed in to relieve the pressure in the pots. In order to blow the material out of the pipe 19 and the spray gun, a valve 77, which has hitherto been closed, is opened to cause compressed air to flow from the pipe 57, through the valve 77, thence through a small pipe 79 into the T 41. From here it flows on through the flexible pipe 19 and the spray gun so as to force all the resinous spraying material out of the pipe and the gun.

The compressed air for the spray gun, after passing through the pressure gage 49, passes through piping 87 which leads down below the floor of the compartment 5, and through a valve having a handle 95. From this valve the air passes through a heater 89 and into the pipe 21, there being provided a thermometer 99 which registers the temperature of the air. From the valve, the handle of which is shown at 95, a pipe 97 leads directly into the pipe 21 so that unheated air may be passed through the spray gun if desired by properly turning the handle.

In the operation of the apparatus, regardless of the composition of the resinous material which

is used, the pressure of air in the top of the pot is ordinarily about 50 pounds per square inch, and the pressure of air delivered to the spray gun is about 60 pounds per square inch; but the temperature of the material and the temperature of the compressed air delivered to the gun vary considerably according to the nature of the material. This material is maintained as an easy flowing liquid by the heat applied to the pot which is being used and to the pipe 19. It is further heated and thinned by the heated air from the pipe 21; and, if the heater for the spray gun is being operated, a further heating of the air and thinning of the resinous material takes place. The apparatus which has been thus briefly disclosed forms no part of the present invention, and any suitable apparatus may be employed.

Examples of resinous materials which may be used are given below.

Example I

	Parts by weight
Vinylite XYSG	16.45
Plasticizer 3GH	7.75
Acetone	37.90
Ethyl alcohol	37.90

Vinylite XYSG, a product of the Carbide & Carbon Chemicals Corporation of New York, is a vinyl acetal which results from the interaction of polyvinyl alcohol and butyraldehyde. Plasticizer 3GH (triethylene glycol di-2-ethylbutyrate), a product of the same corporation, is a plasticizer particularly adapted for use with the so-called X resins, of which Vinylite XYSG is one. The ingredients are mixed for 75 to 100 hours, the product being a viscous liquid. Alcohol is a solvent for the resin. Acetone is not a solvent at room temperature. It has a much lower boiling point than the alcohol and increases the evaporation of the alcohol during the spraying of the material. In use, this material is maintained as an easy flowing liquid at about 100° F. in the pot and in the pipe 19; and the temperature of the air blast is about 175° F., the gun itself not necessarily being heated other than by the blast of hot air. This air, as is usual in spray guns, flows around the small amount of spray material which is flowing through the gun until the air and the spray material meet; and, since the air is at a much higher temperature than the spray material, it further heats this material and thins it so that it is broken up into a spray of fine particles.

What takes place during the coating of the shoe is believed to be as follows. When the material is broken up into a fine spray, its surface area is greatly increased. The particles of the spray at their point of formation are sticky but are caused to decrease in stickiness, by loss of solvent as they travel from their point of formation and by being cooled as they are deposited upon the shoe; the particles, when they are deposited upon the shoe, being much drier as well as at a much lower temperature than when they left the gun. The principal function of the acetone in this example, as has been stated, is to increase the amount of alcohol which is driven off by the hot air. It is believed that most of the acetone and the greater part of the alcohol are thus removed. In any event, the particles as they are deposited upon the shoe adhere lightly to the shoe and firmly to each other so as to form a tough flexible coating which shrinks slightly upon standing and can readily

be peeled from the upper of the shoe when it has served its purpose.

Example II

	Parts by weight
Vynlite XYSG-----	156
Plasticizer 3GH-----	78
Durez resin #550-----	78
Acetone-----	981.5

Durez resin #550, a phenol formaldehyde resin in the A stage, is a product of Durez Plastics and Chemical Inc. of North Tonawanda, New York. It is compatible with the vinyl resin, aids in producing a spray of fine particles, and probably increases the stickiness of the coating. Acetone is a solvent for the vinyl resin only at elevated temperatures. The ingredients may be put together as follows: The Durez resin is dissolved in the acetone; and into this solution is stirred first the plasticizer and then the vinyl resin. The ingredients are placed in a closed container and subjected to a temperature of from 176° to 180° F. for 20 hours. There results a sol which when cooled to room temperature is a stiff gel, and at the time that the heated material is delivered through the pipe 19 to the spray gun, it is an easy flowing liquid at a temperature of about 135° F. which is slightly above the boiling point of acetone.

The temperature of the air flowing through the pipe 21 to the spray gun is about 225° F., the gun itself not ordinarily being heated other than by the blast of air. This hot air, as has been explained above, further heats and thins the spray material, which is flowing through the gun, and breaks it up into a fine spray. What takes place during the coating of the shoe is similar to what has been described in connection with Example I, but is somewhat different due to the fact that the only liquid present is the volatile acetone. When the material is broken up into a fine spray, its surface area is greatly increased. The sticky particles are caused to decrease in stickiness by loss of solvent during their travel and by being cooled as they are deposited upon the shoe at which time most of the acetone has been removed. In any event, they form upon the shoe a tough flexible coating which adheres lightly to the shoe and can subsequently be readily peeled off.

Example III

	Parts by weight
Vynlite XYSG-----	156
Plasticizer 3GH-----	78
Durez resin #550-----	78
Acetone-----	981.5
Nokorode-----	6.5

The Nokorode, by which this formula differs from the preceding one and which acts to cause the final product to be somewhat thinner, consists substantially of—

	Parts by weight
Petrolatum-----	65.9
Zinc chloride-----	22.7
Ammonium chloride-----	2.9
Water-----	7.6

Instead of Nokorode other substances which will act to thin the product, such for example as an equal amount of the oleic acid ester of monoethanolamine hydrochloride may be used.

The method of putting together the ingredients of the formula is preferably as follows—

(1) The Durez resin is dissolved cold in the greater part of the acetone.

(2) The Nokorode is stirred into the rest of the acetone which has been heated to its boiling point. The petrolatum melts and, together with the zinc chloride and the ammonium chloride, disperses readily in the hot acetone.

(3) The Nokorode dispersion is poured into the Durez resin solution.

(4) The plasticizer is stirred in.

(5) The Vynlite XYSG is stirred in and the resulting product allowed to stand for 24 hours.

(6) The resulting compound is packed in a drum and heated at from 176° F. to 180° F. for 18 hours. The product, when cooled to room temperature, is a very viscous liquid, which, like the compound of Example II, becomes a thin liquid when sufficiently heated.

The coating produced by using the compound of Example III is a little more sticky than that produced by using the compound of Example I, and its exposed surface may be dusted, if desired, with some substance, such as powdered talc, to reduce its stickiness. Substantially the same temperatures of compound and air blast are maintained with the compound as with the compound of Example II.

When a protective coating is applied to a lasted shoe, a part of the coating extends over upon the margin of the bottom of the shoe, and this part helps maintain the coating in place. In a McKay shoe or a Goodyear welt shoe it is not necessary to disturb this part, but in a shoe, the sole of which is to be attached by cement, it is necessary to remove this part preparatory to or during the roughing of the margin of the bottom of the shoe. Thus, in the manufacture of shoes to which soles are attached by cement, it is desirable that the coating should adhere slightly more firmly than when shoes of the McKay or Goodyear welt type are being manufactured. The compound of Example III is well suited for use in the manufacture of all types of shoes and particularly shoes the soles of which are attached by cement.

In the examples given above the solutions used for spraying are nearly saturated solutions at the temperature at which the spray is formed, the temperature of the material and that of the compressed air delivered to the spray gun varying considerably according to the nature of the spray material and the wetness desired in the coating as first formed, that is, the time it will take for the coating, as first formed, to dry out to a hard, tough condition. The particles of spray at their point of formation contain just about sufficient solvent to dissolve their solid content; but, as these particles travel from the gun to the article, enough solvent is evaporated so that the particles gel to form as they strike the article, a lightly adherent coating.

Example IV

Vynlite XYSG-----	1	parts by weight
Plasticizer 3GH-----	1½	parts by weight
Durez resin #550-----	1	parts by weight
Calcium stearate-----	2%	of total weight

The calcium stearate is a heat stabilizer, its function being to counteract the tendency of the elevated temperature to which this material is subjected to adversely affect the resin.

This compound is applied by the same apparatus as the two preceding compounds, but the temperatures used are much higher and the gun is heated not only by the air blast but by the electric heater. The resin pot and the pipe lead-

ing to the spray gun are maintained at about 300° F., which keeps the resinous compound in the form of an easy-flowing liquid. The temperature of the air blast is about 400° F. and that of the spray gun is also about 400° F., the gun being thus heated to ensure that any loss in heat of the air while passing through the pipe 21 shall be made up. By this high heat the spray material is further thinned and, when it encounters the blast of hot air, it is broken up into a fine spray. It will be noted that the compound of this example contains no ingredient, such as acetone, which is liquid at room temperature. When a cover is formed in situ upon the upper of a shoe, for example, by spraying upon it a coating material in the form of a solution, the material as it coalesces upon the upper contains a certain amount of the liquid; and, with the many kinds and shades of colored leather which are used in making shoes, there is a possibility that some dye which has been used in coloring the leather may be attacked by the liquid. When a coating, which when applied contains a solvent for a dye, is subsequently peeled off after having served its purpose, a certain amount of the dye is liable to be removed with it, and the color of the leather, usually in spots, is dulled or otherwise objectionably affected so that touching up the spots and/or recoloring the whole area in which the spots occur is necessary. With the compound of Example IV this tendency is greatly diminished.

At the time when the molten resinous compound is broken up into a spray, the particles of the spray being at an elevated temperature, are very sticky, but, as they travel from the spray gun to the shoe, they are cooled considerably, and when they strike the shoe a further cooling occurs, the result being that they are at a suitable temperature to coalesce into a firm coating which adheres with just sufficient firmness to the shoe.

The shape of the particles of the spray may be varied, for example by varying the pressure of the air or by varying the viscosity of the spray material. Particles in the form of minute filaments have been found to be satisfactory, and particularly so in certain instances, for example when the uppers of the shoes are made of linen heavily loaded with a stiffening substance. Fig. 2 shows a fragment of a part of an upper over which a spray of filaments has passed for the first time in the course of building up a coating, the particles being shown as greatly enlarged. The minute filaments, many of which have small heads or enlargements at one end,

are to an extent separate from one another, but to some extent they touch and cross one another. The succeeding applications of the spray to this locality progressively fill and/or cover the empty spaces by causing succeeding filaments to be deposited upon and at an angle to those already on the shoe. There is thus formed first a reticulated coating and then a substantially continuous coating.

Since the covers are made of material which may be dissolved or melted, as may be desired, the scrap which results when the covers have been removed from the shoes may be reclaimed or regenerated and used again.

For convenience, the invention has been illustrated and described with reference to applying a temporary coating or cover to the upper of a lasted shoe. It should be understood, however, the coating may be applied to shoe parts in the flat and to articles other than shoe parts, and that fillers and coloring matter may be incorporated in the compound if desired.

The present application is a division of application Serial No. 348,096, filed July 29, 1940.

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

1. A shoe part having a single sprayed temporary protective coating comprising a vinyl resin and a plasticizer therefor formed in situ directly upon it, said coating adhering to the shoe part sufficiently to remain in place while the shoe part is being subjected to various manufacturing operations but being capable of being readily peeled off after it has served its purpose.

2. An article having a single sprayed temporary protective coating comprising a vinyl resin and a plasticizer therefor formed in situ directly upon it, said coating adhering lightly to the article and being capable of being readily peeled off after it has served its purpose.

3. An article having a sprayed temporary protective coating deposited from a solution of a vinyl resin and a plasticizer therefor, said coating adhering lightly to the article and being capable of being readily peeled off after it has served its purpose.

4. An article having a sprayed, temporary protective coating comprising a vinyl resin and a plasticizer therefor, said coating consisting of superposed filaments arranged at random and adhering lightly to the article but being capable of being readily peeled off after having served its purpose.

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