Patented Oct. 17, 1950

2,526,431

UNITED STATES PATENT OFFICE

2,526,431

METHOD OF MAKING RUBBER COATED FABRIC ARTICLES

Sherman I. Strickhouser, Edgewood, R. I., assignor to United States Rubber Company, New York, N. Y., a corporation of New Jersey

No Drawing. Application April 7, 1948, Serial No. 19,629

4 Claims. (Cl. 117—163)

1

This invention relates to a method of producing rubber-coated fabric articles, more particularly fabric gloves with a coating of rubber directly deposited from latex.

The invention will be illustrated with more particular reference to the manufacture of rubber-coated fabric gloves, although it may be readily used in the manufacture of a wide variety of rubber-coated fabric articles.

Rubber-coated fabric gloves are commonly made by dipping the glove body on a form into latex, removing from the latex, dipping into a liquid coagulant or exposing to coagulant vapors, and subsequently drying and vulcanizing. Gloves made in this manner are stiff due to the penetration of the latex into the glove body in the initial dip into the latex. Such stiffness is not particularly undesirable, and may even be advantageous, in work gloves, but it is decidedly unsatisfactory in light weight play gloves, such as children's snow mittens. It is known to make unlined rubber gloves by dipping a form into a liquid coagulant or by spraying a liquid coagulant on the form, or by applying particles of a solid coagulant or a coagulant gel to the surface of a form, before dipping into the latex. It is also known to simultaneously spray latex and a coagulant onto a form, or to spray latex through coagulant vapors onto a form. When such processes which first coat the coagulant on the form surface are applied to a fabric body on a form, it is found that the rubber coating does not satisfactorily adhere to the fabric lining and peels off in use. When such spraying processes are applied to a fabric body on a form, a smooth impervious rubber surface is not obtained, and poor adhesion also results.

According to the present invention, a light weight rubber-coated glove, such as a child's play mitten, for example a snow mitten, may readily be produced that is flexible and that has a smooth coating of rubber on the fabric body that is firmly bonded to the fabric and does not peel off in use. The term "glove" is used herein in the sense of any hand-covering, whether of the mitten type, having one sheath for the thumb and one sheath for the four fingers, or of the glove type having separate sheaths for the thumb and for each of the fingers.

In carrying out the present invention, the

2

fabric glove body on a form is exposed to coagulant vapors, after which the glove body is removed from the coagulant vapor and dipped into the latex. The thus applied latex layer may be coagulated as by directly drying, or by treatment with a coagulant, either by a second exposure to coagulant vapors or, preferably by dipping in a solution of a coagulant, before drying. This method maintains the necessary pliability of the finished rubber-coated glove so that a child can grasp objects easily, and provides the firm bond between the rubber coating and the fabric that is necessary to insure a long service life. The coagulant vapor treatment prevents undue penetration of the latex but allows the dried rubber deposit to bond firmly to the fabric glove body.

The coagulant vapor to which the glove body is exposed prior to dipping in the latex is acetic acid vapor. Such acetic acid vapor may be the vapors from glacial acetic acid, or the vapors from glacial acetic acid with up to one-half its weight of ethyl alcohol. The time of exposure of the fabric glove body to such coagulant vapors is that necessary for the fabric to absorb some of the coagulant vapors. The coagulant vapor treated fabric body, however, should not remain in the air too long a time after removal from the coagulant vapor before dipping in the latex otherwise the coagulant vapor will diffuse into the air and be lost. The fabric body should, of course, be dipped into the latex while it still retains some coagulant vapors. With acetic acid vapors from glacial acetic acid or from glacial acetic acid with up to one-half its weight of ethyl alcohol, exposure of the fabric glove body from one-half minute to thirty minutes gives satisfactory rubber coating where the treated glove body is dipped into the latex while it still retains some absorbed coagulant vapors. The latex may be compounded with vulcanizing ingredients so that heating at drying temperatures or at elevated temperatures will vulcanize the deposited rubber coating, or the latex may be vulcanized before deposition in known manner. The glove form with the coagulant vapor impregnated fabric body thereon may be dipped at any desired rate and to any desired depth, in the latex, and held therein, if desired, and removed at any desired rate. It may be drained

on removal first with the closed end of the glove down and then rotated so that the open end of the glove is down and further drained prior to drying or a dip in a liquid coagulant prior to drying. The forms may be of wood, rubber, metal, glass, or clay, all as well known in the art.

The following example shows in detail the manufacture of children's play mittens, or so-called "snow mitts," by the process of the present invention, and is intended to be illustrative of the invention and not limitative thereof.

Fabric glove bodies of the mitten type with a sheath for the thumb and a single sheath for the four fingers and made of knitted stockinet with circular knitted cuff, were placed on wooden forms of mitten shape and the forms were inserted on a rack. The rack was placed in a closed chamber over a body of glacial acetic acid and a fan was used to circulate the acetic acid vapor. The fabric glove bodies on the forms remained in the acetic acid vapor for about 10 minutes, after which they were removed from the coagulant vapor and dipped the desired depth into a tank of a vulcanizable latex composition with the closed ends of the gloves down. In the case of natural rubber latex, the formulation of the latex compound was as follows (the latex being a 60% total solids creamed latex and the compounding ingredients being added as conventional aqueous pastes):

	Parts by weight (calculated dry)
Natural rubber latex	100
Sulfur	2
Zinc oxide	.75
Antioxidant	.25
Accelerator	1.25
Pigments, stabilizers, thickeners	5

Water sufficient to bring total solids to 55%.

In the case of polychloroprene synthetic rubber latex (aqueous emulsion polymerizate of chloro-2-butadiene-1,3), the formulation of the latex compound was as follows (the latex being a 50% total solids polychloroprene latex and the compounding ingredients being added as conventional aqueous pastes):

	Parts by weight (calculated dry)
Polychloroprene latex	100
Zinc oxide	10
Antioxidant	.5
Filler (clay)	10
Plasticizer (light spindle oil)	5
Pigments, stabilizers, thickeners	4.5

Water sufficient to bring total solids to 48%.

Other synthetic rubber latices, such as emulsion polymerizates of mixtures of butadiene-1,3 and styrene, and of mixtures of butadienes-1,3 and acrylonitrile, may also be used. The forms were dipped into the latex with not more than two minutes elapsing after removal from the coagulant vapor chamber. The dip into the latex took about one-half second and the removal from the latex without any appreciable dwell in the latex between ingress and egress of the forms took about one-half second. After removal from the latex, the forms were allowed to drain about one and a half minutes with the closed ends down, then rotated 180° so that the closed ends were up and allowed to drain about one and a half minutes more. After this draining, the forms were dipped into a liquid coagulant comprising 25 parts by weight of calcium chloride and 75 parts by weight of ethyl alcohol. Other coagulants, such as aqueous solutions or organic solvent solutions of various acids and salts may also be used. The forms were dipped into the alcoholic calcium chloride coagulant, taking about two seconds, then allowed to dwell in the coagulant for one second, and then removed in about two seconds. The rubber-coated gloves on the form were leached in running water at about 60–75° F. for about 30 minutes, and then dried in circulating hot air at 180° F. for 90 minutes. The coated gloves were then stripped from the forms, hung over bars on a curing rack, and vulcanized in circulating hot air at about 250° F. for 80 minutes. The gloves made in this manner are flexible and have a smooth rubber coating well bonded to the fabric body of the glove.

The process of the present invention may be used in the manufacture of other flexible rubber-coated fabric articles than gloves, including rubberized flat fabrics. Fabric linings may be formed into the desired shape of articles, such as hats, socks, jackets and other articles of wearing apparel, before rubber-coating by the process of the present invention. Rubber-coated flat fabrics produced by the process of the present invention may be cut and assembled into the desired articles.

In view of the many changes and modifications that may be made without departing from the principles underlying the invention, reference should be made to the appended claims for an understanding of the scope of the protection afforded the invention.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. The method of making a flexible rubber-coated fabric article which comprises applying a non-liquid coagulant to a fabric base by exposing said fabric base to coagulant vapor circulating from over a body of liquid containing a volatile coagulant for a time sufficient to absorb some coagulant vapor, removing the same from said coagulant vapor, and before diffusion of all the absorbed coagulant vapor therefrom, dipping the fabric base into an uncoagulated latex, dipping the latex-coated fabric base into a liquid coagulant, removing therefrom, drying, and vulcanizing the latex deposited rubber coating.

2. The method of making a flexible rubber-coated fabric article which comprises applying a non-liquid coagulant to a fabric base by exposing said fabric base to acetic acid vapor circulating from over a body of liquid containing acetic acid for a time sufficient to absorb some acetic acid vapor, removing the same from said acetic acid vapor, and before diffusion of all the absorbed acetic acid vapor therefrom, dipping the fabric base into an uncoagulated latex, dipping the latex fabric base into a liquid coagulant, removing therefrom, drying and vulcanizing the latex deposited rubber coating.

3. The method of making flexible rubber-coated fabric gloves which comprises applying a non-liquid coagulant to fabric glove bodies by exposing said fabric glove bodies to coagulant vapor circulating from over a body of liquid containing a volatile coagulant for a time sufficient to absorb some coagulant vapor, removing the same from said coagulant vapor, and before diffusion of all the absorbed coagulant vapor therefrom, dipping the fabric glove bodies into an uncoagulated latex, dipping the latex-coated gloves into a liquid coagulant, removing there-

from, drying, and vulcanizing the latex deposited rubber coating.

4. The method of making flexible rubber-coated fabric gloves which comprises applying a non-liquid coagulant to fabric glove bodies by exposing said fabric glove bodies to acetic acid vapor circulating from over a body of liquid containing acetic acid for a time sufficient to absorb some acetic acid vapor, removing the same from said acetic acid vapor, and before diffusion of all the absorbed acetic acid vapor therefrom, dipping the fabric glove bodies into an uncoagulated latex, dipping the latex coated gloves into a liquid coagulant, removing therefrom, drying and vulcanizing the latex deposited rubber coating.

SHERMAN I. STRICKHOUSER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,955,840	Trobridge	Apr. 24, 1934
2,111,933	King	Mar. 22, 1938
2,121,717	Sullivan	June 21, 1938
2,273,995	Rogerson	Feb. 24, 1942
2,335,116	Hansen	Nov. 23, 1943