

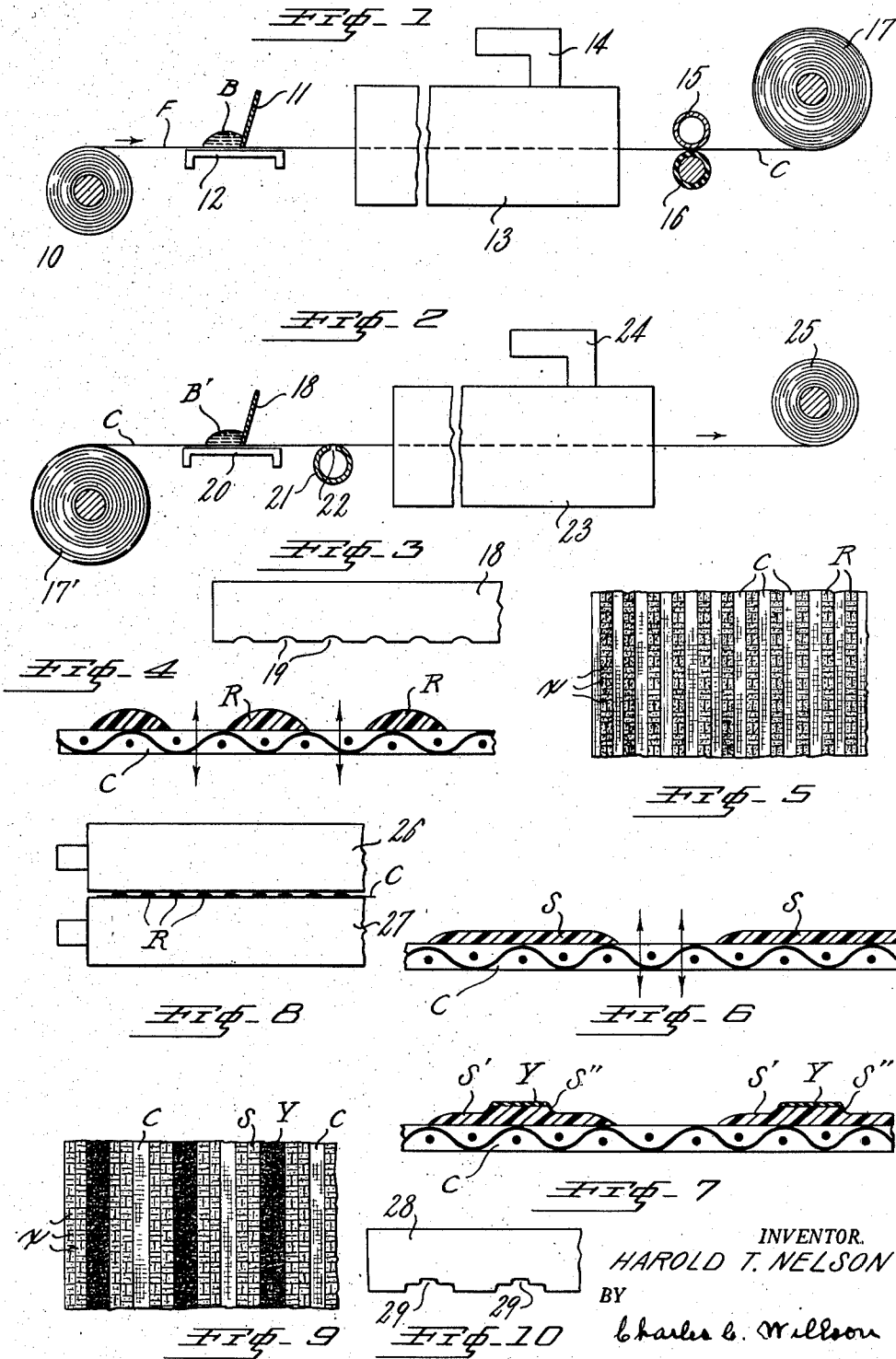
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BREATHABLE STRIPED UPHOLSTERY FABRIC

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BREATHABLE STRIPED UPHOLSTERY FABRIC

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This invention relates to coated upholstery fabrics, and more particularly to a porous or breathable striped fabric having raised plastic stripes of one color and valleys therebetween of a different color. The striped fabric herein contemplated is an inexpensive fabric having excellent wearing properties and is well adapted for use as an upholstery material in automobiles, busses, trucks and upon furniture. The plastic stripes reduce the drag in that they prevent the clothing of a person sitting upon or resting against this upholstery material from clinging thereto, and these raised plastic stripes receive the wear and thereby protect the underlying fabric to which the stripes are secured.

Coated fabrics such as a woven cotton fabric having a vinyl resin coating applied to one face thereof are extensively used as upholstery material in the fields above mentioned, and while such coated fabrics have many desirable properties, they are open to the objection that they are not porous and therefore do not breathe; so that when a person sits upon or rests against this non-breathable fabric in hot weather he may become damp from perspiration due to the failure of air and moisture to pass through this coated fabric.

The striped fabric contemplated by the present invention possesses practically all of the advantages of the coated upholstery fabric just mentioned, and it has an important added advantage in that it is porous or breathable so that the moisture due to perspiration can escape through this breathable fabric.

The base fabric used in carrying out the present invention is preferably an inexpensive woven cotton fabric, such as a duck, twill or drill ranging in weight from about 4 to 10 ounces per square yard, and this fabric should have a sufficiently loose weave to cause the grey fabric to have good porosity or breathability. Such fabric in order to reduce the cost of the same, may be woven of yarns formed of relatively short uncombed cotton fibers, but since these inexpensive cotton yarns will produce a fabric having somewhat rough surfaces, it is important to treat the face of such fabric which is to receive the coating material so as to render it relatively smooth, and to remove or lay the fuzz produced by the projecting fibers. This may be done to a substantial degree by boiling the cotton fabric in caustic, and singeing the surface of the fabric. The remaining fuzz formed by projecting fibers can be laid by coating the face of the fabric with a thin thermoplastic coating material such as vinyl resin. This coating should be applied so that it will bond down the protruding fibers, and also so that it will not reduce to any substantial degree the porosity of the grey fabric.

After the woven cotton fabric is provided with a thin vinyl coating to increase the smoothness of the surface of the fabric without rendering the fabric impervious to air, it is ready to receive the raised plastic stripes, which impart to the fabric its durable wear surface and pleasing appearance. It is important that the fabric shall have a smooth surface before the plastic stripes, to be described,

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are applied thereto because cleanly formed plastic stripes can not be laid upon a rough surface. Other means than above described may be employed to provide a smooth face breathable base fabric, but the inexpensive cotton fabrics above mentioned give good results.

Striped designs are frequently desired in upholstery fabrics. The stripes herein contemplated are preferably formed of a vinyl resin and are laid upon the fabric by the use of a notched scraper bar or doctor bar which serves to form spaced stripes so that the valleys between these stripes will be substantially free of such plastic material, and therefore will remain porous, to provide the desired breathable coated fabric. These valleys may be of one color whereas the raised stripes are of a contrasting color to impart to the fabric the desired contrasting striped appearance.

If a three-color upholstery fabric is desired, this is readily produced by printing lengthwise of each raised stripe, just mentioned, a line having a third color that will differ in appearance from the color of the valleys and that of the stripes. In this manner breathable coated fabric which is highly pleasing in appearance and which has excellent wearing properties and abrasion resistance, and is easy to keep clean can be produced.

The above and other features of the present invention will be further understood from the following description when read in connection with the accompanying drawing wherein different embodiments of the invention are illustrated.

In the drawing:

Fig. 1 is a diagrammatic view of apparatus for applying the first coating to the grey fabric so as to lay the fibers without rendering the fabric impervious to air;

Fig. 2 is a similar view showing apparatus employing a notched doctor blade for depositing the plastic stripes on the fabric after it has been treated as shown in Fig. 1;

Fig. 3 is a face view of the notched doctor blade used in Fig. 2;

Fig. 4 is an enlarged transverse sectional view of the fabric as it leaves the apparatus of Fig. 2;

Fig. 5 is a top plan view of the fabric of Fig. 4;

Fig. 6 is a view similar to Fig. 4 but shows a modified fabric having wider plastic strips than those shown in Fig. 4;

Fig. 7 is a view similar to Fig. 6 but shows a three-color fabric in which a longitudinal line is printed along each plastic stripe;

Fig. 8 shows printing means for printing the longitudinal lines shown in Fig. 7;

Fig. 9 is a top plan view of the three-color fabrics shown in Fig. 7; and

Fig. 10 is a face view of the notched doctor blade used to form the stripes of Fig. 7.

Now referring first to Fig. 1 of the drawing, the numeral 10 designates a roll of woven cotton fabric which preferably has been treated with a caustic solution and then singed to increase the smoothness of the face that is to be coated. However even after such fabric has been treated as just mentioned some fibers are likely to protrude slightly from the surface that is to be coated and it is found that these interfere seriously with the operation of the notched doctor shown in Fig. 3, in that such protruding fibers tend to distort the stripes produced by the doctor. It is therefore found important to lay these slightly protruding fibers. This is readily done by depositing on the uncoated or grey fabric F supplied by the roll 10, and which preferably is approximately 50 inches wide, a very thin coating of vinyl resin. This is conveniently done by advancing the fabric F in the direction indicated by the arrow in Fig. 1 so that it travels under a straight blade doctor 11 of usual construction

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and against which blade a small bank B of a thin vinyl resin such as organosol is maintained. As the fabric F passes under the doctor 11 it is preferably supported by any suitable means such as the transversely extending bar 12 upon which the fabric rests. As the fabric F leaves the scraper 11 which deposits a very thin film of vinyl resin over its upper surface, it passes through a relatively long oven such as 13 that is maintained at a temperature of about 300° F. to drive off the solvent. The fumes which develop in this oven may be carried off through the discharge duct 14. The vinyl coating spread upon the fabric F by the doctor blade 11 should be so thin that when the solvents are driven off by the heat of the oven 13, this film will form a non-continuous coating that does not render the fabric impervious to air. This coated fabric, which is now designated by the letter C, leaves the oven 13 at a temperature that is high enough to render plastic the vinyl coating as it approaches the cooperating rolls 15 and 16. The upper roll 15 is a cooled steel roll whereas the lower roll is preferably a rubber coated roll, and the purpose of the upper roll is to press the upstanding fibers down against the face of the fabric and then quickly chill the vinyl coating so that it will hold these fibers down. The coated fabric C after it has been further cooled may be wound into the roll 17. The resins B used to coat the fabric F as just described may be given any desired color, such as a lighter shade of color for example, so that the later applied stripes may have a contrasting dark color.

The cooled fabric C when wound into the roll 17 is ready to be provided with the plastic stripes contemplated by the present invention. This roll may therefore be transferred from the take-up position in which it is shown in Fig. 1 to the let-off position of Fig. 2 wherein it is designated by the numeral 17'. As this fabric unwinds from this roll 17' it passes under the notched doctor blade 18 and the notches of this blade may be rounded and spaced from each other as indicated by 19 in Fig. 3 so that this blade will form the well rounded plastic ribs indicated by R in Fig. 4. The blade 18 is shown in Fig. 2 as having a bank of vinyl resin such as organosol resting thereagainst, and as the fabric C advances under the blade 18 it rests upon the transversely extending support 20. The arrangement is such that the doctor blade 18 will deposit the spaced stripes or convex ribs R upon the fabric C, but will deposit very little resin on the fabric between these spaced ribs. Some resin may be deposited on the fabric between the ribs R, which is undesirable, since it tends to render the fabric between these ribs non-porous. This thin film of resin is preferably promptly removed by causing the fabric to slide over a vacuum tube 21 which extends transversely of the fabric and is provided along its upper surface with a narrow slit 22, disposed so that air will be drawn downwardly through the fabric to thereby remove the resin from its interstices between the ribs R. The fabric C with the ribs R deposited thereupon passes from the vacuum tube 21 through a relatively long drying oven 23 which has the fume discharge duct 24. The oven is preferably maintained at a temperature of about 300° F. in the area where the solvent is driven off and farther along the temperature is raised to between 400 and 425° F. to fuse the resin. Upon leaving this oven the striped fabric is cooled a desired amount and is then wound into the roll 25. This completes the operation of forming the striped upholstery fabric such as shown in Figs. 4 and 5 of the drawing, except that the convex plastic ribs R will have a smooth surface. In order to reduce the sheen or glossy appearance of the fabric, it may be desirable to pass the hot fabric under an embossed roll, not shown, which will serve to score the ribs slightly both transversely and longitudinally to reduce the gloss of these ribs and give each rib the fabric-like scored appearance indicated by x in Fig. 5. The arrows of Fig. 4 are provided to indicate that the coated fabric is breathable.

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The striped fabric shown in Fig. 6 may be made the same as that shown in Fig. 4 except that a doctor blade is used having wider and flatter notches to form the relatively wide stripes S shown in Fig. 6. In forming the stripes S a vacuum tube such as shown in Fig. 2 of the drawing is used to remove the small amount of resin which the notched scraper may spread on the fabric between these stripes. This vacuum will remove the resin from the interstices of the fabric between the stripes so that the valleys will remain porous as indicated by the arrows in Fig. 6.

In making the construction shown in Fig. 4 and that shown in Fig. 6, the striped fabrics will present two colors, one supplied by the ribs R or stripes S and the other by the color of the resin B deposited on the fabric lying between the rows. Should it be desirable to provide a three-color striped fabric, this can readily be done by printing a longitudinal line along the crown of each rounded rib R. This may be done by passing the fabric of Fig. 4 between a pair of rolls the upper of which may be a smooth printing roll 26 and the lower a supporting roll 27, so that the upper roll will print vinyl ink upon the crown of the ribs R to give the fabric a third color. The ink used can be a standard commercial vinyl ink. If however the ribs R vary in size or shape the lines printed along these ribs by the roll 26 will be non-uniform in width.

A better means of providing such third color is to provide the fabric C with stripes shaped somewhat as indicated by S in Fig. 6 or by S' in Fig. 7, but impart to the stripes S' a raised ridge S'' which the roll 26 will engage to print thereon the color lines Y shown in Figs. 7 and 9. These specially shaped stripes S', S'' can be produced by using a doctor blade 28, see Fig. 10, having the specially shaped notches 29 that produce such stripes.

In order to reduce the sheen of the fabric of Fig. 5 the plastic material R while hot is preferably acted upon by an embossing roll to impart to the ribs R the scored appearance indicated by x. The stripes of the fabrics of Figs. 6 and 7 can be similarly treated to produce the scored effect indicated by x in Fig. 9. The number of ribs R or stripes S per inch formed upon the coated fabric C may vary from several to the inch to a dozen or more per inch as desired, and the space therebetween, which constitutes the porous valleys may vary from about 10% to 60% of the total fabric areas. The striped fabrics herein shown and described will obviously be less porous than the uncoated fabric F, but the breathability of the finished striped fabric may be equal to about 50% of that of the fabric F.

The plastic solution B applied to the fabric F as shown in Fig. 1 to lay the fibers must have certain viscosity characteristics. These are obtained by adjusting the solids content of the solution. The solids must be low enough so that only a thin film of resin is deposited on the yarns of the fabric. Too much resin will fill the interstices and reduce porosity, and the viscosity must be high enough to prevent the solution from penetrating the yarns and rendering them stiff. The preferred solids content is from 20 to 35% resin based upon the total weight of the composition. The preferred viscosity is from 10,000 to 50,000 centipoises. The amount of the resin B deposited upon the fabric ranges from 10 to 20% of the weight of the uncoated fabric. A typical formula for the resin composition is the following, in parts by weight:

Polyvinyl chloride	25.0
Dioctylphthalate plasticizer	17.5
Lead carbonate stabilizer85
Solvents:	
Methyl ethyl ketone	45.0
Cyclohexanone	11.25
Coloring pigment4

All of the ingredients except the solvents are mixed together on a hot mill in the conventional manner to form

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a homogeneous mixture. The stock is sheeted off in a thin sheet. The sheet is cut into small pieces and stirred into the solvent with a high speed stirrer until completely dissolved. This forms the stock for the bank B shown in Fig. 1 and which is spread thinly on the fabric F so that when the solvent is driven off in the oven 13 it will form a broken film through which the fabric can breathe.

The plastic composition B' of Fig. 2 which forms the convex ribs R or wider strips S is preferably an organosol coating composition as follows, in parts by weight:

Polyvinyl chloride (plastisol grade) -----	50
Diocetylphthalate plasticizer -----	23
Lead carbonate stabilizer -----	2.8
Coloring pigments -----	13.0
Solvent:	

Toluol or aliphatic hydrocarbon like kerosene - 11.2

Mix the dry ingredients separately and add the mixture slowly with constant stirring to the plasticizer. When smooth add the solvent slowly while stirring. Strain through double cheese cloth and store for 5 hours at 158° F. to permit thickening. This composition has a viscosity of from about 30,000 to 50,000 centipoises. The viscosity should be carefully adjusted so that the ridges formed by the doctor blade do not flatten out. The organosol should be able to hold its shape. On the other hand the viscosity should not be too high or the vacuum will not adequately remove the material deposited in the interstices of the fabric. The color of the organosol coating may harmonize or contrast with the color of the solution beneath.

The coated striped fabric of the present invention has an abrasion-resistance many times better than commercial upholstery fabrics such as whipcord or mohair, and it eliminates drag which is important when used to cover the seats of motor vehicles, where one needs to slide across the upholstery in getting into and out of the seat. Another important advantage is that the vinyl coloring is permanent and will not fade on exposure to the sun. Also this striped fabric is very easy to keep clean.

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

1. A breathable striped upholstery fabric provided with raised plastic stripes, comprising a woven cotton fabric having a thin flexible discontinuous coating of a selected color applied to one face of the fabric so as to increase the smoothness of this surface without rendering the fabric impervious to air, and having spaced raised stripes of a vinyl type of resin of a different color from said coating deposited on the coating so that the fabric areas between the raised stripes remain porous, said stripes being of sufficient thickness and closely spaced to form a plastic wear surface for the upholstery fabric, to thereby provide a breathable striped fabric having raised stripes of one color and valleys therebetween of a different color.

2. A breathable striped upholstery fabric provided with raised plastic stripes, comprising a woven cotton fabric having a thin flexible discontinuous coating of a selected color applied to one face of the fabric so as to increase the smoothness of this surface without rendering the fabric impervious to air, and having spaced raised stripes of a vinyl type of resin of a different color from said coating deposited on the coating so that the fabric areas between the raised stripes remain porous, said stripes being of sufficient thickness and closely spaced to form a plastic wear surface for the upholstery fabric, to thereby provide a breathable striped fabric having raised stripes of one color and valleys therebetween of a different color, and the raised stripes being embossed to reduce the sheen of the fabric.

3. A breathable striped upholstery fabric provided with raised plastic stripes, comprising a woven cotton fabric having a thin flexible coating of a selected color applied to one face of the fabric so as to increase the

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smoothness of this surface without closing the interstices of the fabric to render it impervious to air, and having spaced raised stripes of a vinyl type of resin of a different color from said coating deposited on the coating so that the fabric areas between the raised stripes remain porous to provide a breathable striped fabric, said stripes being of sufficient thickness and closely spaced to form a plastic wear surface for the upholstery fabric, and each stripe having a longitudinal line of a different color printed thereon to produce a three-color fabric.

4. A striped upholstery fabric provided with raised plastic stripes, comprising a woven cotton fabric having a colored thin vinyl coating applied to one face of the fabric so as to hold the fibers down without rendering the fabric impervious to air, and having spaced raised stripes of a different color vinyl resin deposited on the coating so that the fabric area between the stripes remain porous, said stripes being of sufficient thickness and closely spaced to form a plastic wear surface for the upholstery fabric, to thereby provide a breathable striped fabric having raised stripes of one color and valleys therebetween of a different color.

5. A striped upholstery fabric provided with convex wear-resistant ribs, comprising a woven cotton fabric having a thin flexible discontinuous coating of a selected color applied to one face of the fabric so as to increase the smoothness of this surface without rendering the fabric impervious to air, and having spaced convex ribs of a vinyl type of resin of a different color from said coating deposited on the coating so that the fabric areas between the ribs remain porous, said ribs being of sufficient thickness and closely spaced to form a plastic wear surface for the upholstery fabric, to thereby provide a breathable, wear-resistant fabric having ribs of one color and the valleys between the ribs of a different color.

6. A breathable striped upholstery fabric with raised wear resisting stripes, comprising a fabric having a thin, flexible, porous coating of a selected color applied to one face of the fabric so as to increase the smoothness of this surface without rendering the fabric impervious to air, and having closely spaced raised surface forming stripes of a thermoplastic resin of a different color from said coating deposited on the coating so that the fabric areas between the raised stripes remain porous, said stripes being of sufficient thickness and closely spaced to form a plastic wear surface for the upholstery fabric, to thereby provide a breathable striped upholstery fabric having a resinous wear surface of raised stripes of one color and valleys therebetween of a different color.

7. A breathable striped upholstery fabric with raised plastic stripes forming the wear surface thereof, comprising a woven fabric having a thin, flexible, coating of thermoplastic resin of a selected color applied to one face of the fabric, said coating covering the yarns in the fabric so as to increase its smoothness without bridging the interstices to render the fabric impervious to air, and having closely spaced raised stripes of a vinyl type of resin of a different color from said coating deposited on the coating so that the fabric areas between the stripes remain breathable, said raised stripes being of sufficient thickness and closely spaced to form a plastic wear surface for the upholstery fabric, to thereby provide a breathable striped upholstery fabric having a vinyl wear surface of raised stripes of one color and valleys therebetween of a different color.

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