Oct. 13, 1942. W. W. ROWE 2,298,592

DECORATIVE PRODUCT

Filed Feb. 8, 1937

FIG. 1.

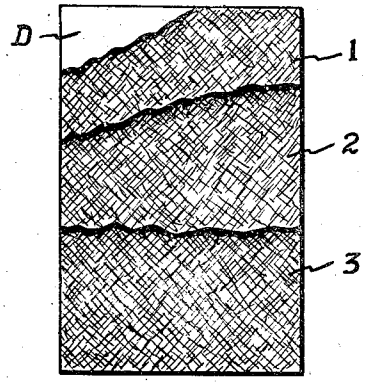


FIG. 2.

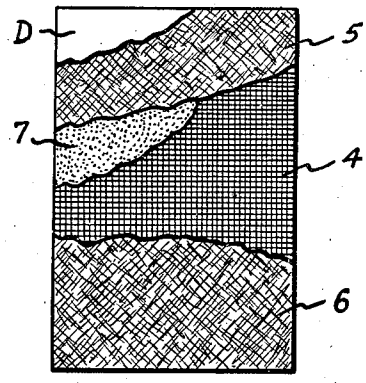
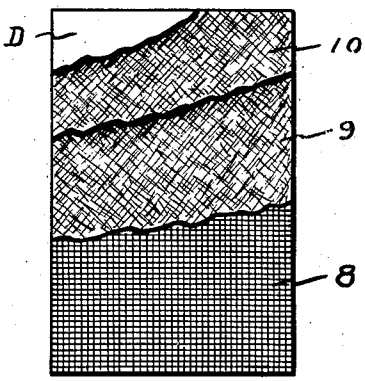


FIG. 3.



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UNITED STATES PATENT OFFICE

2,298,592

DECORATIVE PRODUCT

William Wallace Rowe, Cincinnati, Ohio, assignor to Cincinnati Industries, Inc., a corporation of Ohio

Application February 8, 1937, Serial No. 124,649

2 Claims. (Cl. 154—47)

My invention is directed to the manufacture of novel, durable, and economical decorative materials of the general class of materials suitable for use as artificial leathers, as wall coverings, as floor coverings, and in certain instances, as external coverings or facings for buildings, in book-binding, in the manufacture of luggage and protective cases and coverings for articles and materials, and in many other uses. To the extent that the same subject matter is disclosed herein, this case is a continuation in part of several of my copending applications for United States Letters Patent, as follows: Serial No. 512,311, filed January 30, 1931, entitled Flexible impervious and weatherproof material and method of making it, which has now matured into Patent No. 2,085,473, dated June 29, 1937, Serial No. 736,055, filed July 19, 1934, and entitled Coated creped fabrics and articles and processes of making them, which has now matured into Patent No. 2,077,438, dated April 20, 1937, Serial No. 668,106, filed April 26, 1933, and entitled Plural ply fabrics, which has now matured into Patent No. 2,069,778, dated February 9, 1937.

This invention relates to materials having an external surfacing of decorative and durable character consisting of or comprising such materials as cellulosic compositions, lacquers, paints, oxidizing and drying oils, synthetic or condensation resins, certain natural resins or mixtures of any of these, or printed or painted decorative coatings, covered or not with any of the substances set forth above, or coatings covered with short fibers or flock, or durable and weatherproofed coatings including metal foils, films of cellulose derivatives, Celluloid, rubber derivatives and the like, or combinations of two or more of such coatings.

The general objects of my invention are the provision of novel and improved materials of the character described, together with methods of making them. The more specific objects of my invention will be set forth hereinafter or will be apparent to one skilled in the art upon reading this specification.

Reference may now be made to the drawing wherein each of the three figures shows a different type of fabric falling within the scope of my invention, certain layers being cut away to show underlying layers.

I have indicated hereinabove that my invention relates to materials classifiable as artificial leathers, decorative wall coverings, floor coverings and external surfacing materials. These present, of course, a number of individual problems, but also present a number of problems in common; and in order to make a definitive showing of my invention, it will be necessary to discuss these problems. Artificial leathers have heretofore been made on a base of cloth coated with suitable pyroxylin compounds, lacquers, or the like, to give the desired surface appearance. Wall coverings of the types herein described have not, so far as I am aware, been made previous to my work as set forth herein, although in a few instances walls have been covered with the artificial leathers of commerce. Floor coverings of the printed class have uniformly been made on a base of asphalt saturated felt. So also have roofing and siding materials. The novel products herein mentioned represent radical departures from anything hitherto known in these arts. I shall discuss the various problems involved under suitable headings:

Body materials

As indicated, artificial leathers have been made heretofore on a cloth base. The cloth base has to be heavy enough to give suitable body to the material, since for many uses a heavy body is very essential. The cloth, of course, also imparts strength; but the requirement of a heavy body in many instances dictates the use of a much heavier cloth foundation than would be necessary from the standpoint of strength requirements alone. The only ways heretofore known in the art of increasing body were either to increase the weight of the cloth foundation or to increase the thickness of the coating. Both ways are disadvantageous in some respects and are quite expensive. It is an object of my invention to provide convenient and economical solutions to these problems.

For certain purposes, so-called napped cloths are used. The napping process is accomplished by taking a web of cloth and roughing up the surface fibers on one or both sides by the use of wire brushes or in other known ways. The effect is to produce a cloth which is soft and flannel-like on at least one surface. It is difficult to take a cloth which has already been coated to produce the artificial leather surface and put it through the napping process because the pyroxylin coating tends to penetrate to the reverse side of the cloth, thereby operating to prevent the action of the wire brushes in napping the cloth on the reverse side. It is also quite difficult to nap the cloth first and then coat it with the coating substance, because the py-

roxylin will tend to penetrate through to the napped side, thereby stiffening the nap.

It is an object of my invention to provide a simple and economical solution for this problem while also providing for a napped surface if it is desired.

As I have also indicated, floor coverings have been made on a base of asphalt saturated felt. The asphalt saturated felt is definitely lacking in inherent strength and is also definitely lacking in flexibility. Moreover, it tends to be brittle and to scuff and tear, and also to break off if edges are turned up or over. The inherent stiffness also raises, under certain conditions, a serious problem in getting the floor covering to lie flat. It is an object of my invention to provide simple and economical solutions for these problems.

Roofings and sidings are subject to much the same difficulties although their manner of use is quite different. Brittleness and the tendency to tear and split upon the application of strain are, of course, of equal importance; though for example, when roll roofing is fastened at both sides, these tendencies arise primarily through stretching, sagging, contraction or expansion of the roofing materials which cause wrinkles, bulges and the like. However, these wrinkles and bulges are unsightly and are a source of complaints. It is another object of my invention to provide simple and economic solutions for these problems. Also it is an object of my invention to provide strength in floor coverings, sidings, roofings, and the like which they have not hitherto possessed.

All of these uses require considerable body in the materials. Cloth is expensive as the sole body material. So also are saturated felts, and these have, as indicated, the additional disadvantage of lack of inherent strength. I have found that materials may be made having substantially any desired body weight by superposing layers of paper providing the paper is bulked in thickness by creping or by giving it some other form of inherent rugosities which have the desired effect. As many layers as desired of creped paper may be cemented together with suitable adhesive and the combined product may, if desired, be reenforced with an internal or external layer of cloth, crossed strands or cords or fibers, or the like. Where these reenforcements are employed, they may be sufficient to give only the required strength characteristics and need not be relied upon for bulk or weight. As a consequence, I can make adequately strong materials without the use of heavy cloth or other reenforcements.

Moreover, a creped paper, while possessing considerable effective transverse bulk or thickness, is nevertheless quite flexible in a direction transverse to the lines of creping. Where universally stretchable paper is employed the product will be quite flexible in every direction. Also products made of stretchable papers have inherent stretchability which is an advantage in many particulars and has not hitherto been available in products of the class to which reference is made here. As I have taught in my copending application Serial No. 668,106 referred to above, non-conjoint layers of paper cemented together with intervening layers of adhesive, while possessing great inherent stretchability possess also an extraordinary resistance to the removal of this stretchability which gives them a further advantage.

If stiffness is required, it may be obtained by backing the paper layers to a stiff material as might be done, for example, in book-binding or in the manufacture of preformed wall covering panels where the decorative material is backed to a panel of cardboard, wallboard, or any of the hard or soft panel boards of commerce.

In the fabric itself, however, varying degrees of stiffness may be obtained in the use of a plurality of layers of single creped papers by so superposing these layers that the creping crinkles in one layer lie transverse to the creping crinkles in another layer, thereby producing a sort of trussing action. This may be done either by cutting and reversing ordinary creped papers, or by employing single, diagonally creped paper layers so arranged that the crinkles are oppositely disposed.

As exemplary material I have indicated in Fig. 1 a composite product comprising several layers 1, 2 and 3, of universally stretchable paper made in accordance with the teachings of the Kemp Patents 2,008,181 and 2,008,182, and the copending application in the name of William C. Kemp Serial No. 558,884, filed August 24, 1931. The number of layers of paper in the product does not constitute a limitation on my invention. The product as shown in this figure is a flexible and limber product having, however, any desired body and very considerable strength. By reason of its inherent stretchability it may be conformed to irregular surfaces much more readily. The stretchability of the product, while not lessened, may be resisted in various ways, as by the inclusion in the combining adhesive of short, heterogeneously arranged fibers. If greater strength is desired at the expense of stretchability various reenforcements, as above mentioned, may be used externally or internally with this product. Also it is possible by proper distribution of these reenforcements, as taught in my copending application Serial No. 122,172, filed Jan. 25, 1937, to retain stretchability in one or more directions, if desired. The layers of paper may be cemented together with any suitable adhesive. Where the paper has been creped by means of the use of a positive thermoplastic adhesive, such for example, as asphalt, or where the paper has been creped by means of rubber, as set forth in my copending application Serial No. 668,105, filed April 26, 1933, the creping adhesive may be employed to join the plies together.

In Fig. 2 I have shown a fabric such as that described and claimed in my copending application Serial No. 512,311, referred to above, where there is a layer of fabric 4 and externally disposed layers of paper 5 and 6. These have been shown as single layers, but for purposes of giving bulk to the product additional layers may be added, if desired. The paper, of course, may be single creped paper formed by the usual water-creping process, or it may be paper creped by the use of a positive creping adhesive, as set forth in my Re. Patent No. 17,633, or it may be the single or double diagonally creped paper made under the Kemp patents hereinabove referred to. Also for purposes of giving bulk or providing a cushioning or insulating effect, I may use other types of paper such as paper creped and corrugated in accordance with the teachings of the issued Rowe and Morris Patent No. 2,034,421. Such papers give bulk; but for reasons which will hereinafter be made clear, it is preferable not to use such papers as an external layer which is to be coated with lacquer, paint or the like.

Where a coarse, woven material such as burlap, for example, is used in a product of this character, if thin layers of paper are cemented to it with relatively thin layers of adhesive, there may be a tendency upon bending the product, to have the grain of the weave of the cloth show through the paper surfacing. In embossed products, as hereinafter set forth, this may not be disadvantageous; but in any event it may be obviated by using sufficient adhesive substance to fill up the interstices between the weave of the cloth. I have indicated at 7 in Fig. 2, a layer of adhesive or filler substance which fills up the weave of the cloth.

An advantage of interleaving cloth between layers of paper is also that the appearance of the cloth is not a factor in the appearance of the final product, so that adequately strong cloths which are cheaper than the cloths usually used, may be employed with attendant economy. Still another advantage of interleaving cloth with layers of paper, especially where the materials are to be used in places exposed to the weather or under conditions of dampness or the like, is that the cloth may be entirely sealed by a suitable coating of waterproofing adhesive substance, such as asphalt. This is, of course, especially important in connection with floor coverings, roofing and siding. In Fig. 3 I have indicated, however, a layer of cloth 8 with one or more layers 9 and 10 of paper cemented to one face thereof. Such products may likewise be employed for the uses contemplated herein, and in such products depending, of course, upon the nature of the exterior of the cloth, the cloth may be napped or not, as desired. All of these products may have a decorative coating indicated generally at D.

The coating base

In my novel products a creped web is employed as a base for the incorporation or superposition or both, of decorative coatings. The coating base operates in three fundamental ways:

(*a*) It keeps the coating essentially out of the body material,

(*b*) It aids in the formation of a more perfect film, a thinner film and a film less subject to damage and disintegration,

(*c*) It either imparts a desirable texture to the film of coating substance or provides a basis for the subsequent configuration or texturing of the material. These various functions will now be discussed in detail.

I have spoken hereinabove of the difficulties attendant either upon the use of napped fabrics in the production of artificial leather or of the procedure of napping fabrics after they have been coated. In the production of artificial leathers or similar materials, if a fabric is first faced with a layer of paper and the pyroxylin or other coating applied to the paper, it will be clear that this coating cannot get through the paper so as to impregnate the cloth. Thus the cloth may have a nap at the start of the process, which nap will not be impaired, or the cloth may be napped after the paper has been coated without the difficulties hereinabove described.

Another result of the use of my novel construction is that when coating a paper-lined cloth or a paper-surfaced article, less coating may be used to obtain a perfect film when the coating is applied over paper rather than over an unlined or plain piece of cloth. The pyroxylin coating is likely to be the most expensive part of the article and the effective part of the coating is the surface film. On my materials the coaters can produce an equally effective surface film with the use of a lower total amount of pyroxylin coating, as will be clear. There is no problem of filling up or masking the interstices of a cloth web by means of a decorative top coating. As a consequence, also, it is possible to use cloth reenforcements of a much more open mesh and a much coarser structure than could normally be used as a base for pyroxylin coating. For example, I am able to use a paper-lined burlap and secure an excellent coated surface. If the appearance of burlap on the under side of the article is objectionable, instead of using the product shown in Fig. 3, I may employ that shown in Fig. 2. Reenforcing materials embodying open mesh netting or crossed fibers or cords can likewise be employed, as I have indicated, and such products it would be impossible to coat at all in the ordinary construction. In materials coated on the back side with paper, if the appearance of a nap is desired, the paper may be flocked as hereinafter set forth.

The paper layer thus contributes to the production of a more perfect and thinner film. Also the paper contributes to the production of a film which is less liable to disintegration. As is well known, many paints, lacquers and the like show a tendency toward cracking and crazing with lapse of time. In part, this may be due to other causes; but a great percentage of it appears to arise through unequal contraction and expansion of the film or coating and the base on which it is placed. Universally stretchable papers coated with these substances appear to provide a base having substantially no tendency to produce cracking and crazing arising from this cause. I explain this by the fact that the stretchable paper is free to expand and contract as the coating expands and contracts, and therefore does not impose upon the coating the strains which ordinary bases impose.

There is another source of failure in coating woven fabrics which my invention obviates. When cloth forms the base for a pyroxylin coating, it is clear that when the cloth is distorted on the bias there is a scissors-like motion of the warp and woof threads which places an undue strain on the film of coating. This has presented a problem in the manufacture of artificial leathers leading to the establishment of standards of performance and laboratory tests among which is the so-called flexing test. A piece of the fabric is clamped in a suitable apparatus and is repeatedly distorted on the bias under a predetermined amount of force. Fabrics, to pass the established standards, must withstand a large number of flexes. Considerable work apparently has been done also in the art of developing certain kinds of cloth which have a less strongly marked tendency to subject the coating to this type of strain.

Where, however, the fabric is faced with a stretchable paper and this paper is given the coating, the coating itself is shielded or protected from the severe scissors-like action of the warp and woof threads and is required only to accommodate itself to whatever general distortion there may be in the web as distinguished from the severe local distortions referred to. As a consequence, my fabrics are better and last longer from the standpoint of the permanence of the coating than fabrics hitherto made.

When coating paper to form products sub-

jected to hard usage involving flexing, as for example, in upholstery or the like, it is advisable to make provision against the internal splitting or separation into plies of a paper layer to which the coating is applied if this layer be of very heavy character. This is taken care of, however, easily by one of two methods. Any impregnation of the paper with a relatively hard substance whether permanently adhesive in character or of the character of paint, lacquer, or the like will cut this splitting tendency down to the point where it is no longer of importance. Thus when coating paper with lacquer, varnish, pyroxylin or the like, it is possible to apply the material in such form that a portion of it penetrates in and through the paper, thereby eliminating the splitting tendency. This may largely be controlled by the viscosity of the coating at the time of the application, and the viscosity may be controlled in known ways. Where, however, it is undesirable to make provision for the external coating to penetrate the body of the paper, the paper may be rendered non-splitting by causing penetration into the paper of the adhesive employed in building up the composite fabric. The adhesives most commonly used in building up the composite fabric will be such materials as asphalt or other bitumen, resins, rubber derived from latex, or artificial rubber dispersions. Of course, other materials including silicate adhesives and the various vegetable and animal glues may be employed, if desired, but are ordinarily not so advantageous. Pliability in the adhesive is desirable and in most instances so also is a waterproof and moisture-proof character. The several adhesives, however, may be caused to penetrate into the paper either at the time of their application thereto in building up the fabric or by an after treatment similar in character to that which I have described in my copending application Serial No. 135,296 filed April 6, 1937. Thus when employing asphalt, for example, as an adhesive, the asphalt can be caused to strike into or through the paper, if desired, by treating the external uncoated surface of the paper with a volatile solvent for the asphalt. After the solvent has drawn the asphalt into the paper it of course disappears by evaporation. Other adhesives may be treated in a similar manner by the use of appropriate solvents therefor. It will be clear also that aside from the splitting tendency, such treatment of the paper tends also to preserve it, especially where my materials are subjected to external weather conditions or to conditions of moisture as in a flooring. Where the paper is not permeated it is possible for water to work into the layer of paper from a cut edge by capillarity. Thus the paper may be weakened and separation promoted. By the treatment hereinabove outlined, the paper itself is sealed against such action and maintains its inherent strength in spite of adverse external conditions.

In connection with the application of certain types of coatings, and where a composite fabric has been built by using some sort of staining adhesive like asphalt, it is desirable to prevent either a staining of surface layers or a penetration of the staining adhesive through surface layers. Also this action is important where, as in the case of bitumen as an adhesive, any heat to which the material might be subjected in use might cause the adhesive to soften and tend to penetrate through paper layers so as to stain an external coating or so as to penetrate through such a coating. Under these conditions one or more of the paper layers may be subjected to an anti-staining treatment, as set forth in my copending application Serial No. 512,311. A simple form of such treatment is to give the paper a coating of rubber latex either before or after creping. Such coating acts to prevent staining of the paper or penetration through the paper of underlying adhesives when located next the adhesive coating. When located on the side of the paper away from the adhesive coating it, of course, does not tend to prevent penetration of the paper but will prevent the adhesive coming through the paper and any external coatings. It will be understood that penetration of the paper by a dark colored or staining adhesive may be of importance where the nature of the overlying coating is such as to be transparent or translucent in part at least. Under these circumstances a change in color of an underlying paper layer due to any cause might be disadvantageous. Moreover certain types of coatings, and in particular paint coatings, and the like, are susceptible to staining from the lighter oils of the asphalt. This is of particular importance in the making of paint-printed floor coverings and the like. For these uses it is frequently advisable to give the paper an anti-staining treatment either on its upper surface or beneath, as may be desired. Where, however, any coating is of a character which would not itself be stained by any materials from an adhesive and where it is dark enough in color and opaque enough to mask any changes in color of the coating base, it may act itself as a stain-preventing layer in the sense of preventing any materials coming through the paper layer from going any further.

A creped paper is a paper having a distinct surface texture. When used as a coating base it is capable of imparting this texture to a coating placed thereon. For most uses, however, the texture of ordinary creped paper will not be found particularly desirable. The texture of the double diagonally creped paper of the Kemp patents referred to above is in itself, however, a fine grained leather-like texture and especially suitable for coating in the formation of artificial leather and decorative materials in general.

The application of the coating may be done in any way desired by several modes of application for their own peculiar advantages. As set forth in my copending application, Serial No. 736,055, filed July 19, 1934, the paper may be coated before creping. This has a number of advantages. In the first place it is easier to coat plain paper than it is creped paper and a smoother and more uniform coating may be applied. Also there is not the tendency to remove stretchability from the paper during the operation of coating. Furthermore, when the coated paper has been creped the coating is creped conjointly with the paper, and therefore partakes sharply and definitely of the same rugosities. The paper coated before creping is characterized by a novel type of texture and differs quite markedly in appearance from paper coated after creping. When paper is coated after creping the coating to some degree, at least, tends to fill up the rugosities of the paper, giving a markedly different appearance. Both types of appearance, however, have their own particular utility and may be employed as desired. I have furthermore found that the characteristic appearance of paper coated after creping is destroyed to a very great extent by subsequent embossing. Thus a paper coated after creping may,

by embossing, be made to resemble a paper coated before creping.

It will be understood, of course, that when coating already creped paper the thickness of the coating or coatings applied will determine in large measure the persistence of texture derived from creped paper. Thus in manufacturing floorings by the printing method, successive layers of coatings of paint or the like tend considerably to minimize the underlying texture. Yet, I have found that a pleasing softness quite distinct from the hard glazed appearance of the ordinary felt base flooring is secured in floorings of my type where the coatings are laid down on a coating base of creped paper. The operations of printing the floor covering with my new fabrics are carried on in the same way as is usual with felt base materials.

The use, moreover, of paper characterized by a distinct texture as a coating base facilitates the manufacture of parti-colored coatings. Thus, paper may be coated before or after creping with a relatively thin layer of coating having one characteristic color. After this coating has dried and set a coating having a contrasting color may be applied thereover, and this coating removed by wiping or otherwise from the higher portions of the rugosities of the textured surface, thereby giving a parti-colored result of great effectiveness.

The decorative surface may be applied to the paper in any desired way as by spraying, roller coating, dipping, doctoring and the like. Also, it is within the scope of my invention to employ as a coating base creped papers which have been printed with suitable designs, and then employ as an overlying covering a clear lacquer or varnish or a preformed translucent or transparent film of cellulose derivative, or rubber derivative, held in place either by a development of its own adhesive properties or by a suitable coating of translucent adhesive. Under these circumstances the texture of the paper may again be important. Thus paper printed in imitation of cloth, and lacquered, not only is highly decorative, but has a texture, imparted by the creping, which is quite suggestive of a cloth surface.

Finally, many of my products are embossed by treating them between the plates of a platen press, one of which contains a suitable design or by passing them between a series of embossing rollers. Embossing not only changes the surface aspects of the products but also tends to mask surface imperfections and to mask the juncture between adjacent webs, where the surface of a fabric has been covered with non-coterminous webs. Metal foils may be incorporated in my material and these may likewise be embossed both for the sake of general appearance, surface or texture, and for the masking of lines of juncture between adjacent foil pieces. It is to be noted, however, that the production of deep embossing in products of this character is dependent to a considerable extent on the stretchability of the coating base. Many materials including metal foils may be given slight surface embossings without serious danger of splitting; but since embossing essentially involves a stretching action, deep embossings cannot be formed without danger of splitting unless the material be stretchable in and of itself. My coating bases are therefore exceptionally well adapted to deep embossing.

The surfaces of any of my products may be flocked by coating them with a suitable coating layer having adhesive properties during one step of the process at least, and while such layers are adhesive dusting on them a suitable short-fibered flock or the like. In this way a very beautiful effect may be obtained, such as effects in imitation of suede leather. This may be done before or after creping. I have succeeded in making, in the ways described, very durable, very beautiful but exceedingly inexpensive products having a number of distinct advantages. The thickness of the fabrics is not a limitation on my invention. In accordance with my teachings it will be within the skill of the worker within the art to give these fabrics any body weight desired. Where the fabrics are to be used for juncture to walls, to articles, or to stiff panels less body is required. Moreover, my fabrics are such that light body materials may be given heavy bodies at any time after fabrication so that the stocking of large quantities of material otherwise identical but having different body weights is not required. Moreover, ordinary artificial leathers may be given more body by joining them to the fabrics herein described, or to individual layers of creped paper. I am not limited as to the nature of the coating materials employed nor as to the nature of adhesive employed in building up the body fabrics. All of my products have distinct advantages in appearance, durability and economy, as well as in strength and lessened liability toward cracking, tearing, scuffing and the like. All may be characterized by novel, desirable textures. When exposed to the weather as in roofing or siding they are found to be exceedingly durable and weather resistant and even where inherently stretchable are not subject to marked shrinkage or elongation under weather conditions. All of my products are or can be made very flexible. They will lie flat and can be conformed much more readily to irregular surfaces.

Modifications may be made in my invention without departing from the spirit thereof.

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

1. A flexible, non-cracking fabric capable of use as artificial leather, flooring, wall covering and the like, and comprising a flexible body, a layer of universally stretchable paper characterized by crossing sets of creping crinkles adhered to said body by a non-brittle adhesive, and a wear coating imposed upon said paper layer, said paper layer being printed in imitation of cloth, and said coating being a coating of paint-like character so imposed upon said paper that the said creping crinkles impart a cloth-like texture to said coating, said coating being translucent in character to disclose said printing.

2. A fabric visually imitating cloth, and comprising a surface layer of paper printed in imitation of cloth and creped in such manner as to have imparted thereto relatively fine rugosities comparable in size to the rugosities of cloth, whereby the rugosities so imparted to the paper give it a texture reinforcing the impression of cloth imparted by said printing, the creping rugosities consisting in crossing sets of creping crinkles whereby the paper is given universal stretchability, and whereby the said texture is without marked directional grain, the said paper layer being coated with a wear coating of sufficient translucence to disclose said printed representation, said paper layer being joined by means of a flexible adhesive to a flexible body comprising at least one layer of universally stretchable paper.

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