

[54] FLEXIBLE SHEET MATERIAL

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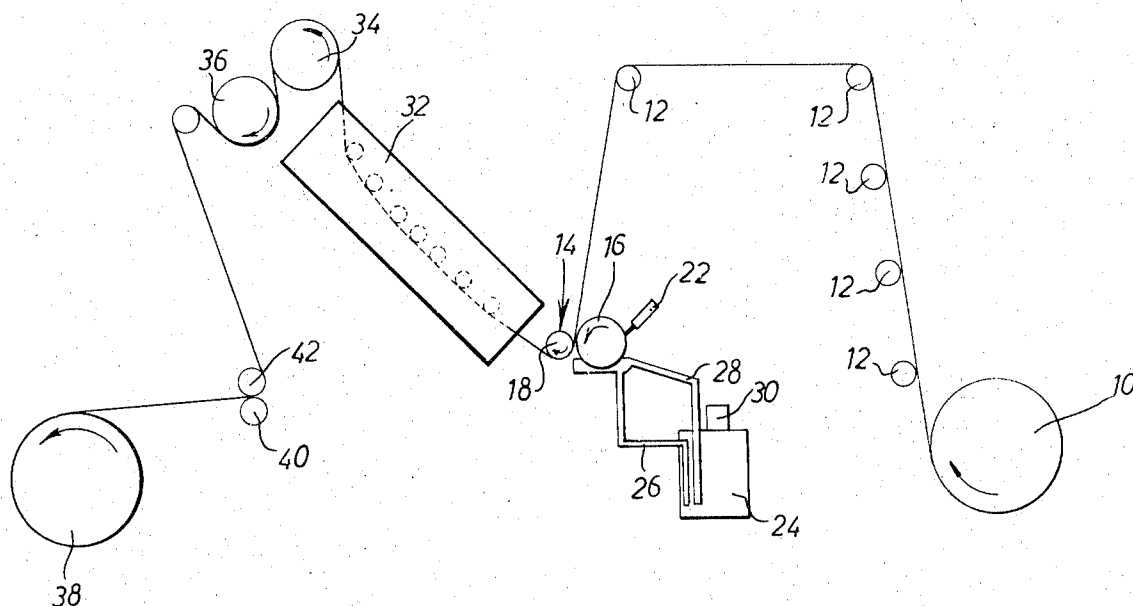
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[57]

ABSTRACT

A readily strippable wall covering which comprises a wall covering sheet including a fibrous backing surface. A material comprising a wax-aluminum-protein-rosin complex in water is disposed on the fibrous backing surface in the form of a plurality of discontinuous portions incompletely covering the fibrous backing surface for reducing the susceptibility of the wall covering to adhere to a wall upon the subsequent application of a water-based adhesive to the material prior to positioning the wall covering on a wall such that the subsequently applied adhesive can be directly applied against the fibrous backing surface between the discontinuous portions, and the amount of the material applied to the fibrous backing surface is within the range of 2 gm/sq. meter to 12 gm/sq. meter to partially reduce a direct bonding between the adhesive and the fibrous backing surface.

13 Claims, 2 Drawing Figures



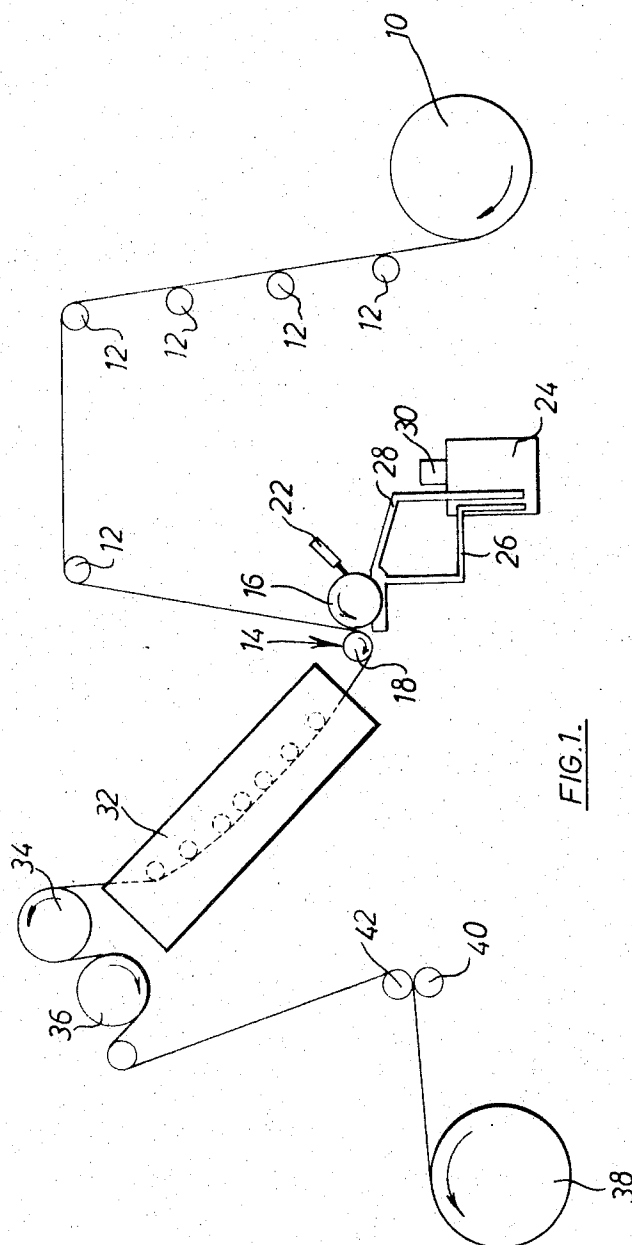
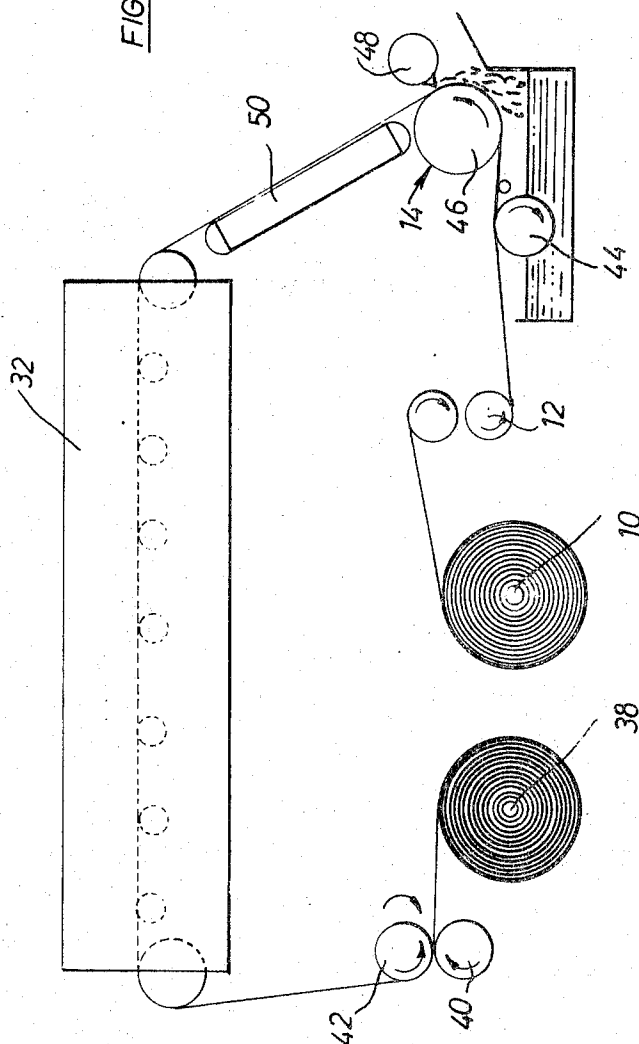


FIG. 1.

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FIG. 2.



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FLEXIBLE SHEET MATERIAL

This is a continuation in-part application of the co-pending patent application Ser. No. 709,537, filed Mar. 1, 1968, now abandoned.

The present invention relates to a dry-strippable wall covering and to a method of manufacturing same.

Hitherto a water based adhesive has been used to apply a wall covering to a wall. When the time has come to remove the wall covering from the wall it has been necessary to apply water or steam to the wall covering to loosen the hold of the adhesive. Thereafter once the adhesive hold has been loosened it has been possible to scrape the wall covering from the wall. Clearly a disadvantage with this known form of wall covering is that its removal from a wall is tedious and time consuming and therefore expensive.

In order to overcome the above problems various kinds of dry-strippable wall covering have previously been proposed.

One known dry-strippable wall covering consists of two sheets namely a backing sheet and a facing sheet weakly adhered to the backing sheet. To apply the wall covering to a wall, the composite sheet is glued to the wall using a water based adhesive. When it is desired to remove the wall covering, the facing sheet is stripped from the backing sheet leaving the backing sheet attached to the wall. Clearly a major disadvantage with this known type of strippable wall covering is that the backing sheet remains on the wall.

Other forms of dry-strippable wall coverings are known. For example, it has been proposed to use a pressure sensitive adhesive on a wall covering. This suffers from the disadvantages that it renders the wall covering both expensive to produce and difficult to apply.

Again, it has been proposed to apply a continuous coating or film to the reverse or working side of a wall covering. With this form of covering it has been found that if a commercially available water based adhesive has been used, the paper has tended to peel from the wall since the bonding was too weak. For this reason when a continuous coating or film is used it has become highly desirable to use an adhesive having a bonding strength greater than that of commercially available adhesive. This in turn adds to the cost of providing a dry-strippable wall covering.

It is one object of the present invention to provide a flexible sheet material for attachment to a relatively rigid surface which is readily strippable therefrom subsequent to the attachment, a surface of which material has been treated to modify its susceptibility to adhere to the rigid surface on the application of an adhesive prior to offering up one surface to the other.

The term "relatively rigid surface" as used herein and in the claims herein means a surface which is more rigid than the flexible sheet material itself.

The treatment preferably comprises the application to the material surface of a substance which reduces its susceptibility to adhere to the relatively rigid surface.

It is another object of the present invention to provide a flexible sheet material for attachment to a relatively rigid surface which is readily strippable therefrom subsequent to the attachment, the rear surface of which material has been treated by the application thereto of a substance exhibiting a reduced compatibil-

ity with the adhesive as compared to the untreated surface.

It is still another object of the present invention to provide a wall covering which is ultimately to be dry-strippable from a wall to which the wall covering has been applied using a water-based adhesive.

It is also an object of the present invention to provide a dry-strippable wall covering which can be applied to a wall using any commercially available water based adhesive.

It is a still further object of the present invention to provide a dry-strippable wall covering which can be dry-stripped from a wall, leaving a clean base for receiving a further wall covering.

It is still another object of the present invention to provide a dry-strippable wall covering to which an adhesive can be applied only when it is desired to hang the wall covering, and not in the factory of the paper manufacturer.

The substance which reduces the susceptibility of the material surface to adhere to the relatively rigid surface may be applied initially in liquid form over the entire surface of the sheet material.

Alternatively the substance may be applied initially in liquid form or other form in a discontinuous coating to the surface of the sheet material.

In this embodiment of the present invention the substance is preferably applied as a pattern over the whole of the sheet. Although the substance may be applied as a regular or irregular pattern, preferably a broken pattern is applied such as a micro-dot pattern, which may become irregular once the substance is applied, for instance due to the nature or properties of the sheet material and/or the substance. This is particularly the case where the surface, to which the substance is applied is fibrous, e.g., paper, since the substance may be absorbed into the fibers with consequent spreading or migration of the substance. Where the surface is fibrous therefore, the treated surface may comprise some fibers or parts of fibers having the substance absorbed thereon and other fibers or parts of fibers which do not have the substance absorbed thereon.

The present invention is particularly applicable to flexible sheet material bearing decorative, advertising or instructional matter.

As previously stated, the present invention has particular application to wall-coverings.

It is yet a further object of the present invention to provide a readily strippable flexible wall-covering, the rear surface of which has been treated by the application thereto of a substance of reducing its susceptibility to adhere to a wall surface on the application of an adhesive prior to offering the wall-covering up to the wall surface. Preferably at least the rear surface of the flexible wall-covering is a fibrous product, e.g., paper.

Also according to the present invention there is provided a method of manufacturing a flexible sheet material for attachment to a relatively rigid surface and being readily strippable therefrom subsequent to the attachment, which comprises treating only part of the rear surface of the sheet material to modify its compatibility with adhesive by applying thereto a chemical substance.

It is still yet a further object of the present invention to provide a method of manufacturing a readily strippable flexible sheet material which comprises printing or otherwise applying decorative, advertising or instruc-

tional matter to the material and treating only part of the rear surface of the material to reduce its susceptibility to adhere to a relatively rigid surface when adhesive is applied thereto prior to offering up the material to the surface.

The material may be treated before or after printing or otherwise applying decorative, advertising or instructional matter to the material.

Many methods may be used to apply the substance, which is in the liquid or semi-liquid form, to the surface to be treated, e.g., printing, coating, spraying, immersing or impregnating techniques. Specific methods which have been found to be particularly useful include application by gravure roll, size press, air knife, roller coating and spraying. Silk screen printing, preferably without a stencil, may also be used, for example, where the surface to be treated is relatively small.

Where the surface to be treated is a comparatively rough surface, e.g., the reverse side of the wallpaper, the substance may be applied to only parts of the surface by applying the material by means of a kiss coating method, by which the substance is applied only to the raised portions of the surface. When the adhesive is applied, therefore, it adheres to only those parts of the surface to which the substance has not been applied, i.e., the sunken parts of the surface. Any similar method may be used in which the surface is not completely sealed by the material.

The substance which may be used and the amounts used depend upon the surface being treated, the nature of the rigid surface to which the treated material is to be attached and the adhesive to be used. Examples of types of materials which may be used, however, include lattices, water-repellant inks, lacquers, silicones, and synthetic resins. It has been found that, using a vinylidene chloride copolymer as the substance, quantities between 3 and 12 grms/sq. meter are suitable for an 18 oz. wallpaper that is to be adhered to a surface using a cellulose type adhesive.

The substance is generally one which will result in a water-and/or chemical-resistant finish being formed on at least a part of the surfaces to be adhered together.

Where the adhesive to be used is a water-based adhesive the substance used may be, e.g., a water-repellant material and this material may range from slightly water-repellent to extremely water-repellant.

The amount of substance utilized depends upon the properties of the surface being treated, the adhesive to be used, the properties of the surface to which the treated material is to be adhered and the particular substance used.

The weight of the substance applied to the surface may also vary depending on the method of application, e.g., it has been found that more material is used when aqueous systems are used than when organic solvent systems are used.

Generally the amount of the substance utilized where the surface being treated is a fibrous material such as the reverse side of a wallpaper, is in the range of from 2 to 12gms./sq. meter of surface although the workable range for each particular substance may not extend over the whole of this range and will vary with the properties of the surface to be treated, the adhesive to be used, the properties of the surface to which the treated material is to be adhered, and the method of application of the substance to the surface being treated.

One class of materials which have been found to be particularly useful are polyvinylidene chloride polymers/copolymers which generally may be used in both aqueous and organic solvent systems.

These polyvinylidene chloride polymers have been found to be of particular use when applied to a part of the non-design side of wallpaper to produce a wallpaper which is readily strippable. These materials are particularly preferred where the adhesive used in adhering the paper to the wall is of the cellulose type. Examples of polyvinylidene chloride polymers which have been found to be useful are Polidene 911 sold by Scott Bader (this material may generally be used on paper surface in amounts of between 8 and 12gm/sq. meter, optimally 10 gm/sq meter); Ixan 82A marketed by Solvay et Cie. and Ixan SGA marketed by Solvay et Cie (these last two materials may generally be used on a paper surface in amounts of between 2 and 5 gm/sq. meter optimally 3gm/sq meter).

Further materials which have been found to be useful particularly for applying to the reverse side of wallpaper to produce an easily strippable wallpaper, are polyvinyl chloride resins whose films have low water vapour permeability, low water absorption and excellent toughness and flexibility. The resins are desirably unplasticized and are preferably copolymers with for example one or more of the following:- vinyl acetate, vinyl alcohol and a dicarboxylic acid, such as maleic acid. Particular resins which have been found to be of special use for example, in treating the reverse side of wallpaper are Vinylite VYHH, Vinylite VAGH, and Vinylite VMCH, all of which are sold by Bakelite Limited, of 12-18 Grosvenor Gardens, London, SW1. All three of these substances may generally be used on a paper surface in amounts of from 3 to 7 gm/sq. meters.

A further group of compounds which have been found to be of use in the present invention are nitrocellulose resins whose films have low water absorption, excellent toughness and flexibility. The nitrocellulose resin is preferably unplasticized. When used on the reverse side of wall papers and other materials which are printed or will subsequently be printed, eg., labels, it is desirable that the resin has a high nitrogen content since printing inks may contain methylated spirits which may dissolve low nitrogen content nitrocellulose resins. One nitrocellulose resin which has been found to be of particular use especially in coating the reverse side of wallpaper is a mixture of 75 percent of DHX 30/50 Industrial Nitrocellulose sold by Imperial Chemical Industries Limited, and 25 percent of 120/170 Industrial Nitrocellulose sold by Imperial Chemical Industries Limited. This material may generally be used on a paper surface in an amount of from 3 to 7 gm/sq. meter.

A still further group of compounds found to be useful are products sold under the trade name of Mystolene by Catamance Ltd., Bridge Road East, Welwyn Garden City, Hertfordshire. Examples of such compounds are Mystolene PP/2R, and Mystolene MAS.

These materials may generally be applied to a paper surface in concentrations of 0.2 to 10 percent based on the weight of dried fiber. Optimum concentrations were found to be 6 percent using type PP/2R and 1.5 percent using type MAS, although the quality of the material effects these figures in some degree.

According to the present invention, there is provided a method of manufacturing a dry-strippable wall covering from a fibrous sheet material comprising treating the surface fiber of the fibrous sheet material with a freely flowing aqueous dispersion including:

paraffin waxes having melting points falling within the temperature range of 44°–60°C;

a natural wood rosin;

an acid protein colloid as emulsion stabilizer;

an aluminum salt of a low molecular weight aliphatic carboxylic acid;

the ratio by weight of said paraffin waxes to rosin being from 10:1 to 1:4, and

subjecting the so treated backing material to a curing process wherein the treated surface of the fibrous sheet material attains a temperature above the melting points of the paraffin waxes present in the dispersion and which process ensures that the residual moisture content of the fibrous sheet material is from 5 to 12 percent.

Preferably the paraffin waxes have an oil content of less than 2 percent, usually less than 1 percent by weight.

The term natural wood rosin as used herein includes all rosins obtainable from wood. The natural wood rosin used is preferably of the best grade, for example, WW.

The acid protein emulsion stabilizer is preferably animal glue which has been dimerized.

Examples of aluminum salts which may be used in the dispersions are aluminum acetate and especially aluminum formate. When the dispersion is made up with hard water, it has been found that some of the aluminum salt content may be wasted owing to its reacting, possibly in the form of a chelating agent, with the ions in the hard water. It has been found that no or very little aluminum formate is lost in this way and, therefore, the use of dispersion containing aluminum formate is preferred.

The solids content of the dispersion conveniently has a controlled particle size of less than 2μ and preferably less than 1μ .

The total moisture content is calculated by determining the weight of moisture present in the fibrous material, e.g., by heating to dryness, and expressing this weight as a percentage of the weight of the sample originally, i.e., when moist under ambient conditions.

The dispersion which reduces cohesive strength of the bond between the backing surface of the fiber and the subsequently applied water-based adhesive is applied initially in liquid form over the entire backing surface of the fibrous sheet material. The effect of the reduced bond strength is to reduce the tensile strength required to dry-strip the wall-covering at a later date.

Normally the treated surface has a low 3 minute Cobb value usually below 15. A low Cobb value alone, however, is not sufficient to render a material dry-strippable.

Although the dispersion is initially applied continuously over the whole backing surface it subsequently becomes an irregular covering once the dispersion has been applied, for instance owing to the nature or properties of the sheet material and/or the dispersion. The dispersion is mainly absorbed onto the surface of the fibers of the fibrous backing surface with consequent spreading or migration of the complex, though some

penetration into the fibrous sheet material may occur resulting in that portion being wasted. This waste of dispersion may be reduced or eliminated by a sizing process or the like as hereinafter described. The treated surface therefore comprises some fibers or parts of fibers having the complex absorbed thereon and other fibers or parts of fibers which do not have the complex absorbed thereon.

Certain fibers exhibit a property known as "preferential absorption" which indicates that they have a tendency to adsorb more of an applied material, such as a sizing material, than other fibers. Clearly fibers exhibiting "preferential absorption" together with fibers not exhibiting this property may both be found in a single sheet of fibrous material.

According to a further embodiment of the present invention there is provided a method of adhering a flexible sheet material to a relatively rigid surface so as to enable the material to be subsequently readily stripped therefrom, comprising treating part of the rear surface of the material to reduce its compatability with the adhesive as compared to the untreated surface, prior to application of the sheet material to the relatively rigid surface.

The present invention is applicable to any type of adhesive for example, a cellulose type or other water-based adhesive provided it is chosen having regard to the particular treatment which the surface to be adhered has been subjected to. Adhesives which have been found to be of particular use, especially in connection with the adhering of wall coverings to a wall are Polycel and Lapcel.

Among particular uses of the present invention are the provision of readily strippable wall coverings, e.g., wallpaper, readily strippable package and bottle labels and readily strippable advertising material such as posters, bills, placards, show cards, price tickets., etc.

The invention envisages that the rear surface of the material from which such products are manufactured could be treated prior to manufacturing these products.

The effect of the treatment of the present invention is to render the adhesive bond between the treated surface and the surface to which it is adhered weaker than the bond holding the flexible surface together. As applied to the case of, e.g., wallpaper, this means that when the treated wallpaper is applied to a wall, the adhesive bond between the wallpaper and the wall is weaker than the bond between the fibers of the wallpaper. A piece of wallpaper thus may be readily removed from the wall.

The invention is particularly applicable to wall coverings bearing or intended to bear decorative, advertising or instructional matter.

Many methods may be used to apply the aqueous dispersion to the fibrous backing surface to be treated, e.g., roller coating, spraying, contact coating or preferably air-knife coating.

When the fibrous surface to be treated is comparatively rough, while the aqueous dispersion is applied to the whole surface to be treated only part of the surface is in fact treated.

The present invention will now be further described with reference to the following examples. Application weights and application concentrations given in the following examples are weights or concentrations of the substance, which reduces the susceptibility of the sur-

face to adhere, retained on the surface being treated.

EXAMPLE 1

A polyvinylidene chloride copolymer sold by Scott Bader under the trade name Poldene 911 and having a high vinylidene chloride content and the following characteristics:

Solid Content	55% ± 1
Viscosity at 20°C (Ferranti Shear rate 24.94 secs ⁻¹)	20 - 30 cP
pH	4.0 - 4.5
Particle Size	approx. 0.25μ
Specific gravity 25°/25° C.	1.27

was thickened slightly by the addition of a 10 percent solution of polyvinyl alcohol and applied to the back of an 18 oz. wallpaper by (a) gravure and, (b) plain roller systems to produce when dry a discontinuous coating. Weights of substance applied ranged from 5 gm/sq meter to 25 gm/sq meter. Application weights of 7 gm/sq meter and below did not have the desired effect, and the areas were 100 percent stuck. Application weights of 12 gm/sq meter and above, again did not have the desired effect, and the areas did not stick. Application weights between 8 gm/sq meter and 12 gm/sq meter, however, resulted in a paper which was at least 50 percent coated and which when used with a cellulose type wallpaper adhesive, adhered to a wall sufficiently for normal purposes but was easily removable when necessary. The optimum application weight by these methods was found to be 10 gm/sq meter. These weights and limits could vary with different substances and types of papers, and are also to some extent dependent on the types of coatings and/or embossings which may be used.

EXAMPLE 2

A solution of a polyvinylidene chloride copolymer resin with a high vinylidene chloride content and marketed by Solvay Cie. under the trade name Ixan W.N. 82A was dissolved in a mixture of equal parts of acetone and toluene, to give a solid content of 20 percent, and was then applied to the back of an 18 oz wallpaper by a gravure system to produce when dry a discontinuous coating. Various weights were applied and it was found that the application weights of between 2 gms/sq meter and 5 gms/sq meter resulted in a paper which when used with a cellulose type wallpaper adhesive, adhered to a wall sufficiently for normal purposes but was easily removable when necessary. The best results were

achieved using an application weight at 3 gms/sq meter. Using the gravure-solvent system of this example the close tolerances which were required could be achieved and slight variations could also be achieved by adjustment of the concentrate on the machine. Such adjustment is not possible in an aqueous system because any alteration of the viscosity-concentration also alters the degree of penetration which should remain fixed to impart the desired properties to the finished 10 sheet.

EXAMPLE 3

A solution of a polyvinylidene chloride copolymer resin with a medium vinylidene chloride content and marketed by Solvay et Cie under the trade name Ixan S.G.A. was dissolved in a mixture of equal parts of acetone and toluene, to give a solids content of 20 percent, and was then applied to the back of an 18 oz. wallpaper by a gravure system to produce when dry a discontinuous coating. Various weights were applied and it was found that application weights of between 2 gms/sq meter and 5 gms/sq meter resulted in a paper which when used with a cellulose type wallpaper adhesive, adhered to a wall sufficiently for normal purposes but was easily removable when necessary. The best results were achieved using an application weight of 3 gm/sq meter. Using the gravure-solvent system of this example the close tolerance which were required could be achieved and slight variations could also be achieved by adjustment of the concentrate on the machine. Such adjustment is not possible in an aqueous system because any alteration of the viscosity-concentration also alters the degree of penetration which should remain fixed to impart the desired properties to the finished sheet.

EXAMPLES 4 to 7

The materials set forth in Table 1 below were each made up as a 20 percent solution in 50/50 mixture or Acetone/Toluene and the resulting lacquers applied to the reverse side of both 18 oz. and 22 oz. wallpapers by the gravure process. Application weights were varied by altering the concentration of the lacquer solutions and it was found that application weights of from 3 to 7 gm/sq meter resulted in a paper which when used with a cellulose type wallpaper adhesive (for example Polycel or Lapcel) adhered to a wall sufficiently for normal purposes but was easily removable when necessary. Application weights of below 3 gms./sq meter resulted in a paper which was not easily strippable and application weights of above 7 gms./sq. meter resulted in the paper not adhering sufficiently to the wall.

TABLE I

Example No.	Material used.	Details of composition
4	Vynlite VYHH	An unplasticised vinyl chloride/vinyl acetate copolymer of medium molecular weight and comprising approximately 87% vinyl chloride and 13% vinyl acetate.
5	Vynlite VAGH	An unplasticised partially hydrolysed vinyl chloride/vinyl acetate copolymer comprising approximately 91% vinyl chloride 6% vinyl alcohol and 3% vinyl acetate.

TABLE I-Continued

Example No.	Material used.	Details of composition
6	Vynlite VMCH	An unplasticised specially modified vinyl chloride/vinyl acetate copolymer of medium molecular weight comprising approximately 86% of vinyl chloride, 13% vinyl acetate and 1% maleic acid.
7	A mixture of DHX 30/50 Industrial Nitrocellulose and 25% of 120/170 Industrial Nitrocellulose	An unplasticized mixture of nitrocellulose resins of high nitrogen content which will blend to give a high viscosity solution

EXAMPLES 8 and 9

The materials set forth in Table II were each applied as an aqueous system to the reverse side of both 18 oz. and 22 oz. wallpapers using (i) an air knife application and (ii) a roller coating application. Various application concentrations based on the weight of dried fibers were tried and a range of 0.2 to 10.0 percent was found to result in wallpapers which when used with a cellulose type adhesive adhered to a wall surface sufficiently for normal purposes but which were easily removable when necessary. 6 percent was found to be the optimum concentration with type PP/2R and 1.5 percent with type MAS but actual figures depend on quality of Mystolene used. All percentages are solid contents.

TABLE II

Example No.	Material used	Details of composition
8	Mystolene PP/2R	A wax-aluminium-protein rosin complex in water.
9	Mystolene MAS	An acid dispersion of metallic salts, oxides and mineral and synthetic waxes in water. Solids content minimum 21%.

In all the foregoing examples it may be desirable to heat the treated sheet material to dry or cure the treating substances, prior to rolling or otherwise storing the sheet material.

For example where a contact coating method is used on a comparatively rough surface the dispersion may be received only on the raised portions of the surface. When an adhesive is subsequently applied during paper-hanging, therefore, it adheres to only those parts of the surface where the dispersion is not present, such as the sunken parts of the rough surface.

The specific dispersion used and the amounts applied depend primarily upon the surface of the fibrous sheet material which is to form the wall covering and to a lesser extent upon the nature of the wall surface to which the wall covering is to be attached and the adhesive to be used by the paper-hanger.

According to a first preferred embodiment of the present invention there is provided a method of manufacturing a dry-strippable wall covering from a fibrous sheet material comprising treating the surface fibers of the fibrous sheet material with a freely flowing aqueous dispersion including

paraffin waxes having melting points falling within the temperature range of 45°- 60°C,

a natural wood rosin, dimerized animal glue as emulsion stabilizer, aluminum formate, the ratio by weight of said paraffin waxes to rosin being 1:2, and

subjecting the so treated backing material to a curing process wherein the treated surface of the fibrous sheet material attains a temperature of from 60° to 80°C, which process insures that the residual moisture content of the fibrous sheet material is from 8 to 10 percent.

According to a second preferred embodiment of the present invention, there is provided a method of manufacturing a dry-strippable wall covering from a fibrous sheet material comprising treating the surface fibers of the fibrous sheet material with a freely flowing aqueous dispersion including

paraffin waxes having melting points falling within the temperature range of 45°- 60°C,

a natural wood rosin, dimerized animal glue as emulsion stabilizer, aluminum formate, the ratio by weight of said paraffin waxes to rosin being 9:1, and

subjecting the so treated backing material to a curing process wherein the treated surface of the fibrous sheet material attains a temperature of from 60° to 80°C, which process insures that the residual moisture content of the fibrous sheet material is from 8 to 10 percent.

With the above and other objects and examples in view, the present invention will be clearly understood in connection with the accompanying drawings, in which:

FIG. 1 illustrates diagrammatically one method, according to the present invention, of treating a flexible sheet material to render it more readily strippable; and

FIG. 2 illustrates diagrammatically a second method according to the present invention.

Referring now to the drawings, and more particularly to FIG. 1, plain paper is unwound from a storage reel 10 and is passed over guide and support rollers 12 to a treating station 14, where it is passed between a nip formed by an engraved roller 16, and a backing roller 18. The roller 16, which has an engraved pattern of micro-dots thereon, rotates with a lower portion thereof in a reservoir 20 of substance, e.g., Ixan S.G.A. to be applied to the paper. The engraved roller 16 picks up the substance in the cavities thereof, excess substance being removed by a doctor blade 22. Additional sub-

stance is stored in a tank 24 and is continuously circulated between the reservoir 20 and the tank 24 through conduits 26 and 28, by means of a pump 30. After being treated, the paper is passed through a drying chamber 32, in which the temperature is preferably above 60°C and is ideally at approximately 80°C. After drying, the treated paper is passed around cooling rollers 34, 36 and is then wound on a take-up reel 38. Drive for the paper may be supplied by rollers 40, 42 which form a nip drive.

Referring now to FIG. 2, plain paper is again drawn from a storage reel 10' and is passed over rollers 12' to a treating station 14'. At the treating station 14' a plain application roller 44 rotates with its lower portion in a reservoir of the treating substance, for example Mystolene PP/2R and PP/W. The roller 44 picks up the treating substance on its surface. The substance is applied to the paper as it comes in contact with the paper surface of the roller 44. The paper is then passed over a backing roller 46, while an air knife doctor 48 removes any excess of the treating substance from the paper, the excess being led back to the reservoir. The paper is then passed over a vacuum belt 50 and through a drying chamber 32.

The remainder of the treatment, including the temperature with the drying chamber 32, is as described in connection with FIG. 1, like reference characters being used to denote like elements shown in FIG. 1.

In the curing or heating process it is desirable that the surface of the treated fibrous sheet attains a temperature of at least 60°C and preferably 80°C. It is essential, however, that the temperature is at least several degrees, preferable more than 10°C, above the melting point of the waxes present in the dispersion. During the curing process all the moisture must not be driven from the material and the finished moisture content must lie within the range 5 percent to 12 percent and preferably within the range 8 percent to 10 percent.

The speed at which the material is passed through the dryer depends upon the dryer temperature. It has been found that the above conditions can be obtained with a sheet flow-through speed of approximately 400 ft/min with an air temperature of 150°C and a web bulb temperature of at least 80°C. The above quoted speed is only approximate however, and must be regulated to maintain the desired finished moisture content. The approximate treatment time is 1 min.

In certain types of dryers it has been found necessary to introduce steam in order to maintain the wet bulb temperature above 80°C.

After curing the treated sheet material is wound onto a take-up reel 26, drive for the material being supplied by drive rollers 28 and 30.

Referring now to FIG. 2 there are shown a plurality of fibers randomly arranged on the surface of a sheet of fibrous material. A plurality of zones are defined between the fibers and within the confines of some of the zones discrete particles of cured MYSTOLENE can be seen.

It will be appreciated from FIG. 2 that the treatment is not a coating but more a surface fiber treatment analogous to paper sizing (e.g., internal rosin sizing).

The treated surface has a controlled water repellency and would typically have a 3 minute COBB value of 15. (BSS 2644 1955, TAPPI standard PT 15 1954). The treated surface allows a subsequently applied aqueous adhesive controlled adhesion to the fibrous surface. In

practice the controlled water repellency of the treated surface means that the surface has controlled wettability with respect to the aqueous adhesive.

The dispersions may generally be applied to the fibrous sheet material from 3 gm/sq. meter to 9 gm/sq. meter. The optimum concentration being an application weight to average 5 gm/sq. meter of cured dispersion using Mystolene type PP/2R although as previously mentioned the quality of the fibrous sheet material affects these figures in some degree.

Any type of aqueous based wall-covering adhesive for example, a cellulose-type adhesive may be used. Adhesives which have been found to be of particular use are, SOLVITE, POLYCELL or LAPCELL (Registered Trade Marks). POLYCELL is a mixture of carboxy methyl cellulose and methyl cellulose; the others are of similar compositions.

The effect of the treatment of the invention is to render the cohesive strength of the bond between the treated surface and the adhesive weaker than the cohesive strength of the fibrous sheet material. A strip of wall-covering thus may be readily dry-stripped from the wall, either as a complete strip or in several large sections.

It has been found that the pre-surface size pressed paper can advantageously be used with the method of the invention. The pre-surface sizing can conveniently be applied on a size press of a paper making machine. Advantageously the fibrous web produced on the paper-making is sized at an approximate moisture content of 15 percent, typically with a starch size.

By pre-surface sizing the fibrous material less of the relatively expensive dispersion may be used since the size pressing holds the dispersion on the surface of and discourages penetration thereof into the fibrous material. Alternatively the same weight of the material applied would give an increased strippability relative to an unsized fibrous sheet. Since it is only the surface dispersion which is effective, the pre-surface sizing reduces or prevents any of the expensive dispersion penetrating beyond the surface of the fibrous material.

The freely flowing aqueous dispersion used includes paraffin waxes having melting points falling within the temperature range of 45° - 60°C, a natural wood rosin, an acid protein colloid stabilizer as emulsion stabilizer and aluminum salt of a low molecular weight aliphatic carboxylic acid, the ratio by weight of said paraffin waxes to rosin being from 10:1 to 1:4.

The invention will now be further described with reference to the following specific examples. Application weights and application concentrations given in the following examples are weights or concentrations of the complex, which reduces the susceptibility of the surface to adhere, retained on the surface being treated.

EXAMPLE 10

The material set out in Table III was applied, as a freely flowing aqueous dispersion, to the reverse side of a 20 inch wide strip of fibrous sheet material by air knife coating. The treated sheet was then passed into a multi-chamber tunnel dryer having an air temperature of about 150°C and a wet bulb temperature of 80°C. The surface of the sheet material attained a temperature of 60°C. Curing was effected for approximately 1 minute and the final moisture content of the sheet material was 8 percent.

After curing, the treated surface was coated with SOLVITE (Registered Trade Mark) a commercially available water-based, cellulose-type adhesive, and the fibrous sheet material applied to a wall. After the adhesive had been allowed to dry, the material was dry-stripped in a single piece from the wall by a force of 800 gm applied evenly across the 20 inch wide strip.

TABLE III

Example No.	Material used	Details of composition
10	MYSTOLENE PP/2R	An aqueous dispersion including paraffin waxes having melting points falling within the temperature range of 45–60°C a natural wood rosin, dimerized animal glue as emulsion stabilizer and aluminium formate. The ratio by weight of the paraffin waxes to rosin is 1:2

EXAMPLE 11

The material set out in Table IV was applied as a freely flowing aqueous dispersion to the reverse side of a 20 inch wide strip of wall covering having a fibrous backing surface. The treated sheet was then cured under the conditions specified in Example 10.

TABLE IV

Example No.	Material used	Details of composition
11	MYSTOLENE PP/W	An aqueous dispersion including paraffin waxes having melting points falling within the temperature range of 45–60°C, a natural wood rosin, dimerized animal glue as emulsion stabilizer and aluminium acetate. The ratio by weight of the paraffin waxes to rosin was 9:1.

After curing, the treated surface was coated with SOLVITE (Registered Trade Mark) a commercially available water-based, cellulose-type adhesive, and the wall covering applied to a wall. After the adhesive had been allowed to dry, the wall covering was dry-stripped, in a single piece, from the wall by a force of 1,000 gm applied evenly across the 20 inch wide wall covering. It will be appreciated that by varying the strength of the dispersion or by varying the strength of the adhesive, the force required to dry-strip the material from the wall may be controlled. It has been found desirable to make the force required greater than 500gm/20 inch width of paper and preferably not more than 1,000 gm/20 inch width. Below 500 gm the bond holding the wall covering to the wall is too weak for practical purposes and above 1,000 gm the bond is of such a strength that weak papers may not be removed from the wall in a single piece. Clearly if a stronger wall covering is used, such as a vinyl coated covering, the bond between the wall covering and wall may be increased.

It will be readily apparent to those skilled in the art that various modifications or alterations may be effected to the invention set forth herein without departing from the spirit and scope of the invention as set forth in the appended claims.

While I have disclosed several embodiments of the present invention, it is to be understood that these embodiments are given by example only and not in a limiting sense.

I claim:

1. A readily strippable wall covering comprising a wall covering sheet including a fibrous backing surface, coated with the dried residue of an aqueous dispersion comprising

a wax-aluminum-protein-rosin complex in water disposed on said fibrous backing surface in the form of a plurality of discontinuous portions incompletely covering said fibrous backing surface being adapted to receive a water-based adhesive such that the adhesive can be directly applied against said fibrous backing surface between said discontinuous portions, said wax being a paraffin wax having a melting point in the range between 45°C. and 60°C., the aluminum component being an aluminum salt of a low molecular weight aliphatic carboxylic acid, the protein being an acid protein colloid and said rosin being a natural wood rosin, the ratio by weight of said paraffin wax to said rosin being from 10:1 to 1:4,

the amount of said material applied to said fibrous backing surface being within the range 2 gm/sq. meter to 12 gm/sq. meter to partially reduce a direct bonding between said adhesive and said fibrous backing surface, and the residual moisture content of the fibrous sheet material being from 5 to 12 percent.

2. A readily strippable wall covering according to claim 1

wherein the amount of said complex applied to said range 3 to 7 gm/sq meter to partially reduce a direct bonding between said adhesive and fibrous backing surface.

3. The wall covering of claim 1 wherein said wax-aluminum-protein-rosin complex comprises paraffin waxes having melting points falling within the temperature range of 45° to 60°C,

a natural wood rosin,
an acid protein colloid as emulsion stabilizer,
an aluminum salt of range molecular weight aliphatic carboxylic acid,

the ratio by weight of said paraffin waxes to resin being from 10:1 to 1:4,

said wall covering having a residual moisture content of the fibrous sheet material from 5 to 12 percent.

4. The wall covering of claim 3 having a residual moisture content of the fibrous sheet material from 8 to 10 percent.

5. The wall covering of claim 3, wherein the amount of said complex on said fibrous backing averages 5 gm/sq meter.

6. The wall covering of claim 3, wherein said acid protein colloid is dimerized animal glue.

7. The wall covering of claim 3, wherein said paraffin waxes used have an oil content of less than 2 percent by weight.

8. The wall covering of claim 3, wherein said fibrous backing surface contains a

sizing means for the latter disposed between the latter and said wax-aluminum-protein-rosin complex.

9. The wall covering of claim 1 wherein said wax-aluminum-protein-rosin-complex comprises

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paraffin waxes having melting points falling within the temperature range of 45° to 60°C
a natural wood rosin,
dimerized animal glue as emulsion stabilizer, alumi-
num formate,
the ratio by weight of said paraffin waxes to resin
being 1:2,
said wall covering having a residual moisture content
of the fibrous sheet material from 8 to 10 percent.

10. The wall covering of claim 9, wherein the amount
of said complex on said wall covering averaging 5
gm/sq meter.

11. The wall covering of claim 9,
wherein the backing surface of said fibrous sheet ma-
terial contains a sizing material.

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12. The wall covering of claim 1 wherein said wax-
aluminum-protein-rosin-complex comprises
paraffin waxes having melting points falling within
the temperature range of 45° to 60°C,
a natural wood rosin,
a dimerized animal glue as emulsion stabilizer, alumi-
num formate,
the ratio by weight of said paraffin waxes to resin
being 9:1,
said wall covering having a residual moisture content
of the fibrous sheet material from 8 to 10 percent.

13. The wall covering of claim 12, wherein the
amount of said complex on said wall covering averages
5 gm/sq meter.

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