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SEPARABLE BOND ASSEMBLY

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Fig. 1.

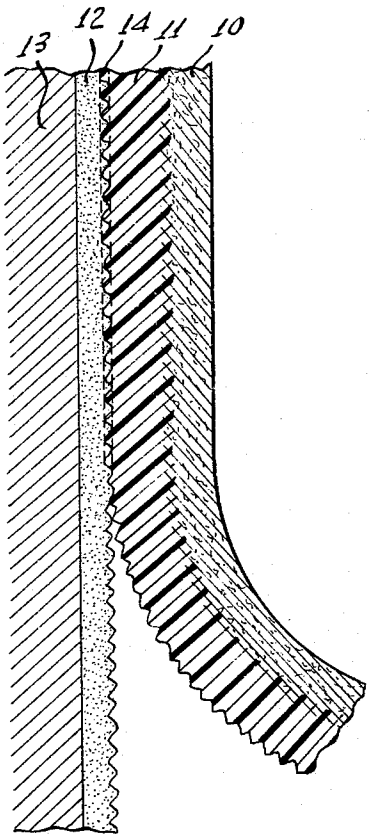
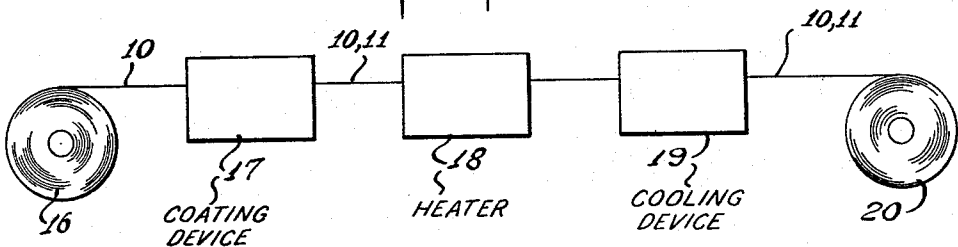


Fig. 2.



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1

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3 Claims. (Cl. 117-76)

The present invention relates generally to improvements in bonding systems, and it relates more particularly to an improved separable bonding assembly.

It is very often desirable to effect an adhesion between a pair of bodies which may be broken without damage to the bodies and thus permit their separation. Examples of where this type of adhesion may be advantageously employed is in the application of wallpaper, posters, labels, and the like, to a base substrate such as a wall, billboard, or bottle, respectively. When webs of the above nature are applied to the base substrate, a settable adhesive is usually employed, commonly of water based or water sensitive variety such as the starch pastes and glues. The removal of the web from the base substrate, such as in cases where it is desired to repaper a wall or apply a new poster to a billboard is a tedious, time and labor consuming, and hence expensive, procedure frequently resulting in damage to the stripped web or to the base surface or to both. Moreover, the stripped web is generally of no further use, and parts of the web remain adhered to the base surface to impair the appearance of the base as well as subsequently applied webs. The use of a pressure sensitive adhesive has been suggested and resorted to but this expedient possesses numerous drawbacks and disadvantages. The stripping properties of the bond is dependent upon the tackiness and elongation of the adhesive which are sensitive to many difficult to control variables. Furthermore, the pressure sensitive adhesives are relatively expensive and frequently difficult to apply. It is apparent from the above that the conventional procedure of adhering webs to base surfaces possesses numerous drawbacks and disadvantages and the strippable bonds heretofore proposed leave much to be desired.

It is therefore a principal object of the present invention to provide an improved separable bond assembly and an improved method of producing the same.

Another object of the present invention is to provide an improved separable bond assembly of high stability and an improved method of producing the same.

Still another object of the present invention is to provide an improved separable bond assembly employing an aqueous adhesive wherein the force required to rupture the bond may be varied within wide limits.

A further object of the present invention is to provide an improved strippable web and an improved method of producing the same.

Still a further object of the present invention is to provide an improved aqueous adhesive based strippable paper web in the form of a wallpaper, billboard, poster, label floor covering, adhesive tape, and the like, and an improved method of producing the same.

Another object of the present invention is to provide an improved article of the above nature characterized by its versatility, low cost, and ease of application.

The above and further objects of the present invention will become apparent from a reading of the following description taken in conjunction with the accompanying drawing wherein:

FIGURE 1 is an enlarged sectional view of a strippable paper web according to the present invention, illustrated as applied to a base surface and being partially stripped therefrom; and

2

FIGURE 2 is a block diagram illustrating the improved method of producing the subject web.

In a sense, the present invention contemplates the provision of a separable bond assembly comprising a layer of a hydrophobic material having a substantially non-volatile water penetrant agent dispersed therethrough, and an aqueous adhesive superimposed upon and penetrating said layer. It has been found that the zone in the region of the interface of the water penetrant carrying hydrophobic layer and the adhesive is a zone of weakness defining the separating or stripping zone and that the rupturing strength of this zone may be varied within wide limits. The bond strength of the stripping zone is advantageously less than the cohesive strength of the adhesive and of the penetrant carrying hydrophobic layer and less than the bond between the adhesive and the penetrant carrying layer and their respective opposite substrates.

When the term water penetrant is employed, what is meant is a hydrophilic emulsifier, wetting agent or mixture thereof, and the term aqueous adhesive designates the water based adhesives and the water sensitive or actuated adhesives. Among the aqueous adhesives which may be advantageously employed are the glues such as animal and fish glues as well as other protein type glues, the starch based pastes, synthetic and natural resin and resin based aqueous emulsions, and the like. Examples of water penetrants which may be employed to advantage are polyvinyl alcohol, Span (sorbitol fatty acid esters, for example, sorbitol esters of monolaurate, monopalmitate mono and poly oleates and stearates), Tween (polyoxyethylene derivatives of the sorbitol fatty acid esters, such as listed above), Cellulosize (hydroxyethylcellulose), non-ionic detergents, sodium sulfosuccinate, and others. The layer hydrophobic material is advantageously a synthetic organic thermoplastic resin and in a fused continuous state. Examples of preferred thermoplastic resins are the polyacrylics and modified polyacrylics, polyvinyl acetate homopolymers and copolymers, polyvinyl acetate-acrylic terpolymers, the polyolefins such as polyethylene and polypropylene, and the halogenated polyolefins, polyvinyl chloride and copolymers therewith. In addition to the hydrophobic resin and the water penetrant, the penetrant carrying hydrophobic layer may include waxes, fatty acids, pH modifiers, glossing agents, bactericides, fungicides, dyes and pigments, etc.

The thickness of the hydrophobic layer should be sufficient to effect the bonding thereof to a supporting substrate and impede the flow of the aqueous adhesive completely therethrough when applied to the hydrophobic layer. The concentration of the water penetrant in the hydrophobic layer is such as to produce a strippable bond of the desired rupture strength. The optimum concentration of the water penetrant in the hydrophobic layer to achieve the desired bond rupture strength depends upon the composition of the water penetrant and the hydrophobic material, and may be readily determined by one skilled in the art as may the optimum thickness of the hydrophobic layer. A hydrophobic layer thickness of between .00025 inch and .010 inch and up is highly satisfactory.

An improved strippable web, in accordance with the present invention is illustrated in FIGURE 1 of the drawing and includes a web 10 formed of a fibrous or non-fibrous material having suitably affixed to a face thereof a layer 11 of a non-volatile water penetrant carrying hydrophobic material of the nature described. The face of the layer 11 remote from the web 10 is provided with a coating 12 of an aqueous adhesive which, in turn, adheres to a base 13 onto which the web 10 is strippably

3

mounted. In the region of the interface of the hydrophobic layer 11 and the adhesive coating 12 is a zone of weakness or strippable zone 14. The zone of weakness 14 does not penetrate the full depth of the layer 11 and its rupture strength is less than the cohesive strength of the adhesive coating 12 and the layer 11 as well as the adhesion between the base 13 and adhesive 12 and between the layer 11 and the web 10. The strength of the strippable bond 14 may be varied in the manner earlier set forth.

The web 10 may be a paper, for example any type of Kraft paper, printing paper, tissue paper, wallpaper, wall covering, paperboard, fiberboard and the like. Furthermore, the web 10 may be in the form of a wallpaper, band, a tape, a label, a poster, a floor tile, or of any other configuration, in accordance with the desired function or use. The adhesive coating 12 may be carried in a dry state by the hydrophobic layer 11 and may be wetted to actuate the adhesive immediately prior to its application to the base 13 or the wet adhesive may be applied to the base 13 before the adhesive dries. To separate the web 10 from the base 13 it is merely pulled from the base 13 with sufficient force to rupture the weakness zone 14 and as a consequence no damage results to either the web 10 or the base 13, either of which may be reused without any further preparation.

According to the improved method of producing a hydrophobic layer carrying web for achieving the subject strippable bond, an aqueous emulsion of a synthetic organic thermoplastic resin and a water penetrant is applied to a face of the web, dried and heated to effect the fusion of the thermoplastic material and then cooled. A layer of an aqueous adhesive such as a glue may then be applied to the exposed face of the fused layer and dried to finish the strippable web which may be used by merely wetting the adhesive layer and applying it to a base surface. In the alternative, the aqueous adhesive may be applied in a wet state to the fused layer and the web applied to the base support before the adhesive dries substantially.

The following example is given merely by way of illustration and is not intended to limit the scope of the present invention.

A uniform mixture of the following ingredients is made, all parts being given by weight:

	Parts
Polymekon TT (a petroleum wax marketed by Western Petrochemical)	76
Cardis 320 (a petroleum wax marketed by Western Petrochemical)	12
Paraffin wax	72
Oleic acid	9.6
Morphaline	8
Resin 15546 (a thermoplastic polyester gloss imparting resin marketed by Durez)	9
Water	223
Sodium hydroxide	1

To the above mixture was added 1000 parts of Catalin A1322, an acrylic copolymer aqueous emulsion containing 50% resin solids and 2% by weight of the copolymer resin of Cellulosize (hydroxyethyl cellulose) as an emulsifier (marketed by Carbide and Carbon Chemicals Co.), and then there was slowly added to the above 500 parts of polyvinyl acetate homopolymer aqueous emulsion emulsified with 2% by weight of the homopolymer of Cellulosize and containing 50% by weight of the resin solids. To the resulting mixture there was then added 2.5 parts of sodium sulfosuccinate to complete the coating composition for forming the penetrant carrying hydrophobic layer.

In FIGURE 2 of the drawing there is illustrated by block diagram, a method for applying the hydrophobic layer to a web 10 formed, for example, of paper or other fibrous materials, in which the web 10 is withdrawn from

4

a roll 16 and transported through a coating device 17 wherein a layer of the desired thickness of the above described aqueous emulsion coating solution is applied, advantageously of a thickness of not less than 0.5 mil (.0005 inch). The coating device may be of any conventional type such as a knife coater, transfer roll coater, air knife coater, reverse roll coater or other suitable mechanism. The coated web 10, 11 is then passed through a dryer and heater 18 such as a steam, gas or hot air oven or drying can, or infra-red heater, to evaporate the water from the emulsion and raise the temperature of the resin to the fusion temperature thereof whereby to form a fused layer of the hydrophobic resins having the emulsifiers and wetting agents dispersed therethrough. With the subject coating material, a temperature of 150° F. is adequate to effect the fusion of the thermoplastic resin although higher temperatures may be used to evaporate the water. The fibers of the web 10 adjacent to the fused resin coating are firmly embedded in the fused coating so as to effect a strong bond between the coating layer and the web. Following the heater 18 the coated web is cooled in a suitable fashion to room temperature by any conventional cooling device 19 so that it may be packaged into a roll 20 without blocking. The coated web 10 may be employed as such in the manner earlier set forth by using a wet adhesive, or a water sensitive adhesive may be applied to the coated face of the web 10, 11, dried and thereafter employed by rewetting the adhesive. The water sensitive adhesive may be applied to the web 10, 11 immediately following the cooler 19 or the roll 20 may be fed to conventional adhesive coating equipment. While the finished web may be employed as such, it may, of course, be cut into any desired shape.

While there have been described and illustrated preferred embodiments of the present invention, it is apparent that numerous alterations, omissions and additions may be made without departing from the spirit thereof.

What is claimed is:

1. A strippable laminate assembly comprising a fibrous web, a first substantially continuous layer of a hydrophobic synthetic organic thermoplastic resinous material having a substantially non-volatile wetting agent dispersed therein superimposed upon a surface of said web, the fibers of said web along said web surface being imbedded in said first layer, and a second layer of an aqueous adhesive superimposed upon and penetrating the opposite face of said first layer for only a part of the depth of said first layer.

2. A strippable laminate assembly according to claim 1 wherein the adhesive bond strength between said first and second layers is less than the cohesive strength of said first and second layers respectively and less than the bond strength between said first layer and said web whereby upon adhesive application of the face of said second layer remote from said first layer to a base surface, the bond strength between said second layer and said base surface is greater than the bond strength between said first and second layers.

3. A strippable laminate assembly according to claim 1 wherein said web is paper.

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