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COHESIVE WRAPPING PAPER AND METHOD FOR PRODUCING SAME

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Fig. 1.

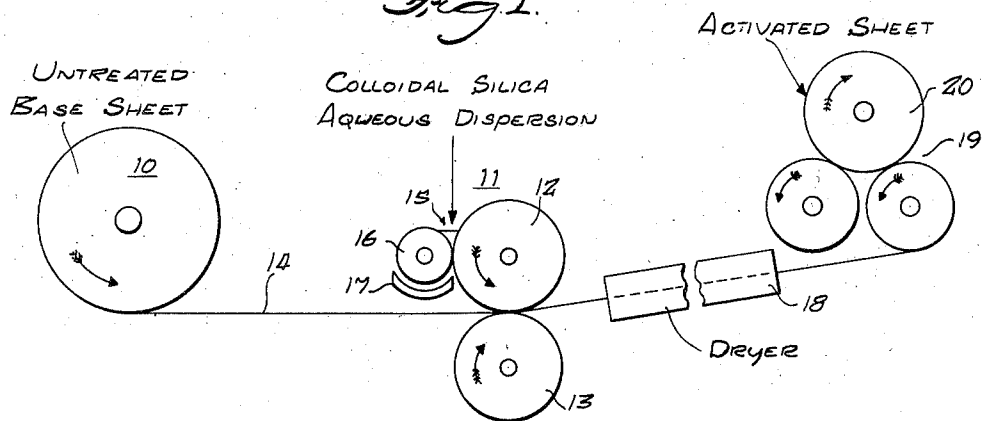
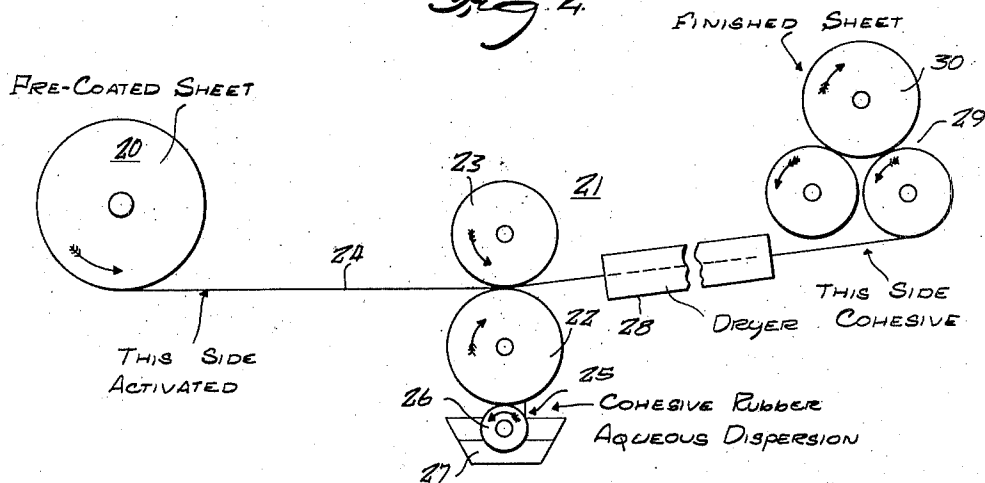


Fig. 2.



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COHESIVE WRAPPING PAPER AND METHOD FOR PRODUCING SAME

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4 Claims. (Cl. 117—80)

Our invention has been found to be of particular value in connection with the manufacture of cohesive sheet material and especially that type of cohesive sheet which has a one-sided coating of cohesive substance so that it may be interleaved or wound up into rolls without the necessity of including a sheet of parting material between the contiguous plies or turns.

The term "cohesive" is used by us to describe a substance which when dry will adhere to itself, particularly when subjected to some pressure, but will not stick to most other materials even when subjected to considerable pressure. This characteristic is of extreme value in the case of sheet materials used for wrapping packages. It is of value not only in the initial wrapping of the package, for example in the factory, but it has great advantages for use in the home because the seal may be pulled apart without tearing the sheet or damaging the coating, which permits a portion of the contents of the package to be removed and the package resealed in the same manner as was done in the initial wrapping of the package.

Although the invention may have value in connection with some porous or semi-porous base-sheet materials, it is especially well adapted for use in the application of cohesive coatings to base-sheets of non-porous character such as glassine, cellophane, cellulose acetate, polyethylene, polyesters such as nylon and Mylar,¹ and other sheets having similar physical properties.

In general, the property of cohesion (ability to stick to itself) as distinguished from adhesion (ability to stick to many other materials) is possessed by rubber or rubber-like substances, for example the dry rubber film deposited from natural rubber latices. Generally, coatings of these substances are applied to the base-sheet in the form of an aqueous dispersion, and such application to the surface of the sheet does not involve any extraordinary problems when the base-sheet is somewhat porous, in which case the rubber coating may be able to anchor itself effectively to the base-sheet. However, when the base-sheet is virtually non-porous as in the case of glassine or cellophane, it is found that the cohesive rubber coating when applied is not adequately anchored to the surface of the sheet and separates from the sheet much too easily in subsequent use or handling.

Attempts have been made to blend or mix the cohesive substance with another ingredient or ingredients which might enable the cohesive coating to bond itself adequately to the non-porous sheet while not interfering too greatly with its normally cohesive properties. But this effort to compromise between the conflicting requirements of the coating in respect of the base-sheet and to itself, so far as we are advised, has not been commercially successful.

The invention herein described does not involve any compromise between two conflicting requirements as above described.

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We have discovered a way of pretreating or activating the surface of a base-sheet, especially a non-porous base-sheet, in such a way as to impart to the base-sheet properties or characteristics which enable the coating to stick to the surface of the base-sheet without in any way impairing the cohesive properties of the coating, in the sense that the selectivity of the cohesive coating in respect of its ability to adhere to other materials is not materially impaired.

Although materials of similar character may possibly be used for this pre-coating of the non-porous base-sheet, we have had exceptionally good results in pre-coating the sheet with colloidal silica. For example, in pre-coating a material such as glassine weighing between 5 and 15 pounds per thousand square feet, we can coat the surface with an aqueous dispersion of colloidal silica having a consistency of 3.5% to 40% of solids and in sufficient volume to increase the dry weight of the sheet by an amount of silica weighing from .04 to .60 pound per thousand square feet.

Wetting agents may be added as desired to the colloidal silica dispersion to improve coverage and wetting of the base sheet. Suitable wetting agents are Aquarex SMO (a water solution of mono sodium salt of sulphated methyl oleate), Triton NE (alkyl aryl polyether alcohol) and Santomerse S (an alkyl aryl sulphonate salt). These are added in small amounts, for example .01 part (dry weight) of a solution of wetting agent per 100 parts (dry weight) of colloidal silica.

Roll application of controlled amounts of colloidal silica dispersion is aided by adjusting the viscosity of the dispersion. This may be done, for example, by the addition of thickening agents such as Superloid (sodium alginate) as required, a typical amount being 1.25 parts (dry weight) per 100 parts (dry weight) of colloidal silica dispersion.

After the silica dispersion is applied the sheet is dried either by exposing it to air at normal atmospheric temperatures or by forced drying. To the activated pre-coated surface of the base-sheet there is then applied a coating of a dispersion of natural rubber or latex or the equivalent thereof in such volume and concentration as to increase the dry weight of the sheet to the extent of about .20 pound to 1.3 pounds of dry cohesive substance per thousand square feet. The sheet is then redried, and finally wound up into a roll or piled in sheets. It can then be taken off the roll or pile at any time without danger of the back of one sheet sticking to the cohesive face of the contiguous sheet, and the cohesive properties are maintained to the fullest extent. Packages can be wrapped in the material and sealed by bringing the face areas together so as to effect a seal between them in the customary manner, and then when the seal is pulled apart, the rubber coating remains on each of the sheets and substantially none of it pulls off on the other sheet. This shows that the strength of adherence of the rubber coating to the pre-coated surface of the base-sheet is superior to the power of the cohesive coatings to adhere to each other. This relationship has been very difficult to achieve with previously known methods, especially when using nonporous base materials. The sheet can be stored in the roll or pile without loss of its desirable properties.

In the drawings accompanying this application, we have shown diagrammatically an apparatus which may be employed in practicing our improved method and in manufacturing our improved sheet.

In these drawings:

Figs. 1 and 2 are schematic diagrams illustrating successive steps of the improved process, and the equipment employed therein.

In the drawings, referring to Fig. 1, 10 represents a roll of untreated base-sheet, for example glassine, the

¹ Du Pont trademark.

numeral 11 represents as a whole the coating equipment which comprises an applicator roll 12 and a lower roll 13, forming a nip through which the base-sheet 14 is propelled. An aqueous dispersion of colloidal silica is fed to a metering nip 15 between the applicator roll 12 and the metering roll 16. After leaving the metering nip, the coating which passes through said nip is divided a part being applied to the applicator roll 12 and a part being returned to the pool in the trough 17.

The concentration of the colloidal silica dispersion which is supplied to the coating equipment 17, and the pressure applied between the metering roll 16 and the applicator roll 12, are so adjusted as to supply the desired amount of colloidal silica to the surface of the sheet 14. After the sheet has passed through the applicator nip between rolls 12 and 13, it is conducted through a dryer 18 and then by means of the rewinder 19 it is wound into a roll 20. It will be observed that the pre-coated or activated surface of the sheet is on the outside of the roll 20.

The activated surface of the sheet of the roll 20 is then coated with cohesive rubber by the coater 21 shown in Fig. 2. In this case, in view of the fact that the activated or pre-coated surface of the sheet is on the underside as it travels to the coating rolls, the applicator roll 22 is located below the complementary roll 23 which, with the applicator roll 22, forms the nip through which the activated sheet 24 is propelled. The aqueous rubber dispersion 25 is metered by a metering roll 26 which contacts the lower face of the applicator roll 22.

The cohesive rubber aqueous dispersion which is fed into the pool 27 is of such concentration and the metering pressure between rolls 26 and 22 is such that sufficient rubber is applied to the sheet to increase the dry weight of the sheet to the extent of about .20 to 1.3 pounds per 1000 square feet of sheet.

After the sheet has received its rubber coating, it is then conducted through a dryer 28 to remove excess moisture, and is then rolled up in a rewinding device 29 to form a completed roll 30 of finished material ready for immediate use. If the finished material is to be stored for future use, it is advisable to include a suitable anti-oxidant in the cohesive dispersion. In the case of a natural rubber dispersion, we can use any of the conventional anti-oxidants.

The term "cohesive rubber" as used herein means any natural rubber, rubber latex, or any of the synthetic latices or resins having the cohesive property of natural rubber.

The following are three specific examples showing the use of the invention. Example I refers to the use of glassine and also is typical of a formula which may be used on cellophane.

EXAMPLE I

Cohesive coated glassine

	Parts by Weight	Pounds/1,000 Square Feet
Glassine (Hydrated Cellulose).....		8.22
Precoat Formulation (Dry Weight), 31% solids:		
Colloidal Silica.....	100	
Sodium Alginate.....	1.25	
Alkyl Aryl Polyether Alcohol.....	0.01	
Precoat Weight.....		.24
Natural Rubber Top Coat (Dry Weight), 50% solids:		
Natural Rubber.....	100	
Antioxidant.....	1.0	
Alkyl Aryl Polyether Alcohol.....	0.75	
Ammonia (NH ₃).....	0.25	
Coating Weight.....		.47
Total Weight Base and Precoat and Top Coat.....		8.93

EXAMPLE II

Cohesive coated polyethylene

	Parts by Weight	Pounds/1,000 Square Feet
Polyethylene.....		7.10
Precoat Formulation (Dry Weight), 31% solids:		
Colloidal Silica.....	100	
Sodium Alginate.....	1.25	
Alkyl Aryl Polyether Alcohol.....	0.01	
Xylol Emulsion.....	5.0	
Precoat Weight.....		.19
Natural Rubber Top Coat (Dry Weight), 50% solids:		
Natural Rubber.....	100	
Antioxidant.....	1.0	
Alkyl Aryl Polyether Alcohol.....	0.75	
Ammonia (NH ₃).....	0.25	
Coating Weight.....		.54
Total Weight Base and Precoat and Top Coat.....		7.83

EXAMPLE III

Cohesive coated polyester

	Parts by Weight	Pounds/1,000 Square Feet
Polyethylene Terephthalate.....		7.15
Precoat Formulation (Dry Weight), 31% solids:		
Colloidal Silica.....	100	
Sodium Alginate.....	1.25	
Alkyl Aryl Polyether Alcohol.....	0.01	
Water Sol. of Mono-Sodium Salt of Sulfated Methyl Oleate.....	3.50	
Precoat Weight.....		0.17
Natural Rubber Top Coat (Dry Weight), 50% solids:		
Natural Rubber.....	100	
Antioxidant.....	1.0	
Alkyl Aryl Sulphonate Salt.....	0.05	
Ammonia (NH ₃).....	0.25	
Coating Weight.....		0.50
Total Weight Base and Precoat and Top Coat.....		7.82

When using organic films as the base material, anchorage of the colloidal silica to the film may be improved by adding an emulsion of a suitable solvent to the dispersion of colloidal silica. Typical solvents which might be used are xylol, toluene, or mineral spirits.

We claim:

1. A foundation sheet of impervious substance to the bare surface of which a coating of cohesive rubber cannot be adequately anchored, a coating of colloidal silica on the surface of one side only of said sheet, and an outer coating of cohesive rubber weighing from .20 to 1.3 pounds per 1000 square feet overlying said first coating, the first coating serving to bond said cohesive coating to the sheet the surface of the other side of the sheet being free from silica and free from cohesive rubber, whereby the finished sheet may be stored in a roll or pile without interleaving with parting material.

2. Cohesive wrapping paper comprising a base of glassine weighing 5 to 15 pounds per 1000 square feet, having on one side an anchorage pre-coating of .04 to .60 pound of colloidal silica per 1000 square feet and a natural rubber cohesive coating of from .20 to 1.3 pounds per 1000 square feet on and anchored to said pre-coating.

3. Method of applying a cohesive rubber coating to one side of a foundation sheet of impervious material to make the sheet suitable for wrapping purposes, which comprises coating the surface of one side only of the material with an aqueous dispersion of colloidal silica, drying said coating, then coating said silica-treated surface with an aqueous emulsion of cohesive rubber, and finally drying said cohesive coating, thereby to produce a sheet one side of which is cohesive to itself but not to the other side and which may be stored in a roll or pile without interleaving with parting material.

4. Method of applying a cohesive rubber coating to one side of a foundation sheet of non-adhesive and non-

cohesive impervious material so as to make the sheet suitable for certain wrapping purposes, which comprises coating the surface of one side only of the material with an aqueous dispersion of colloidal silica and drying said coating, then applying to said silica-treated surface a film 5 of an aqueous emulsion of cohesive rubber, said film containing between .20 to 1.3 pounds of rubber per 1000 square feet of area, and then finally drying said coating thereby to produce a sheet one side of which is cohesive to

itself but not to the other side, and which may be stored in a roll or pile without interleaving with parting material.

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