Patented Jan. 14, 1947

2,414,313

UNITED STATES PATENT OFFICE

2,414,313

PROCESS OF COATING WEB SURFACES

Thomas Gostage Leek, New York, N. Y., assignor to Edgar Brothers Company, Metuchen, N. J., a corporation of New Jersey

No Drawing. Original application August 24, 1944, Serial No. 551,059. Divided and this application October 8, 1945, Serial No. 621,162

11 Claims. (Cl. 117—155)

1

This invention relates to a process of coating web surfaces. It relates particularly to the coating of web surfaces with a clay-resin composition. This application is a division of my copending application Serial No. 551,059.

My invention has great utility in the paper making art, so for purposes of explanation and illustration it will be described in connection with its application to that art and particularly the application to paper of a coating material. The invention is not so limited, however, also having utility in other arts, as, for example, the art of coating fabric webs, or fibres before the webs are formed. The word "web" as used hereafter in the specification and in the claims comprehends webs of paper fabric or other material and also fibres as above referred to.

I have found that by spray-drying an admixture of resin dispersion and clay slip a powder is formed which when dispersed with an adhesive, such as starch, produces a paper coating material which imparts superior properties to paper coated with it. When such an admixture is spray-dried there results a clay-resin composition comprising particles composed of a portion of clay and a portion of resin physically joined together. The product is in powder form. The resin tends to coat the clay and the spray-drying normally results in a powder comprising particles of clay individually coated with resin.

As explained in my said copending applicatoin, the spray-dried product has a number of important advantages. Among these is the advantage that when such product is made into an aqueous dispersion with starch or other adhesive and applied to paper it forms a superior coating with a lesser amount of expensive raw material. Papers coated with such a coating material respond very favorably to the standard wax test and uniformly give higher values than if the same ingredients are mixed in aqueous dispersion in the ordinary way.

I have found that when the spray-dried material is to be used for coating paper or other web excellent results are obtained by spray-drying an admixture of a water dispersion of urea-formaldehyde resin and a clay slip, forming a water dispersion of the spray-dried material with starch and applying the same to the web. Desirably between about fifteen and about twenty-five parts of clay by weight to one part of resin are employed. The preferred proportion is twenty parts of clay to one part of resin. The starch should have a weight at least about 10% of the weight of the spray-dried clay-resin composition em-

2

ployed, preferably about 15%. The starch is preferably cooked in the usual way.

After the coating material consisting of a water dispersion of the spray-dried clay-resin composition and starch is applied to the web the coated web is calendered. The coated web is preferably heat treated to polymerize the resin. I find it advantageous to calender the coated web cold and thereafter heat treat the calendered web. For best results, I find, the coated and cold-calendered web should be subjected to a temperature of in the neighborhood of 100° C. or somewhat higher for a period ranging between about fifteen and about twenty-five minutes. Preferably the heat-treating temperature is about 105° C. and the time of heat-treating about twenty minutes.

Preferably, I adjust the acidity of the dispersion of spray-dried clay-resin composition, as by the addition of an accelerator, such as ammonium chloride, to the pH value approximating the optimum pH value for polymerization of the resin. For example, I adjust the acidity of a disperson of a spray-dried composition of clay and urea-formaldehyde resin by adding ammonium chloride to bring the dispersion to a pH value of about 4.5, which is the optimum pH value for polymerization of urea-formaldehyde resin. The pH value of clay is about 4.5.

Coated papers prepared as above explained exhibit properties markedly superior to papers coated with an admixture of resin in aqueous dispersion with a clay slip. The wax test indicia are several points higher. The coating is relatively tenacious or adherent to the paper and the paper exhibits superior water-repellent properties and better finish (higher gloss).

An advantage of the spray-drying process as applied to the treatment of resinous compositions, and particularly clay-resin compositions, is that the resin is not polymerized in the process. Thus the spray-dried material may be incorporated in the ultimate product and thereafter polymerized. I avoid polymerization of the resin during spray-drying by limiting the time during which the material is subjected to a temperature above the polymerization temperature of the resin to prevent polymerization. This can be done because the time required for the spray-drying of the material is less than the time required for polymerization of the resin.

While I have described certain present preferred methods of practicing the invention it is to be distinctly understood that the invention is not limited thereto but may be otherwise vari-

ously practiced within the scope of the following claims.

I claim:

1. A process of coating a web surface comprising applying to the surface a liquid dispersion of a spray-dried clay-resin composition and starch and calendering the coated surface.

2. A process of coating a web surface comprising applying to the surface a liquid dispersion of a spray-dried clay-resin composition and starch, calendering the coated surface and heating the coated web to polymerize the resin.

3. A process of coating a web surface comprising applying to the surface a liquid dispersion of a spray-dried clay-resin composition and starch, calendering the coated surface and thereafter heating the coated web to a temperature of about 105° C. for about 20 minutes.

4. A process of coating a web surface comprising spray-drying a liquid dispersion of urea-formaldehyde resin and clay, forming a liquid dispersion of said spray-dried material, adjusting the acidity of said dispersion to a pH value of about 4.5, applying the same to a web surface and calendering said surface.

5. A process of coating a web surface comprising forming a liquid dispersion of a spray-dried clay and urea-formaldehyde resin composition, adjusting the acidity of said dispersion to a pH value of about 4.5, applying the same to a web surface, calendering said surface and thereafter heating the coated web to a temperature of about 105° C. for about twenty minutes.

6. A process of coating a web surface comprising applying to the surface a liquid dispersion of a spray-dried composition containing about 20 parts clay to 1 part urea-formaldehyde resin by weight, which dispersion contains an amount of starch equal to at least about 10% by weight of the spray-dried composition, calendering the coated surface and heating the coated web to polymerize the resin.

7. A process of coating a web surface comprising applying to the surface a liquid dispersion of a spray-dried composition containing about 20 parts clay to 1 part urea-formaldehyde resin by weight, which dispersion contains an amount of starch equal to about 15% by weight of the clay, calendering the coated surface and heating the coated web to polymerize the resin.

8. A process of coating a web surface comprising applying to the surface a liquid dispersion of a spray-dried composition containing about 20 parts clay to 1 part urea-formaldehyde resin by weight, which dispersion contains an amount of starch equal to about 15% by weight of the clay, calendering the coated surface and thereafter heating the coated web to a temperature of about 105° C. for about twenty minutes.

9. A process of coating a web surface comprising applying to the surface a liquid dispersion of a spray-dried clay-resin composition containing between about 15 and about 25 parts of clay to 1 part of resin together with starch and calendering the coating surface.

10. A process of coating a web surface comprising applying to the surface a liquid dispersion of a spray-dried clay-resin composition and starch, cold-calendering the coated surface and thereafter subjecting the web to a temperature at least about as high as 100° C. for a period ranging between about 15 and about 25 minutes.

11. A process of coating a web surface comprising forming a liquid dispersion of a spray-dried clay and urea-formaldehyde resin composition containing between about 15 and about 25 parts of clay to 1 part of resin, which dispersion contains an amount of starch equal to at least about 10% by weight of the spray-dried composition, adjusting the acidity of the dispersion to a pH value of about 4.5, applying the same to a web surface, cold-calendering the coated surface and thereafter subjecting the web to a temperature at least about as high as 100° C. for a period ranging between about 15 and about 25 minutes.

THOMAS GOSTAGE LEEK