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PAPER COATING COMPOSITION CONTAINING AN OPTICAL BRIGHTENER

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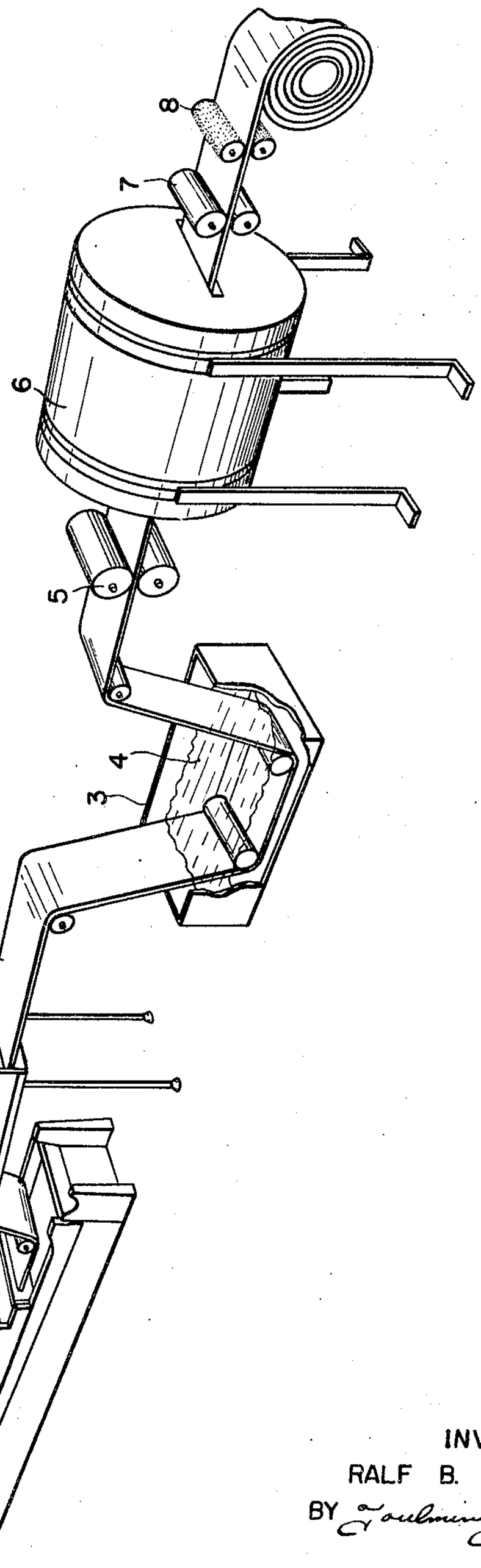

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PAPER COATING COMPOSITION CONTAINING AN OPTICAL BRIGHTENER

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2 Claims. (Cl. 252—301.2)

This invention relates to paper coatings and, in particular, to increasing the brilliancy of a printed product by the application of a light reflecting coating increasing the brightness of the paper and increasing the contrast between the printing and the paper while, at the same time accomplishing a smooth, non-tacky finish that can be applied at high speed to paper sheets and paper strip after printing without bleeding or other deterioration of the printing or deterioration of the paper.

In particular it is the object of this invention to provide for coatings that improve the light reflection of paper and printed paper and improve the contrast between the paper and the printing.

It is an object of this invention to provide such coating which may be applied to continuous sheets and strip as well as independent sheets and to provide a coating that prevents the sheets of paper from adhering to one another and causes them to be easily moved over one another when in engagement with one another. This is particularly desirable in connection with playing cards, books and the like.

It is a further object to provide a coating that will protect the coating of the surface of the paper and printing as well as increase the brilliancy of the light reflecting qualities of the article so treated.

It is a particular object of this invention to provide an optical bleach or light converter in wax coatings and to provide such a coating that it is substantive to the cellulose of the paper and ink on the paper.

It is a further object of the invention to provide such a coating on impervious surfaces.

In the case of playing cards, it is necessary to have flexible stock the surface of which is smooth, hard and permits the shuffling and dealing of the cards without deterioration or sticking. It is a further problem to be able to apply the coating at high speed with accuracy and without causing any damage to the brilliancy of the printing, but to the contrary, increase the brilliancy between the paper and the printing to facilitate the contrast between the printing and the paper.

Referring to the drawing, it shows a flow sheet for the treatment of paper, printed or unprinted by the compositions of this invention.

In order to carry out this invention, I have various compositions coming within the scope of my invention by which the following examples are typical:

EXAMPLE #1

Ingredients:	Grams
Carnauba wax, refined	100.0
Oleic acid	15.0
Isopropanolamine	6.0
Alpha benzyl B methyl umbelliferone	1.0
Water, distilled	900.0

Method for combining.—The carnauba wax was melted and the oleic acid was added and stirred, and brought to 100° to 110° C. The isopropanolamine was diluted with

10 ml. of hot water and added with stirring to the melted wax. These ingredients produced a clear, jelly-like mass upon stirring. Hot water in portions of about 10 ml. were stirred into the mass until noticeable thinning occurred and at this stage, the one gram of alpha benzyl B methyl umbelliferone was added, all the time keeping the preparation boiling gently. When the latter compound had dissolved (about 3 minutes were required) the balance of the hot water was added with stirring. The product was then ready to cool which can be accomplished by chilling the outside of the container.

EXAMPLE #2

Ingredients:	Grams
Carnauba wax #2 yellow	100.0
Oleic acid	12.0
Mono ethanolamine	5.0
B-methyl umbelliferone	1.0
Shellac	10.0
Ammonia 26°	5.0
Water	1,000.0

Method for combining.—The procedure for combining the carnauba wax, oleic acid, monoethanolamine, B-methyl umbelliferone and 900 ml. of water was similar to the method of Example #1, and this constituted part A.

The shellac (10.0 g.) was stirred in 100 ml. of water, to which was added the 5.0 g. of ammonia. The shellac dissolved to form a clear or nearly clear solution. This constituted part B.

Parts A and B were then mixed.

EXAMPLE #3

Ingredients:	Grams
Carnauba wax, refined	90.0
Paraffin wax, Grade Sun Oil Company's #5512	10.0
Oleic acid	14.0
Triethanolamine	10.0
Sodium salt of 4:4 dibenzoylamine-Stilbene 2:2 disulfonic acid	1.0
Distilled water	900.0

The method of combining these items was identical with the method of Example #1.

EXAMPLE #4

Ingredients:	Grams
Paraffin wax (Grade Sun Oil Co.'s #5512)	100.00
Stearic acid	12.0
Monoethanolamine	5.0
B-methyl umbelliferone	1.0
Water	250.0

Method for combining.—The paraffin wax and the stearic acid were melted together. The monoethanolamine was diluted with an equal amount of water and added with stirring to the melted wax. A thick paste resulted that could then be diluted with 50 ml. of hot water. Next, the methyl umbelliferone was thoroughly stirred into this preparation, and finally, the balance of the hot water (200 ml.) was gradually added during thorough stirring. The resultant emulsion of wax in water permitted further dilution at time of use.

EXAMPLE # 5

Ingredients:	Grams
Hydrogenated castor oil (melting point of 85°)	100.0
Oleic acid	15.0
Ethylethanolamine	10.0
B-methyl umbelliferone	1.0
Water	400.0

Method for combining.—The hydrogenated castor oil was first melted and into this was stirred the oleic acid.

Twenty grams of water were mixed with the 10 g. of ethylethanolamine and this solution was stirred into the melted wax, followed by the addition of the B-methyl umbelliferone. Finally, the water was added, about 10 ml. at a time until 100 ml. were used. Then, the balance was all in. This wax emulsion, like the others, was diluted with water to attain a 10 to 12% solids (in suspension) for use.

EXAMPLE #6

Ingredients:	Grams
Carnauba wax #2 Yellow	100.0
Oleic acid	13.0
Isopropanolamine	6.0
Borax	2.0
4 methyl 7 diethylamino coumarin	1.0
Water	900.0

EXAMPLE #7

Ingredients:	Grams
Carnauba wax	80.0
Casein	20.
Oleic acid	10.5
Isopropanolamine	5.0
Ammonia 26°	10.0
4 methyl 7 diethylamino coumarin	1.0
Water	875.0

Method for combining.—The carnauba wax was melted and to it was added the oleic acid with stirring. Isopropanolamine, diluted with some water was next added, followed by the 4 methyl 7 diethylamino coumarin. Finally, this was diluted with 500 ml. of soft water. The method for this step is similar to that described in Example #1. This part constituted part A.

The casein was rapidly stirred into 300 ml. of water to which then was added the ammonia. After a period of time the casein was dissolved producing a somewhat viscous solution. This constituted part B. Part A and part B were then mixed and any unused or additionally desired water was added. Ammonia in excess of the amount required to dissolve the casein acts as a preservative, and additional inhibitors may be added to this or the other examples to preserve them.

This preparation, and also that of Example #2 requiring shellac provides for the use of water soluble sizing and body materials which are often useful in testuring fibrous surfaces and, in general, modifying wax containing surface coatings.

Any one of my wax emulsion compositions can be further modified by incorporating a resinous, ingredient with the wax. For example, part of the carnauba wax may be replaced with resin of the type frequently used in varnish making, such as, modified rosin-malleic anhydride phenolic copolymers, the cumar resins, resins derived from terpenes and from pinenes and many others. The resin and wax can be melted together and then the resulting melt can be emulsified by the well known method of which Example 1 is typical.

Method for combining.—First, the carnauba wax was melted and when it was at 110° C., the oleic acid was stirred into it and the heating was discontinued. The isopropanolamine was diluted with 12 ml. of water and then poured slowly into the melted wax with stirring. Next, the borax, which had been dissolved in 5 ml. of hot water, was also stirred into the wax. At this stage the one gram of 4 methyl 7 diethylamino coumarin was next added followed by 10 ml. portions of hot water until 50 ml. were added. Hot water was then added in 25 ml. portions with stirring, until a total of 200 ml. were used. Then, the balance was poured in.

Optical brighteners

I find that 0.1% furnishes a satisfactory quantity of brightener. Such products as the following will be found useful:

Stilbene derivatives such as "Blancophor" manufactured by General Dyestuff Corporation, New York, New York; "Fluorosol" manufactured by the National Aniline Division, Allied Chemical and Dye Corp., New York, New York; "Uvitex" manufactured by Ciba Company, New York, New York; "Tinopal" manufactured by the Geigy Co., New York, New York; "BMU" manufactured by Koppers Co., Pittsburgh, Pennsylvania; and "Calcofluor" manufactured by American Cyanamid Co.

I have found useful coumarin and stilbene derivatives. Other useful compounds are the fluorescent benzimidazoles and naphthylamines, thiazole derivatives, terephthalic acid derivatives, oxynaphthalene sulfonic acid and derivatives of anthraquinone. The "Blancophor" compounds are based upon diaminostilbene compounds. The fluorosols are also based upon the stilbene derivatives. The fluorosols are either oil soluble or water soluble. I have used successfully methyl umbelliferone manufactured by the Carlisle Company of Reading, Ohio. I prefer alpha benzyl B-methyl umbelliferone.

The concentrations I prefer are 0.1% but they may range from 0.005% to 0.05%.

Hydroxycoumarin may be used in place of beta-methyl umbelliferone.

The amine soap formed by oleic acid and isopropanolamine, monoethanolamine, triethanolamine acts as an emulsifier. The use of borax assists in the emulsification as does ammonia. The borax controls penetration.

Method of application

The paper stock **1** is printed at **2** either on continuous strip or on sheets and, upon the ink drying, the strip or sheets are immersed in a vat **3** containing the composition **4** of one of the examples. This warm wax dispersion containing the brightening agent is maintained at a temperature of 1° C. to boiling (about 100° C.) preferably between 25° C. and 60° C. Since the viscosities of the emulsions vary somewhat with temperature, generally being less and thinner at higher temperature degrees, the regulation of temperature degrees somewhat controls the amount of wax emulsion adhering to the paper prior to passing through the rollers **5**. The sheet is fed between rollers **5** for distributing the wax and applying pressure to the wax surface of the paper. The sheet is then fed through a dryer tunnel **6** where a temperature of approximately 140° F., plus or minus, is provided. When the coating is dry, the sheet is passed between polishing rollers **7** which give a light kiss to the sheet to polish the wax coating and thence between final brushes **8** for completing the operation.

It will be understood that I desire to comprehend within the following claims such variations and adaptations of my invention which may be found necessary in applying to various industrial conditions and requirements.

I claim:

1. In a new composition of matter for surface coating of paper, the combination of carnauba wax, refined, 100.0 grams; oleic acid, 15.0 grams; isopropanolamine, 6.0 grams; alpha benzyl B-methyl umbelliferone, 1.0 grams; and water, distilled, 900.0 grams.

2. In a method of manufacturing a composition of matter for coating paper as set forth in claim 1, the step (*a*) of melting carnauba wax; the step (*b*) of adding oleic acid through the resultant melted wax and stirring the mixture; the step (*c*) of heating the mixture to 100 to 110° C.; the step (*d*) of introducing into the heated mixture while stirring isopropanolamine diluted with hot water, the step (*e*) adding additional hot water to dilute the jelly-like mass; and the step (*f*) of introducing alpha benzyl B-methyl umbelliferone an optical brightening agent thereto while maintaining the mixture at a boil.

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