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COATED PAPER AND PAPER-COATING
COMPOSITIONS

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This invention relates to new and improved compositions for coating paper and paper coated therewith.

It has heretofore been proposed to coat paper with various materials, including cellulose derivatives, for a wide variety of purposes, as, for example, sizing and water-proofing.

It is an object of the present invention to provide new and improved coated papers having certain desirable properties. A further object is to provide new and improved coating compositions for paper. An additional object is to provide coated paper and coating compositions in which the active ingredients are compatible with paraffin. Other objects will appear hereinafter.

These objects are accomplished in accordance with the present invention by preparing coating compositions for paper comprising mixed alkyl ethers of cellulose containing lower alkyl radicals, e. g., methyl and ethyl, and higher aliphatic hydrocarbon radicals, and by coating paper with such compositions. Any kind of paper may be coated with compositions of the type described with a view to rendering such paper more attractive in appearance, feel, more resistant to penetration by grease and water vapor or to the action of liquid water, and/or more transparent. The compositions may be applied to the paper as lacquers, in organic solvents, as hot melts (i. e., in a melted condition without solvent), or as emulsions in water. They may also be applied to paper in the form of previously cast sheets by the application of heat and pressure.

The invention will be further understood, but is not limited, by the following examples in which the quantities are stated in parts by weight unless otherwise indicated.

EXAMPLE I

A sample of "Lorol" ethyl cellulose containing 0.75 ethyl and 1.33 "Lorol" groups per $C_6H_{10}O_5$ unit was dissolved in toluene to a 25% solution. Strips of glassine paper were passed through this solution, excess liquid being stripped off by doctor knives or steel rods, and were dried at 90° C. for two to five minutes. The coated paper had no objectionable color, odor or taste, and had greatly improved transparency, gloss, and general appearance, as compared with the uncoated paper. It was also very flexible and had excellent water-repellency, being very much superior to the uncoated paper in this latter respect. The coated paper also had a pleasant feel and was free from rattle. The weight of the coating ap-

plied on both sides was approximately 3 pounds per 3000 square feet of paper. Such paper had no tendency to stick on storage at 120° F.

The water vapor impermeability of the coated paper was measured by the following method: The paper to be tested was sealed with beeswax-rosin mixture over the top of a small Petri dish containing calcium chloride. The dish was placed for twenty-four hours in a dry desiccator, weighed and then placed in an atmosphere of approximately 100% relative humidity. From time to time the dish was removed, and after being stored several hours in a dry desiccator, was weighed again to determine the amount of water vapor which had passed through the paper. Such tests were made in quadruplicate. Results of these tests are given below, where permeability is expressed as the number of milligrams of water vapor passing through per hour per square inch of surface coated with 0.5 gram per square foot of dry coating (if any) at 25° C. and approximately 100% relative humidity. Five-tenths (0.5) gram of coating per square foot of paper corresponds approximately to 3 pounds per 3000 square feet. The assumption is made that the coating is uniformly distributed over the paper.

Uncoated paper

Dish No.	Permeability after 19 hours
1.....	6.67
2.....	6.15
3.....	6.23
4.....	6.27
Average.....	6.33

Coated paper

1.....	4.11
2.....	3.78
3.....	2.02
4.....	3.71
Average.....	3.41

EXAMPLE II

Strips of vegetable parchment paper were coated with the same solution as used in Example I, the weight of the coating being approximately 9 pounds per 3000 square feet. After drying, the paper had a very pleasant, soft feel, being flexible and free from rattle. It had no objectionable color, odor or taste. In addition to being extremely water-repellent, the coated paper was much more grease-resistant than corresponding

uncoated paper. For example, grease-resistant tests were made with pieces of the coated paper in comparison with uncoated paper as follows: The coated papers were tested both creased and uncreased. The paper was creased in a standard manner by passing through rubber rolls, all papers being creased practically simultaneously, along with a control of uncoated paper. The paper used in these tests was vegetable parchment #30 white containing approximately 9 pounds of coating per 3000 square feet of paper. The paper, creased or uncreased, was sealed with a 50-50 beeswax-rosin mixture to the bottom of a glass cylinder about three inches in diameter and one-half inch high. The cup so prepared was placed upon a piece of filter paper. Twenty (20) parts of a mixture of 100 parts of pine sawdust and 260 parts of turpentine containing a little oil red dye, was placed in the cup and pressed evenly down by putting a one-kilogram weight on top for one minute. About 50 parts of small lead shot was placed on top of the turpentine-sawdust mixture to weight down the paper and thus insure good contact between it and the filter paper beneath. The cup was then covered with a watch glass. At intervals the filter paper under the cup was examined to see whether the turpentine had penetrated the coated paper, as indicated by a stain on the filter paper underneath. The dye facilitated detection of penetration of the paper by the oil.

Results of these tests were as follows:

Uncreased paper

- Uncoated—Slight failure in 20 hours.
Definite failure in 10 days.
Coated—No failure in 40 days.

Paper with creases at right angles to each other

- Uncoated—Failure in 10 minutes.
Coated—Slight failure in 11 days.
Definite failure in 14 days.

EXAMPLE III

- Cast sheets of the "Lorol" ethyl cellulose of Example I and camphor in the ratio of 9:1, 0.001 inch thick, were attached to grease-proof paper by applying 500 pounds hydraulic pressure per square inch at a temperature of 110° C. to 115° C. Sheets of this paper were thus (1) laminated, (2) coated on one side, (3) coated on two sides. The coated sheets thus prepared had a pleasing feel and appearance. The sheets coated on both sides were rendered almost transparent, the difference between them and uncoated paper in this respect being remarkable. The coated sheets were also highly water-repellent and the coatings adhered well to the paper after soaking in water for several days.

EXAMPLE IV

A solution was prepared of the following composition:

	Parts
"Lorol" ethyl cellulose (of Example I)	10
Paraffin	10
Toluene	80

- Glassine paper was coated with this solution as in Example I. The coated paper had excellent water-repellency, slip and feel, and fair transparency. It had no objectionable color, odor or taste. With lower ratios of paraffin the transparency is better. Such papers are moisture-proof.

Mixtures of paraffin and higher alkyl ethers of cellulose (without solvent) can be applied to paper as hot melts by technique which is well known to those skilled in the art.

EXAMPLE V

Grease-proof paper was coated with the solution used in Example IV according to the procedure of Example II, a coating of 15 pounds per 3000 square feet on both sides of the paper being applied. Grease-resistant tests, with automobile lubricating oil (mineral oil) and refined cottonseed oil in place of the turpentine-sawdust mixture of Example II, were run with this paper in comparison with the uncoated paper. The results were as follows:

Uncoated paper, creased, using automobile lubricating oil

Initial failure	minutes	22
Definite failure	hours	5½

Coated paper, creased, using automobile lubricating oil

Initial failure	hours	5½
Definite failure	days	14

Uncoated paper, creased, using refined cottonseed oil

Initial failure	minutes	25
Definite failure	hours	5½

Coated paper, creased, using refined cottonseed oil

	Hours
Initial failure	5½
Definite failure	17

EXAMPLE VI

A solution was prepared of the following composition:

	Parts
"Lorol" ethyl cellulose (of Example I)	12
Monoethyl phthalate	4
Toluene	48

Glassine paper coated with this solution was very water-repellent, had greater transparency compared with the uncoated paper, good gloss and less tendency to show a white mark on creasing than did uncoated paper. Such paper had no objectionable color, odor or taste.

EXAMPLE VII

Grease-proof paper coated with 9 pounds per 3000 square feet of the solution disclosed in Example VI was found to be much more resistant to penetration by either automobile lubricating oil or refined cottonseed oil than was uncoated paper, when tested for grease-resistance according to Example II (substituting the oils indicated for the turpentine-sawdust mixture). For example, such grease-resistance tests gave the following results:

Uncoated paper, creased, using automobile lubricating oil

Initial failure	minutes	22
Definite failure	hours	5½

Coated paper, creased, using automobile lubricating oil

Initial failure	5½ hours	
Definite failure	14 days (at which time the amount of oil penetrated was much less than in the case of uncoated paper after 5½ hours)	

EXAMPLE VIII

A solution was prepared of the following composition:

	Parts
"Lorol" ethyl cellulose (of Example I)	12
Rosin	4
Toluene	64

Glassine paper was coated with this solution as in Example I. The coated paper was very water-repellent and retained its strength and water-repellency much better than uncoated paper when soaked in water for eighteen hours. It had a pleasant feel, excellent gloss and much better transparency than uncoated paper. It showed absolutely no tendency to stick on storage at temperatures as high as 130° F.

Mixtures of rosin and higher alkyl ethers of cellulose can also be applied to paper as hot melts.

EXAMPLE IX

Grease-proof paper coated with the solution of Example VIII to give a coating of 9 pounds per 3000 square feet of paper was tested for grease-resistance as in Example II, substituting the oils indicated below for the turpentine-sawdust mixture, with the following results:

Uncoated paper, creased, using automobile lubricating oil

Initial failure.....minutes... 22
Definite failure.....hours... 5½

Coated paper, creased, using automobile lubricating oil

Initial failure..... 4 days
Definite failure..... 21 days (being still greatly superior to uncoated paper after 5½ hours)

Uncoated paper, creased, using refined cottonseed oil

Initial failure.....minutes... 25
Definite failure.....hours... 5½

Coated paper, creased, using refined cottonseed oil

Initial failure.....(very slight)..... 4 Days
Very slight failure..... 25

EXAMPLE X

Glassine paper was coated, as in Example I, with a solution of the following composition:

	Parts
"Lorol" ethyl cellulose (of Example I)	12
Camphor	4
Toluene	64

The coated paper had no objectionable color or taste, and had good feel, flexibility, better transparency than uncoated glassine, and excellent water-repellency. It did not stick on storage at 130° C.

EXAMPLE XI

Grease-proof paper coated with the solution of Example X was tested for grease-resistance according to the procedure of Example II, substituting the oils indicated below for the turpentine-sawdust mixture. The thickness of the coating was 10.2 pounds per 3000 square feet of paper. Results were as follows:

Uncoated paper, creased, using automobile lubricating oil

Initial failure..... 22 minutes

Coated paper, creased, using automobile lubricating oil

Initial failure..... 5½ hours

Uncoated paper, creased, using refined cottonseed oil

Initial failure.....minutes... 25
Definite failure.....hours... 5½

Coated paper, creased, using refined cottonseed oil

Initial failure..... 4 Days
Definite failure..... 25

EXAMPLE XII

Glassine paper was coated, as in Example I, with a solution of the following composition:

	Parts
"Lorol" ethyl cellulose (of Example I)	12
Damar	4
Asiatic wax	1.2
Ethyl acetate	4
Toluene	42

The amount of coating applied in this case was 3 pounds per 3000 square feet of paper. The coated paper had much better water-repellency than uncoated glassine, being characterized by good strength and water-repellency even after eighteen hours' soaking in cold water. The coated paper also had better slip and feel than uncoated glassine, had no objectionable color or taste, and did not stick appreciably on storage at 120° F.

EXAMPLE XIII

The solution of Example XII was used to coat grease-proof paper, 11 pounds of coating per 3000 square feet of paper being applied. The coated paper was tested for grease-resistance as in Example II, the oils indicated below being substituted for the turpentine-sawdust mixture. The results were as follows:

Uncoated paper, creased, using automobile lubricating oil

Initial failure.....minutes... 22
Definite failure.....hours... 5½

Coated paper, creased, using automobile lubricating oil

Initial failure.....hours... 5½
Very slight failure only.....days... 14

Uncoated paper, creased, using refined cottonseed oil

Initial failure.....minutes... 25
Definite failure.....hours... 5½

Coated paper, creased, using refined cottonseed oil

Initial failure..... 4 Days
Very slight failure only..... 25

EXAMPLE XIV

Glassine paper was coated, as in Example I, with a solution of the following composition:

	Parts
"Lorol" ethyl cellulose (of Example I)	12
Polyether resin	4
Toluene	64

The coated paper had better transparency than uncoated glassine, had good feel, and no objectionable color, or odor.

EXAMPLE XV

The "Lorol" ethyl cellulose of the previous examples may be replaced partly or wholly by corresponding amounts of other compatible mixed alkyl ethers of cellulose. For instance, any one of the mixed ethers prepared as follows may be used:

(a) Steep cotton linters in 50% sodium hydroxide solution for two hours at 20° C., press to about four times the weight of the cellulose and shred at 12° C. for one and one-half hours. To 1194 parts of alkali cellulose prepared in this manner add slowly, while shredding at 12° C., 1428 parts of freshly distilled diethyl sulfate. Allow the mixture to warm to 25° C. and continue shredding at this temperature for seventeen hours. Purify the ethyl cellulose thus formed by rapid washing in hot water and dry the resultant product.

To 330 parts of the above ethyl cellulose add 1200 parts of "Lorol" chloride, 20 parts of Turkey red oil and a cooled solution of 418 parts of sodium hydroxide in 751 parts of water. Place these substances in a nickel-lined autoclave in the order mentioned, and after displacing the air in the autoclave with nitrogen, heat the mixture at 150–155° C. for fifteen hours. Remove the dark aqueous liquor from the autoclave and to the rest of the material add acetone, with stirring, to effect a thick, smooth solution. Add more acetone until "Lorol" ethyl cellulose is precipitated. Wash this precipitate with acetone, then with water until nearly alkali-free. Suspend it in 0.5% HCl overnight, wash again with water until neutral, then rapidly extract with acetone and air-dry the product. After drying at 65° C., the resultant white powder softens at 80° C. and contains 1.1 "Lorol" groups for each glucose unit of the cellulose.

(b) Steep 159 parts of cotton linters for two hours at 25° C. in 42.6% NaOH solution, press to 1184 parts and shred for one and one-half hours with 10 parts of sodium "Lorol" sulfate. Mix this alkali cellulose with 405 parts of octyl chloride, 177 parts of ethyl chloride and 250 parts of kerosene. Place in a nickel-lined autoclave and heat at 110–120° C. for five hours, after which continue the heating at 150–155° C. for eleven hours. Purify the reaction product as in (a). This product is a white powder, insoluble in kerosene but soluble in a mixture of toluene and alcohol.

(c) Steep 130 parts of wood pulp (6% moisture) in 42.6% sodium hydroxide solution for two hours at 20° C., press to 930 parts and shred for two hours at 25° C. with the addition of 10 parts of "Gardinol". Place this alkali cellulose into a silver-lined autoclave with 145 parts of ethyl chloride and 857 parts of "Stenol" chloride (the term "Stenol" is applied to the alcohols obtained by the reduction of the acids derived from sperm oil and the corresponding alkyl halides which in this case contained 12.6% chloride). Flush out the air with nitrogen and heat the mixture, while stirring, for six hours at 112–125° C., then at 150° C. for eight hours. After cooling, purify the reaction product as in (a). The resultant white solid is soluble in hydrocarbons including benzene, toluene, kerosene, softens at 85° C., and contains by analysis 0.75 ethyl group and 1.07 "Stenol" groups for each six carbon atoms of the cellulose nucleus.

(d) Steep 100 parts of cotton linters pulp in 50% sodium hydroxide solution for one and one-

half hours at 20° C., press to 328 parts and shred for two hours at 25° C.; then shred in 122 parts of solid sodium hydroxide. Place this alkali cellulose in a nickel-lined autoclave with 300 parts of ethyl chloride, 152 parts of "Lorol" chloride and 567 parts of benzene, and heat the mixture rapidly to 145° C. Hold at this temperature for two and one-half hours, and then heat for six hours at 150° C. Pour the reaction mixture into low-boiling petroleum ether, with good stirring, filter and wash with petroleum ether. Add the product to an excess of hot water, while stirring, and wash with hot water until free from alkali. This gives a "Lorol" ethyl cellulose softening at 100° C., soluble in ethanol, methanol, dioxane, ether, ethyl acetate, butyl alcohol and toluene, but insoluble in aliphatic hydrocarbons. Analysis shows an ethoxyl content of 38.36% and a carbon analysis of 58.57%, corresponding to 0.15 "Lorol" group and 2.09 ethyl groups for each six carbon atoms of the cellulose.

(e) Steep 170 parts of cotton linters pulp containing 162 parts of cellulose in 30% sodium hydroxide solution at 25° C. for two hours, and press to 696 parts. Shred this alkali cellulose for two hours at 25° C., add 252 parts of dimethyl sulfate slowly through a drop funnel, while continuing the shredding for eighteen hours. At the end of this time, place the mixture in an autoclave, together with 10 parts of "Gardinol", 638 parts of "Lorol" chloride and a cold solution of 320 parts of NaOH in 468 parts of water. Heat this mixture, with stirring, for fifteen hours, remove the product and discard the aqueous layer. Then purify the thick, jelly-like mass with acetone and water, as described in (a). The dried "Lorol" methyl cellulose is soluble in toluene 80–alcohol 20. Analysis shows 13.38% methoxyl and 64.91% carbon, equivalent to 1.39 methyl groups and 0.83 "Lorol" group for each C₆ unit of the cellulose.

Throughout the specification and claims the term "Lorol" refers to mixtures of alcohols having from eight to eighteen carbon atoms, but chiefly lauryl alcohol, such as may be derived from coconut oil fatty acids by reduction (see "Journal of the Society of Dyers and Colorists", vol. 48, page 129, 1932). "Glassine" paper is the semi-transparent paper used in the trade for wrapping various articles and for window envelopes. It is a highly hydrated, highly beaten and highly calendered paper. "Grease-proof" paper is the same type paper as glassine except that it is not calendered. The polyether resins, such as referred to in Example XIV, are, for instance, polyether resins made by reacting a polyphenol and an aliphatic polyhalide of the type described in U. S. application Serial No. 651,634 filed January 13, 1933 by J. A. Arvin.

It will be recognized that other mixed cellulose ethers than those disclosed in the examples are within the scope of this invention. These ethers preferably contain a higher alkyl radical of eight or more carbon atoms, as, for instance, octyl, nonyl, decyl, undecyl, dodecyl, myristyl, hexadecyl, octadecyl, octadecenyl, ceryl, and myricyl, and a lower alkyl radical such as, for example, methyl and/or ethyl, in the same molecule. They may contain, for example, 0.5 to 2.0 or more higher alkyl radicals and 0.5 to about 2.0 lower alkyl groups and the sum of the lower and higher alkyl groups may be from 1 to 3 for each glucose (C₆H₁₀O₅) unit. The alkyl groups are attached to the cellulose by replacement of one or more hydrogen atoms of the cellulosic hydroxyl groups,

and the maximum alkylation is determined by the number of hydroxyl groups. In general, the mixed ethers preferably contain a sufficient number of lower alkyl groups and higher alkyl groups per $C_6H_{10}O_5$ unit to be soluble in one or more hydrocarbon solvents such as toluene, kerosene and hot paraffin. The choice of ether may be made upon the basis of its compatibility with other ingredients of the coating composition. Generally, paraffin-soluble ethers containing at least 0.75 mole, and preferably 0.75 to 1.5 moles of lower alkyl group and at least one mole, preferably 1.0 to 2.0 moles, of higher aliphatic hydrocarbon group per glucose unit, give good results. Specific preferred ethers are "Lorol" ethyl cellulose, octyl ethyl cellulose, palmityl (hexadecyl) ethyl cellulose, stearyl (octadecyl) ethyl cellulose, and oleyl (octadecenyl) ethyl cellulose, or mixtures thereof, which are paraffin soluble.

These mixed ethers may be prepared by reacting the cellulose in any suitable form with an active lower alkylating agent and then with a higher alkyl etherifying agent, as, for instance, a higher alkyl halide. The proportion of lower alkylating agent should preferably be such as to introduce at least 0.5 mole of the alkyl group into each glucose unit, and more desirably about 1.0 to 1.5 moles. Such a process is described and claimed in the co-pending application of J. F. Haskins and D. C. Ellsworth, U. S. Serial No. 60,520 filed of even date herewith. Any one of the mixed ethers described therein, or mixtures thereof, soluble in one or more solvents, e. g., toluene, kerosene or molten paraffin, may be employed in coating paper.

The mixed ethers of cellulose above described may be used to coat paper, either alone or mixed with a diversity of modifying agents such as, for example, other cellulose derivatives, resins, waxes, oils and solvents, as illustrated by the examples.

In addition to the use of rosin, damar and polyether resins for modifying compositions comprising higher and lower aliphatic mixed ethers of cellulose for coating paper, many other natural and synthetic resins can be used. These resins may be used alone with the higher alkyl ethers of cellulose, or they may be used with them in combination with other resins, oils, waxes, other cellulose derivatives, etc., with or without solvents. For example, resins such as cumarone-indene resins, dihydronaphthalene resins, manila, copals, phenol-formaldehyde, styrene, polybasic acid-polyhydric alcohol resins, vinyl resins, urea-formaldehyde resins and sulfonamide-formaldehyde resins may be used.

Waxes other than those given in the examples above may be used for modifying any of the higher alkyl ethers of cellulose. Thus, the following waxes may be used alone or in combination with other modifying agents such as resins, oils, other cellulose derivatives and the like: Carnauba, Montan, candelilla, beeswax, Chinese insect wax, chlorinated diphenyls, chlorinated naphthalenes, hydrogenated oils such as hydrogenated castor oil, etc.

Oils alone or in admixture with other modifying agents, such as those named above, may be used for modifying the higher alkyl ethers of cellulose for coating paper. For example, drying oils such as China-wood oil, linseed oil, non-drying and semi-drying oils such as castor oil, cottonseed oil, olive oil, etc., may be used.

In addition, it may be desirable to mix pigments with compositions comprising higher alkyl

ethers of cellulose for purposes of coating paper. Any pigments or fillers may be used for this purpose, e. g., clay, talc, calcium carbonate, metallic oxides, etc.

The paper coating compositions comprising the higher alkyl ethers of cellulose may be applied to any kind of paper in any desired manner, in accordance with standard practice in the paper trade which is well known to those skilled in the art. Any desired thickness of coating may be applied. For purposes of manufacturing the so-called "transparent" coated papers, and to make such papers moisture-proof, water-repellent, or to impart to them better appearance, slip and feel, it is customary to apply about 3 pounds of dry coating per 3000 square feet of paper (on both sides) and such coatings comprising higher alkyl ethers of cellulose are satisfactory for the purposes named. For coating parchment, grease-proof or other wrapping papers to make them more grease- or water-resistant, about 9 pounds of coating per 3000 square feet should be applied. However, any thickness can be used, depending upon the purpose, cost, etc.

The mixed ethers or compositions containing them may be incorporated into paper for use as sizing, as, for example, in the paper beater, or they may be used in impregnating paper. Likewise, as already mentioned, cast sheets of compositions comprising said mixed ethers of cellulose may also be attached to paper by the application of heat and pressure. Thus, sheets coated on one or on both sides or laminated with these compositions may be prepared.

The advantages of the invention will be apparent from the examples. The mixed ethers of cellulose containing long chain aliphatic hydrocarbon groups of at least eight carbon atoms have certain very desirable properties which are not possessed by alkyl ethers of cellulose in which all of the alkyl groups have a fewer number of carbon atoms. For example, amyl cellulose or amyl-ethyl cellulose, is not nearly as soluble in aliphatic solvents as is lauryl ethyl cellulose. Moreover, the higher alkyl ethers of cellulose are characterized by greater flexibility and pliability than ethers such as ethyl cellulose or ethyl butyl cellulose. They are, therefore, more suitable for coating paper. Moreover, in consequence of their solubility in aliphatic hydrocarbons, the higher alkyl ethers of cellulose are compatible with paraffin, which is often advantageous, especially in moisture-proof coatings for paper. The solubility of the higher alkyl ethers of cellulose in aliphatic hydrocarbons makes it possible to use cheaper solvents for applying them to paper than is possible with the lower alkyl ethers. The higher ethers are also more suitable for application to paper as emulsions than are the lower ethers since they can be more readily emulsified. This fact is especially important because application of coating materials to paper as emulsions is much cheaper than application in the form of lacquers. Moreover, it is often feasible to make much more concentrated solutions of the higher alkyl mixed ethers in organic solvents than would be possible with the lower alkyl ethers of cellulose, without obtaining solutions of unduly high viscosity. This fact makes it possible to apply thicker coatings, if desired, without undue difficulty, and also results in saving of solvent or simplifies solvent recovery. As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it

is to be understood that we do not limit ourselves to the specific embodiments thereof except as defined in the appended claims.

We claim:

- 5 1. A highly grease-proof, water and moisture resistant product comprising paper coated with a composition which comprises a mixed alkyl ether of cellulose containing in the same molecule lower saturated alkyl radicals of not more than two carbon atoms and higher saturated aliphatic alkyl radicals of at least eight carbon atoms. 5
5. The coating composition set forth in claim 4 in which said mixed ether is present as a solution in organic solvent.
6. The coating composition set forth in claim 4 in which said mixed ether is in the form of an aqueous emulsion. 10
7. The coating composition set forth in claim 4 in which the alkyl radicals in said mixed ether are from 0.5 to 2.0 lower alkyl radicals, the remainder being said higher alkyl radicals, said mixed ether being soluble in a hydrocarbon solvent of the class consisting of toluene, kerosene, and hot paraffin. 15
8. The coating composition set forth in claim 4 in which said higher alkyl radicals are a mixture of the alkyl radicals of alcohols having from eight to eighteen carbon atoms. 20
2. The coated paper set forth in claim 1 in which the alkyl radicals in said mixed ether are from 0.5 to 2.0 lower alkyl radicals per C_6 unit of cellulose, the remainder being said higher alkyl radicals, said mixed ether being soluble in a hydrocarbon solvent of the class consisting of toluene, kerosene, and hot paraffin.
3. The coated paper set forth in claim 1 in which said higher alkyl radicals are a mixture of mixed alkyl ethers of cellulose, said mixed ethers having each a lower alkyl radical of not more than two carbon atoms and at least one higher alkyl radical of 8 to 18 carbon atoms.
- 25 4. A liquid coating composition comprising a mixed alkyl ether of cellulose containing in the same molecule lower saturated alkyl radicals of not more than two carbon atoms and higher saturated aliphatic alkyl radicals of at least eight carbon atoms.

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