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CELLULOSE DERIVATIVE ANTI-OFFSET COMPOSITION

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The present invention relates generally to the art of preventing offset upon freshly printed sheets, and is more particularly concerned with a medium to be employed for such purposes.

This application is a continuation in part of my copending application, Serial No. 582,919, filed December 24, 1931, for Offset process.

When printed or lithographed sheets, as they emerge from the press, are piled or superposed one upon another before the ink upon the last printed sheet is dry, the contact of one sheet with the undried ink upon a freshly printed sheet tends to produce a condition that is commonly known as "offset".

It has been the practice, therefore, in certain lines of printing or lithographing, where offsetting must be prevented, to spray the sheets with an anti-offsetting medium as they emerge from the press. This medium is deposited upon the sheets in the form of minute particles which form, in effect, "lands" or projections upon the surface of the sheet, these lands serving to space the sheets apart sufficiently so that the ink from one sheet will not be transferred to an adjacent sheet.

Heretofore, the anti-offsetting medium commonly employed has been a substance such as wax or paraffin that could be liquefied by fusion, and solidified by cooling after application to the sheet. The substances mentioned are normally in a solid state at room temperatures and made fluid by heat, such fluid being then sprayed upon the sheets by the use of compressed air or the like. The air serves to break up the fluid into minute particles and these particles then solidify or regain their original state when deposited upon the sheets.

I provide, according to the present invention, an anti-offsetting medium that is normally in a fluid state and which may be sprayed upon a printed or lithographed sheet to form solid particles or lands for spacing the piled-up sheets apart sufficiently to prevent offsetting. This medium comprises, in a preferred form, a soluble material or solute carried in a suitable evaporable or volatile solvent. In such solution there may also be incorporated, if desired, any suitable plasticizers and any suitable inert fillers or extenders which will serve to give flatness or non-light-reflecting character to the solid particles deposited upon the sheets. Contra-distinguished from prior anti-offsetting media, the instant medium comprises a solution normally in a fluid state at room temperature. When the solution is sprayed upon the sheets the solvent of the solu-

tion quickly evaporates. This evaporation occurs during the travel of the spray, as well as after striking the sheets, and thereby the solute or soluble material of the solution arrives upon the sheets in minute particles, which are sufficiently sticky or adherent when they arrive upon the sheets to remain and form, then or shortly thereafter, spacers of sufficient thickness to secure the desired result. Preferably, the surface tension of the particles or droplets should be great enough so that the particles retain, to a useful extent, the globular form for the purpose of forming spacers of maximum height and minimum content.

In my co-pending application Serial No. 133,927, I have disclosed certain cellulose ester anti-offsetting compositions which have the above-mentioned highly desirable characteristics. These cellulose ester compositions are especially suitable because of the ready availability of the solutes. However, in their preferred form they require as a solvent, a solvent mixture comprising a first component of highly volatile, rapidly evaporable solvent and a second component of a more slowly, less evaporable solvent. Such a solvent mixture for the cellulose esters provides a composition which will be a liquid as it is converted into a spray of globules, but which as it travels through the atmosphere will lose a sufficient fraction of the solvent to convert the globules into self-sustaining, adhesive particles which retain sufficient solvent to adhere to the sheet. Thereafter, the solvent mixture is such as to convert each globule into a solid by evaporative loss of residual solvent while preventing "blushing" of the cellulose ester particles as they are converted into solid form to assure light transmitting quality and to prevent masking of the print beneath them or alteration of the natural appearance to the eye of the unprinted portion of the sheet beneath them.

I have found that compositions of cellulose ethers dissolved in rapidly evaporative solvents provide anti-offsetting media of the desired characteristics, even though little or no, less volatile, more slowly evaporable solvent be used. As will hereinafter more fully appear, the less volatile class of solvents may be used along with the more rapidly evaporative solvents, but the use of the less volatile class of solvents is not required. In accordance with the present invention, compositions of the desired characteristics are obtained by the use of a cellulose ether and one or more solvents of the more rapidly evaporative class, thereby eliminating the necessity for the

incorporation of a less volatile solvent and the consequent close regulation of the proportion of the highly volatile solvent to the less volatile in order to have the composition meet the characteristics required. The cellulose ether solutes have the further advantage that being more readily soluble in the non-inflammable solvents, their use makes possible the ready control of the above described characteristics (globule formation, adhesiveness, light transmission, etc.) in the production of non-inflammable anti-offset compositions.

The cellulose ether composition may be applied by any of the known methods of spraying, i. e. pneumatic, mechanical or hydraulic, the object in each case being the formation and projection of a fine spray of particles of a size great enough to provide the desired projections.

There are a number of advantages accruing to the use of the medium of my invention. The method may be carried out at little expense; it does not heat up the press room; the amount applied may be varied widely without objectionable effects; the material has great adhesive characteristics; and it does not cloud the printed sheets nor render them greasy to the touch. The cellulose ethers are non-inflammable and are readily soluble in non-inflammable solvents so that the compositions may be non-inflammable. As the material which I apply adheres firmly, the printed sheet is clean and brilliant.

Other features and advantages of the invention will appear from the following detailed description.

To practice the invention, I provide a solution in which the solute, preferably consisting of any one or more of the cellulose ethers, is carried in a suitable volatile solvent. These ethers may, for example, consist of ethyl cellulose or benzyl cellulose and are characterized by the fact that they are deposited from the solvent in a tough film when the solvent evaporates. These cellulose ethers, therefore, form the solid particles or lands which are deposited upon the printed or lithographed sheets when the solvent evaporates. The solvent in which the cellulose ethers are carried preferably consists, for example, of highly volatile, rapidly evaporating solvents, such as toluol, alcohol, ethyl acetate, acetone, carbon tetrachloride, trichlorethylene; or of any other solvents which have a relatively low boiling point and vapor pressure, and will thus quickly evaporate and will properly carry the cellulose esters or ethers in solution. If desired, small amounts of less volatile, more slowly evaporable solvents, such as xylol, butyl acetate, "Cellosolve" (monoethyl ether of ethylene glycol) may be used along with the highly volatile solvents, but I have found that the addition of these less volatile solvents is not necessary where cellulose ethers are used as the solutes. Preferably, I employ non-inflammable solvents such as carbon tetrachloride and trichlorethylene, or mixtures of inflammable solvent with non-inflammable solvent, the latter being present in an amount sufficient to make the solvent mixture non-inflammable. A mixture of 70% ethylene dichloride and 30% carbon tetrachloride, for example, is a substantially non-inflammable solvent mixture well suited for cellulose ethers.

In order to give plasticity as well as binding characteristics to the particles or lands which are deposited upon the printed sheets, various plasticizers such, for example, as dibutyl phthalate, diethyl phthalate, tricresyl-phosphate, blown

castor oil, camphor, or any of the other plasticizers which are suitable may be included in the solution if desired. Also, inert fillers or extenders of organic soaps such as aluminum stearate, aluminum palmitate, or zinc stearate may, if desired, be included in the solution to give the requisite flatness of surface or non-light-reflecting characteristics to the particles or lands when they solidify. In this connection, further inert fillers may also comprise such fillers as asbestine or diatomaceous earth, fuller's earth, magnesium carbonate, or any other material which would be suitable for such purpose.

The following are some examples of offsetting mediums employing the above described solutes and solvents in accordance with my invention, it being understood that these are given only in illustration and are in no way limitative:

Example 1

Ethyl cellulose (47 to 48% ethoxy content; medium viscosity).....oz. (dry wt.)	8
Toluol.....gal.	1/2
Ethyl alcohol SD #1.....gal.	1/2
Tricresyl phosphate.....oz.	1

Example 2

Benzyl cellulose.....oz.	8
Ethyl acetate.....qt.	1
Toluol.....gal.	1/2
SD #1 ethyl alcohol.....qt.	1
Dibutyl phthalate.....oz.	2

Example 3

Ethyl cellulose (47 to 48% ethoxy content; medium viscosity).....oz. (dry wt.)	8
Toluol.....pint.	3 3/4
Xylol.....pint.	1/4
SD #1 ethyl alcohol.....gal.	1/2
Tricresyl phosphate.....oz.	1

The S. D. #1 ethyl alcohol of the above examples is specially denatured alcohol, Formula No. 1, and is made by combining 100 gallons ethyl alcohol with 5 gallons methyl alcohol, and so contains 4.767% by volume of methyl alcohol.

As an example of my preferred non-inflammable, anti-offset composition, the following is illustrative:

Example 4

Ethyl cellulose.....oz. (dry weight)	8
Trichlorethylene.....pt.	5
Toluol.....pt.	2
Xylol.....pt.	1
Dibutyl phthalate.....oz.	1

One or more additional solutes which might be employed without departing from the present invention would consist of such solutes as other cellulose ethers, cellulose esters, phenolic base synthetic resin, glycol phthalic base or other natural or synthetic resin base materials of proper hardness and drying time suspended in an appropriate volatile solvent such as, for example, petroleum naphtha, toluol, or any other series of solvents. Even a wax, when dissolved in a suitable evaporable solvent, may be added without departing from the scope of the present invention.

It can be seen from the foregoing examples that the volatile solvent mixture consists essentially of highly volatile, rapidly evaporable solvents of the class of ethylene dichloride, alcohol, ethyl acetate, toluol, acetone, carbon tetrachlo-

ride, and trichlorethylene, but that less volatile, more slowly evaporable solvents such as xylol, butyl acetate, "cellosolve", and ethyl lactate may be added without departing from the present invention. The anti-offsetting compositions are of a dilute nature as compared to cellulose derivative compositions used for lacquer purposes. The solute is used in proportions of from one ounce to one pound per gallon of volatile solvent, and preferably in a proportion in the neighborhood of eight ounces per gallon of solvent. With such proportions, the solution when sprayed will be a liquid as it is converted into a spray of globules, but as it travels through the atmosphere it will lose a sufficient fraction of volatile solvent to convert each globule into a self-sustaining, adhesive particle which retains sufficient solvent to adhere to the sheet. Each globule thereafter will be converted into a solid by evaporative loss of residual solvent, and this promptly, so that the particles will not adhere to another sheet if it is placed on the first sheet. The composition is such that the particles so produced are of light transmitting quality so as to prevent masking of the printing beneath them or alteration of the natural appearance to the eye of the unprinted portion of the sheet beneath them.

It is contemplated that the composition be employed with any of the mechanical methods, such as pressure, automatic or manually operable spraying mechanisms of well known types, for breaking up a solution of the above described ingredients into minute particles and spraying such particles upon the freshly printed sheets, or other sheets to be separated. To this end the solution of the above described ingredients will be prepared so as to have a consistency or viscosity that may be best handled by the spraying equipment employed, and capable of forming the desired spacing projections. Care must be taken not to let the spray become thick enough to merge the drops on the surface of the printed sheets, as the composition must be sprayed upon the sheets to form a plurality of discrete, small raised particles.

As the volatile solvent of the solution begins to evaporate as soon as it is broken up or vaporized, the minute particles reach the printed sheets in a somewhat tacky and partially dry condition and dry completely immediately upon striking the sheet. Their exposed surfaces are then sufficiently hard and non-adhesive so that they act as solid particles that will not adhere to adjacent sheets.

As many apparently widely different embodiments of my invention may be made without departing from the spirit and scope thereof, it is to be understood that I do not intend to limit myself to the specific embodiments thereof except as defined in the appended claims. It will be apparent that soluble solids, other than those above mentioned, may be employed, as well as a complete range of other solvents, plasticizers and inert fillers, without departing from the spirit of the present invention.

What I claim is:

1. A composition of matter for preventing offset that is normally in the liquid state and which may be sprayed upon a printed or lithographed sheet to form thereon solid particles or lands, and comprising a cellulose ether and a highly volatile, rapidly evaporable organic solvent selected from the group consisting of toluol, ethylene dichloride, alcohol, ethyl acetate, acetone, carbon tetra-

chloride and trichlorethylene, the cellulose ether being present in the proportion of from one to sixteen ounces of cellulose ether per gallon of solvent.

2. A composition of matter for preventing offset that is normally in the liquid state and which may be sprayed upon a printed or lithographed sheet to form thereon solid particles or lands, and comprising a cellulose ether, a highly volatile, rapidly evaporable organic solvent selected from the group consisting of toluol, ethylene dichloride, alcohol, ethyl acetate, acetone, carbon tetrachloride and trichlorethylene, and a plasticizer, the cellulose ether being present in the proportion of from one to sixteen ounces of cellulose ether per gallon of solvent.

3. A composition of matter for preventing offset that is normally in the liquid state and which may be sprayed upon a printed or lithographed sheet to form thereon solid particles or lands, and comprising a cellulose ether, a highly volatile, rapidly evaporable organic solvent selected from the group consisting of toluol, ethylene dichloride, alcohol, ethyl acetate, acetone, carbon tetrachloride and trichlorethylene, and a less volatile, more slowly evaporable organic solvent selected from the group consisting of xylol, butyl acetate, monoethyl ether of ethylene glycol, and ethyl lactate, the cellulose ether being present in the proportion of from one to sixteen ounces of cellulose ether per gallon of solvent.

4. A composition of matter for preventing offset that is normally in the liquid state and which may be sprayed upon a printed or lithographed sheet to form thereon solid particles or lands, and comprising a cellulose ether, a highly volatile, rapidly evaporable organic solvent selected from the group consisting of toluol, ethylene dichloride, alcohol, ethyl acetate, acetone, carbon tetrachloride and trichlorethylene, a less volatile, more slowly evaporable organic solvent selected from the group consisting of xylol, butyl acetate, monoethyl ether of ethylene glycol, and ethyl lactate, and a plasticizer, the cellulose ether being present in the proportion of from one to sixteen ounces of cellulose ether per gallon of solvent.

5. A composition of matter for preventing offset of freshly printed sheets and comprising a cellulose ether and a highly volatile, rapidly evaporative solvent selected from the group consisting of toluol, ethylene dichloride, alcohol, ethyl acetate, acetone, carbon tetrachloride and trichlorethylene, the cellulose ether being present in the proportion of about 8 ounces of cellulose ether per gallon of solvent, the composition having the characteristics (1) that it is liquid as it is converted into a spray of globules, (2) that as it travels through an evaporative atmosphere it loses a sufficient fraction of volatile solvent to convert each globule into a self-sustaining adhesive globule when it lands on a sheet, (3) that the globule adheres to the sheet while retaining solvent, (4) that the globule thereafter is converted into a solid by evaporative loss of residual solvent, (5) that the globules in the aggregate maintain substantial identity and do not flow together in a film formation over the sheet, and (6) that in the aggregate the dried globules or lands are light-transmitting and substantially not glossy and do not indicate their presence on the sheet to the naked eye, or mask the printing beneath them, or alter the natural appearance to the eye of the unprinted sheet beneath them.

6. A composition of matter for preventing off-

set that is normally in the liquid state and which may be sprayed upon a printed or lithographed sheet to form thereon solid particles or lands, and comprising ethyl cellulose, toluol and ethyl alcohol in substantially the proportions of eight ounces of ethyl cellulose, one-half gallon of toluol and one-half gallon of ethyl alcohol.

7. A non-inflammable composition of matter for preventing offset that is normally in the liquid

state and which may be sprayed upon a printed or lithographed sheet to form thereon solid particles or lands, and comprising ethyl cellulose, trichlorethylene, toluol and xylol in substantially the proportions of eight ounces of ethyl cellulose, five pints of trichlorethylene, two pints of toluol and one pint of xylol.

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