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TRANSFER COMPOSITIONS AND THE PRINTING THEREOF

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The present invention concerns improvements in methods of and materials for printing and is concerned, more particularly with the production of printed sheets or webs which are provided on one or both sides over a desired determined portion or portions of their surfaces with coatings transferable by pressure in the manner of the coatings on the so-termed carbon papers.

The object of the invention is to allow the production of such sheets printed with almost completely non-smearing coatings of the type in question with the aid of any ordinary printing mechanism without modification thereof.

According to the invention the sheets or webs are printed with areas of the desired configuration using a composition of such properties as to render it suitable for printing in the cold in the manner of ordinary printing inks, but such that, by subsequent heating and cooling a substantially permanently transferable coating of the non-smearing character employed on the so-termed "manifolding sheets" is obtained.

In the production of manifolding and transfer sheets of the kind in question, it has for some time been the object of considerable investigation to produce a method whereby ordinary printing mechanisms and arrangements could be employed for the purpose of printing the areas of transfer composition, that is to say, to develop a method wherein the web or sheet during printing did not move in relation to the printing surface and such that the printing operation is effected in the cold.

Efforts therefore have already been made towards producing a composition which can be applied in the desired manner and at the same time produces a satisfactory and unobjectionable transfer coating. It will at once be evident that normal carbon paper compositions can be used in a printing machine only in the heated condition, so that such use necessitates very considerable and rather cumbersome modifications of the printing mechanism.

It has been suggested for the purpose of producing transfer surfaces to employ for cold printing an ordinary printing ink rendered non-drying by the incorporation therewith of a considerable proportion of heavy hydrocarbons. Such compositions, as will be readily understood, are not suitable for modern requirements, since they are permanently sticky materials and owe their transfer properties solely to this sticky character. The dirtiness of these compositions prohibits their use. Investigation has shown also that it is not feasible to incorporate a sufficient proportion of hydrocarbons with ordinary printing inks to mask permanently the strong drying or oxidizing character of certain commonly employed printing ink components, such as linseed oil varnish. Thus these products ultimately become hard and no longer capable of producing transfer impressions.

More recently attention has been directed to the use of compositions capable of application in the cold state and owing their fluidity to the presence of a volatile solvent for certain of the constituents of the transfer composition. The initial material can be applied in the cold in a manner analogous to ordinary printing, and on subsequent evaporation of the solvent produces a non-smearing but pressure-transferable coating. Coatings so produced have been in use to a considerable extent of recent years. The solvents found suitable for the purpose in question are, however, relatively expensive as well as being readily volatile. Thus careful and efficient methods of solvent recovery must be adopted not only for the sake of economy but also to conform to the regulations covering the use of many such materials. Such solvent recovery necessitates working with a printing machine closely hooded and provided with efficient means for withdrawal of solvent vapours and condensation of the same.

The present invention seeks to avoid the complications which have been necessitated by such of the earlier suggestions which have proved in any way practicable, by utilizing a composition which is fluid in the cold state and may be printed in the cold on to the sheet or web by usual printing methods, without the use of volatile components, and which by subsequent heating and cooling on the surface of the sheet or web may be transformed into a transfer coating having the desired characteristics.

In carrying the invention into effect the composition is preferably so constituted that, as initially applied to the paper, it is a heterogeneous mixture of the consistency suitable for use on an ordinary printing machine but which on heating after application to the surface, due to physical change in one or more of the constituents, produces a substantially homogeneous fluid which on subsequent cooling sets to a substantially homogeneous pressure transferable coating of a non-smearing character.

The following examples will illustrate compositions which may be used and will illustrate how

the invention may be adapted to a variety of circumstances.

Example 1

The following components comprise a substantially homogeneous and semi-fluid basis:

	Parts
Petroleum jelly	10
Wool grease	16
Sesame oil	2
Diaceto glyceryl abietate	5

To this, 6 to 10 parts of colouring matter (pigment and/or dye) and 4 parts of carnauba wax are added in finely divided condition and the whole ground until quite smooth. In using this composition according to the invention carnauba wax is initially in suspension, and although it thickens the composition somewhat the latter still has a sticky fluid character since the carnauba wax is substantially insoluble in the cold basis. On heating, the carnauba wax melts and becomes homogeneously mixed with the other constituents and on rapid cooling the mixture produces a solid coating of the type required. This mixture is initially rather thick and is therefore particularly suitable for use in slow running machines or with pressure feed.

Diaceto glyceryl abietate referred to in this specification need not be the chemically pure substance, but it is satisfactory to use commercial grades thereof, such for instance as that sold by Messrs. A. Boake, Roberts & Co. of London under the name of "Resin AA".

Example 2

A composition comprising a semi-fluid basis made up as follows:

	Parts
Petroleum jelly	8
Wool grease	12
Sesame oil	8
Diaceto glyceryl abietate	2 to 5

is provided with additions of the following colouring matters:

	Parts
Purple lake	2
Bronze blue	3
Carbon black	2
Blue lake	3

Carnauba wax in the proportion of 4 to 6 parts is then added in a fine state of subdivision and the whole material ground to uniform smoothness. In this composition the degree of fluidity may be adjusted by varying the proportion of diaceto glyceryl abietate the greater fluidity being associated with the greater proportion of this compound. The hardness of the coating ultimately produced may be varied according to the proportion of carnauba wax used, the hardness being greater the greater the proportion of wax present. It is to be understood, of course, that in this example and also in the preceding example the finely divided form of carnauba wax may be produced in situ in the composition produced in the ordinary fashion of carbon paper composition, namely in the molten condition. The principle adopted in regard to this will be explained hereinafter.

The following general directions will assist in defining the manner in which the compositions of the type above exemplified may be varied. In the first place variations in the oil content, particularly of sesame oil, must be made with care since if too much of oils of this character are present the composition shows a tendency to "grease" through the paper, that is to say to produce oil spots and stains on the reverse side of the coated sheet.

The use of diaceto glyceryl abietate is based upon the following considerations. Carbon paper compositions of the ordinary type but manufactured according to the invention, i. e. in which one or more constituents are in the suspended state so as to give a certain fluidity to the composition do not "go forward" in printing machines well since they lack the necessary "length". Considerable investigation has been carried out in connection with the present invention in regard to suitable additions for giving the composition the necessary "length" for suitable working in printing machines. For this purpose, a fluid component was obviously necessary and furthermore it was necessary that this fluid component should have properties resembling the printing ink varnishes such as linseed oil varnish as far as conferring "length" was concerned, but must on the other hand not show the properties associated with linseed oil in respect of drying. They must on the contrary be chosen from those substances which show non-drying characteristics in the highest degree. Very few such compounds are known. Those that are known are largely the class of synthetic resins and the substance known as diaceto glyceryl abietate appears at the present moment to be the one amongst these compounds which shows the property of non-drying to the greatest extent. It is for this reason, therefore, that the above examples employ diaceto glyceryl abietate exclusively, but it is to be understood that similar materials may be substituted but due regard must be had to their incipient drying characteristics in relation to the effective life of the transfer coating ultimately produced.

It will also be understood that any of the various pigments or dyes which are normally employed in carbon paper compositions are equally applicable in compositions for use according to the present invention.

Generally speaking the components found most suitable are of the type illustrated in the foregoing examples and comprise the oils and fats usually employed in the production of carbon paper compositions together with the waxes known for this purpose, one or more of the latter being present in the initial composition in a fine state of subdivision.

The heating of the applied composition may be achieved by causing the printed web or sheet to pass, after it leaves the printing mechanism, over a simple hot plate.

As regards the temperature of the heating device which is employed according to the invention this will, of course, depend upon the nature of the composition and the paper under treatment and also upon the speed with which the paper web or sheets pass through the device in relation to the size of the device. It will be sufficient to say that the temperature in the case of an ink comprising a suspended wax must exceed the melting point of the wax by sufficient amount to allow of rapid melting thereof, and that in general a temperature of 200° C. should not be exceeded in view of the possibility of charring the paper at higher temperatures.

For printing machines operating at high speeds it may be preferable to employ a heated roller or radiant heat devices for the heat treatment of the printed webs or sheets as these leave the

machine. As radiant heat devices electrically heated elements may be used and it may be preferable to arrange these above the printed surface so that the radiant heat falls immediately upon the film of composition on the surface of the sheet.

The production of the finely divided form of waxes which are required, for example in the composition produced according to the examples given, may be carried out either separately or in the composition itself. In the first case it is suitable to spray the heated fluid wax into a cool chamber. In the latter case the whole of the components may be mixed in the heated condition and allowed to cool in bulk slowly. This causes the wax to separate in a crystalline or fairly fine form which may be still further reduced by suitable grinding.

I claim:—

1. Method of producing non-smearing pressure-transferable colour coatings on paper surfaces which includes coating said surface in the cold by printing methods with a compositon comprising a substantially non-volatile substantially non-drying oily base, including diaceto glyceryl abietate in an amount sufficient to function as an extender, at least one wax in finely divided suspended form and colour components, heating said coated surface to cause a fusion of at least one of said suspended waxes and cooling said heated surface rapidly.

2. As a new composition of matter for the production of transfer coatings on paper and like backings, a printable mixture of pasty and sticky consistency composed essentially of a non-aqueous, substantially non-volatile substantially non-drying oily fluid component, a suspended finely divided solid color component and a suspended, finely divided solid fusible component, the said fluid component and the said solid fusible component being completely miscible on moderate heating and freezing to a solid solution when rapidly cooled, said solid fusible component being present in an amount so as to render said solid solution non-sticky and non-smearing, said oily fluid component containing a non-drying semi-resinous ingredient in an amount necessary to give the composition the necessary "length" in printing.

3. Method of producing non-smearing pressure-transferable color coatings on paper surfaces, which includes applying cold a color composition consisting essentially of a substantially non-volatile substantially non-drying oily liquid base and suspended solid constituents at least one of which is fusible, heating said applied coating to melt at least one of said suspended fusible components and cooling said heated coating rapidly.

4. Method of producing non-smearing pressure-transferable color coatings on paper surfaces, which includes applying to the said paper surface a heterogeneous finely divided mixture composed essentially of substantially non-volatile, substantially non-drying oily liquid components and solid components, including color components, at least one of said solid components being insoluble in the said cold liquid components and soluble in said liquid components when hot to produce a hot liquid mixture forming a solid on rapid cooling, heating said applied coating and cooling said heated coating rapidly.

5. Method of producing non-smearing pressure-transferable color coatings on paper surfaces, which includes applying to said paper surface in the cold by printing methods a substantially non-volatile, substantially non-drying fluid composition consisting essentially of an oily base, color components and at least one suspended wax, heating said coated surface to melt at least one wax and cooling said heated surface.

6. Method of producing non-smearing pressure-transferable color coatings on paper surfaces which includes coating said surface in the cold by printing methods with a composition comprising a substantially non-drying, substantially non-volatile oily base, including diaceto glyceryl abietate, at least one wax in finely divided suspended form and color components, heating said coated surface to cause a fusion of at least one of said suspended waxes and cooling said heated surface rapidly.

7. As a new composition of matter for the production of transfer coatings on paper and like backings, a printable mixture of pasty and sticky consistency composed essentially of a non-aqueous, substantially non-volatile oily fluid component containing as an essential ingredient thereof a non-drying oily synthetic resinous material, a suspended finely divided solid color component and a suspended, finely divided solid fusible component, the said fluid component and the said solid fusible component being completely miscible on moderate heating and freezing to a solid solution when rapidly cooled.

8. A new composition of matter in accordance with claim 7 in which said synthetic resinous material is diaceto glyceryl abietate.

9. As a new composition of matter for the production of transfer coatings on paper and like backings, a printable mixture of pasty and sticky consistency composed essentially of a non-aqueous, substantially non-volatile, substantially non-drying oily fluid component, a suspended finely divided solid color component and a suspended, finely divided wax component, the said fluid component and said wax being completely miscible on moderate heating and freezing to a solid solution when rapidly cooled, said wax being present in an amount so as to render said solid solution non-sticky and non-smearing, said oily fluid component containing a non-drying semi-resinous ingredient in an amount sufficient to impart the desired flexibility to said composition.

10. As a new article of manufacture, paper having areas of transfer compositon on one or both sides thereof, said composition permitting transfer of impressions by pressure without heat and composed essentially of at least one fusible wax, and a substantially non-volatile, non-drying oily base containing a non-drying semi-resinous colloidant acting as an extender.

11. As a new article of manufacture, paper having areas of transfer composition on one or both sides thereof, said composition permitting transfer of impressions by pressure without heat and comprising a wax and substantially non-volatile, non-drying oily base containing diaceto glyceryl abietate in an amount sufficient to function as an extender.

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