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BLEACHABLE TRANSFER INK

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This invention relates to ink compositions. More particularly it concerns ink compositions for use in making carbon paper, transfer paper, typewriter ribbon and the like.

Carbon papers, transfer papers, typewriter ribbons and the like, hitherto known in the art form pressure produced imprints on paper which may be removed or erased, when necessary, by rubber erasers or other abradant materials. As a result of the use of such erasers, the paper is weakened due to the abrasion of the paper surface. Also, such erasers produce a dust of mixed paper fiber and abradant which becomes lodged in the type of the typewriter as well as other portions of the typewriter mechanism. The clogging of the type of the machine as well as other parts thereof requires regular cleaning of the typewriter to maintain it in good working order. Accordingly, it is an object of this invention to provide an ink composition useful in the manufacture of carbon paper, transfer paper, typewriter ribbons and the like, which will produce an imprint on paper capable of being removed from the paper by the application of a chemical agent without the necessity of abrading the surface of the paper bearing the imprint.

The abradant erasers used to remove imprints formed from carbon papers and the like heretofore known in the art are inefficient, inasmuch as such eraser has to be used sparingly lest the paper be torn. Therefor a further object of this invention is to provide a carbon paper, transfer sheet or typewriter ribbon embodying an ink composition which will produce imprints on a paper surface which may be readily removed from the paper surface by the application to the paper surface of a chemical agent adapted to bleach or discolor the imprint, thereby removing the same in a highly efficient manner without impairing the paper surface.

A further object of this invention is to provide an ink composition comprising a vehicle of wax or waxlike material as well as other suitable materials, and a colorant uniformly distributed through the vehicle, said colorant being of a type which is susceptible to bleaching or discoloration upon contact with bleaching or discoloring agents and said vehicle being permeable or penetrable by bleaching or discoloring agents. The ink composition is adapted to be applied to a base to form carbon paper, transfer sheets, typewriter ribbons or the like which will form pressure produced imprints capable of being penetrated by bleaching or discoloring agents to cause the colorant portion of said imprint to become bleached or discolored.

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Other objects of my invention will in part be obvious and in part hereinafter pointed out.

The ink composition of this invention comprises a wax like substance which may be mixed with tempering agents to form a vehicle of predetermined characteristics and in which a colorant may be uniformly distributed therein. Car-nauba or candelilla wax have been found suitable for such purpose. These waxes may be modified by the addition thereto of other waxes such as montan wax, beeswax or paraffin wax. Paraffin wax or microcrystalline wax have also been found suitable as vehicles. Various synthetic waxes or waxlike materials now available on the market are also adapted to be used as vehicles. Carbowax 1000 and Carbowax 4000 which are high molecular weight polyethylene glycols soluble in water, dicetyl carbonate and cetyl alcohol are examples of such synthetic waxes. Certain of the synthetic materials known as Spans, which are long chain fatty acid partial esters of hexitol anhydride and Tweens which are polyoxyalkylene derivatives of hexitol anhydride partial long chain fatty acid esters may also be used alone or in admixture with other waxes or waxlike materials to form suitable vehicles.

Materials which are of an elastic rubbery nature such as isobutylene polymers sold under the name of Vistanex, natural or synthetic latex, either alone or in admixture with waxes or wax like materials and which are in a liquid permeable form, have also been found suitable for use as vehicles in making the ink composition embodying the invention.

The vehicle may be modified by the addition thereto of plasticizing agents such as tricresyl phosphate, paraffin oil, light mineral oil or other known plasticizing agents. Aqualube, which is a polyhydric alcohol ether condensate of fatty acid phthalates and is soluble in water, has been found suitable as a plasticizing agent for the vehicle.

The colorant distributed in the vehicle is selected from among those dyes and other coloring materials which have the property of imparting a uniform color to the ink composition and additionally are adapted to be bleached or otherwise discolored upon contact with appropriate chemical reagents. Such colors may be of the aniline type, as oil black, nigrosine black, china blue, spirit blue and the like. The colorant selected may be soluble in water or alcohol or dispersible in the other ingredients of the composition. The colorant may be compounded with the other ingredients of the ink composition in

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the form of a solution or in powdered solid form. It has been found that small amounts of carbon black may be mixed with larger amounts of bleachable colorant to form a mixed color which may be readily bleached or discolored.

Certain of the waxes or waxlike substances used as a vehicle for the ink composition are readily penetrated by the chemical agents which have for their purpose the bleaching or discoloration of the colorant carried by the vehicle. If a selected wax or waxlike substance is impervious to the passage of such chemical agents, the ink composition including such waxes or waxlike substances is rendered permeable or penetrable, by the inclusion of a wetting or dispersing agent or agents. The wetting or dispersing agents also function as a means for obtaining a uniform dispersion of all the ingredients of the ink composition. The wetting or dispersing agents may be of a waxy character as in the case of some of the Spans and Tweens. Wetting or dispersing agents known in the art such as Tergitols, which are essentially sodium sulfate derivatives of compounds such as 3,9-diethyltridecanol-6 and 7-ethyl-2-methylundecanol-4, copper oleate, dioctyl sodium sulfo-succinate or the like, may be used to render an otherwise impermeable vehicle, penetrable by chemical bleaching or discoloring agents.

The ink composition may include wax in amounts ranging between 40% to 80%, colorant in amounts ranging between 10% to 20%, penetrating agents in amounts ranging between 10% to 40% and plasticizers in amounts ranging between 10% to 40%. Preferably, plasticizers and penetrating agents are each used in amounts ranging between 10% to 20%.

The ink compositions may be formed by melting the waxes or waxlike substances, lowering the temperature of the molten material and then adding the colorant, and remaining ingredients while stirring or milling to obtain a uniform composition. If the ingredients are water soluble, they may be mixed at room temperatures.

The resultant ink composition may be applied to a thin paper base to form carbon or transfer papers, as a hot melt or by other procedures indicated by the characteristics of the vehicle. Typewriter ribbons may be formed by impregnating or coating the tape base in a manner known in the art.

It has been found that the ink composition of the invention produces carbon and transfer papers which are stable over long periods of time. Additionally, the ink compositions of this invention permits the application of coatings of minimum thickness to a base. The carbon papers and transfer sheets formed with the ink composition of the invention exhibit a high degree of resistance to curling under conditions of relatively high humidity, apparently due to the penetrative power of the composition relative to the paper base.

To insure a non-curling product, it has been found highly desirable to distribute aluminum salts such as the sulfate or chloride throughout the paper base by impregnation or by inclusion in the pulp from which the base is formed. The addition of small amounts of such salts to the ink composition also aids in producing a non-curling product.

The pressure formed imprint on a base derived from any of the carbon papers, transfer sheets or typewriter ribbons embodying the ink composition of the invention, may be quickly and easily

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removed without affecting the base. This is accomplished by applying a bleaching or discoloring agent such as sodium hypochlorite to the imprint. This may be readily accomplished by providing a suitable applicator for containing the bleaching agent and dispensing the same in controlled amounts to the imprint to be removed. It has been found that the bleaching action is quite rapid due to the speed of penetration of the bleach into the vehicle. The paper is not impaired and the bleached portion may be readily typed over.

It is understood that other bleaching or discoloring agents such as sodium sulfite or sodium perborate may be used in lieu of the sodium hypochlorite. The bleach may be applied in any form, preferably liquid. The bleaching or discoloring agent may require an activator which may be applied by means of a separate applicator subsequent to the use of the bleach. For example oxalic acid may be used to accelerate the bleaching action of a weak solution of sodium hypochlorite. The oxalic acid may be carried in a special blotter which is applied to the bleach treated imprint. It is apparent that various forms of applicators may be used for bringing the bleach or other reactive agent into contact with the imprint to be bleached or discolored. Multi-component bleaches may have one of the components thereof carried in the ink composition or the base to which the ink is applied. The subsequent application of the other components of the bleach to the imprint will provide a bleaching or discoloring action in situ.

If it is desired that the imprint formed by the ink composition be capable of being treated to restore its color, after being bleached, a small amount, less than 1.0% of ammonium metavanadate may be added to compositions including spirit blue as a colorant. The application of a bleaching or discoloring agent will bleach or discolor the imprint formed from such a composition, but upon treatment of the paper bearing the bleached or discolored imprint with hydrogen sulfide or tannic acid, the imprint will become visible.

The carbon papers or transfer papers made with the ink composition of the invention, may be provided with selected surface portions which are treated so that no imprint will be formed on corresponding surface portions of a paper base in the use of the carbon paper. This is accomplished by treating the coated surface of the carbon paper with a bleaching agent to discolor the colorant of the paper coating on the selected surface portions. This permits the use of such carbon papers to form carbon copies having blank surface portions when desired.

The following examples illustrate the ink composition of the invention but are not to be regarded as a limitation of the invention.

Example I

40% paraffin wax
20% paraffin oil
10% Span 40—sorbitan monopalmitate
10% Tween 40—sorbitan monopalmitate polyoxalkylene derivative
20% spirit blue

The ingredients upon being compounded, produced a composition, which was applied to a tissue base to form a carbon or transfer paper. The imprint produced by the paper did not smudge and was readily bleached upon the application of a bleaching solution thereto. The paper did not

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curl even under conditions of relatively high humidity.

Example II

45% Carbowax 1000
30% aqualube
25% black dye

A carbon paper produced with the above composition gave clear, non-smudging imprints which were readily bleached.

Example III

30% Carbowax 1000
20% dicetyl carbonate
30% tricoresyl phosphate
20% spirit blue

Carbon paper produced with the above composition formed clear prints which were readily discolored by the application of bleaching solution thereto.

Example IV

30% Tween 60—oily liquid sorbitan monostearate polyoxyalkylene derivative
30% Tween 61—waxy solid sorbitan monostearate polyoxyalkylene derivative
20% Span 60—waxy solid sorbitan monostearate
20% black dye

Example V

50% Carbowax 4000
25% aqualube
20% nigrosine black
5% aluminum sulfate

The foregoing ingredients all of which are dispersible in water are readily mixed in a small amount of water to produce an ink composition which was applied to a tissue base at room temperatures. The carbon paper made with this composition showed exceptional resistance to curling under humid conditions. A small amount of the nigrosine black was replaced with carbon black, the resultant composition producing bleachable imprints.

Example VI

25% carnauba wax
20% Carbowax 1000
5% paraffin
25% paraffin oil
25% oil black

The foregoing ingredients were combined to form a hot melt composition readily applied to a paper base and productive of readily bleachable prints.

Example VII

30% microcrystalline wax
20% Tween 60
20% Tween 61
10% Arwax—a mixture of microcrystalline wax and polyisobutylene
20% spirit blue

The ink composition formed from the foregoing ingredients produced satisfactory imprints which were readily discolored by the application of sodium hypochlorite bleach thereto.

Example VIII

35% carnauba wax
5% beeswax
35% mineral oil
10% Tergitol
15% oil black

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The ink composition formed from the foregoing ingredients was applied to a tissue base in the form of a hot melt and gave clear imprint which were effectively discolored by the application of a bleaching solution thereto.

It will thus be seen that there is provided an ink composition and articles embodying the same, in which the several objects of this invention are achieved and which is well adapted to meet the conditions of use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein set forth is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim as new and desire to protect by Letters Patent,

1. A water permeable, bleachable, ink composition for coating and impregnating typewriter ribbons and carbon paper comprising a meltable wax vehicle including at least ten percent of a water dispersible wetting agent for rendering said vehicle permeable to aqueous bleaching agents, and as the sole colorant a bleachable dye homogeneously dispersed through the vehicle.

2. A composition as in claim 1 wherein said wax vehicle comprises carnauba wax.

3. A composition as in claim 1 and further including ammonium vanadate in an amount sufficient to allow imprints formed from the composition and thereafter bleached, to be chemically treated to render the same legible.

4. A water permeable, bleachable, ink composition for coating and impregnating typewriter ribbons and carbon paper comprising a vehicle permeable to aqueous bleaching agents including at least ten percent of a long chain fatty acid partial ester of hexitol anhydride and at least ten percent of a polyoxyalkylene derivative of hexitol anhydride partial long chain fatty acid ester, one of said esters being a waxy solid and the other an oily liquid and as the sole colorant a bleachable dye homogeneously dispersed through the vehicle.

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