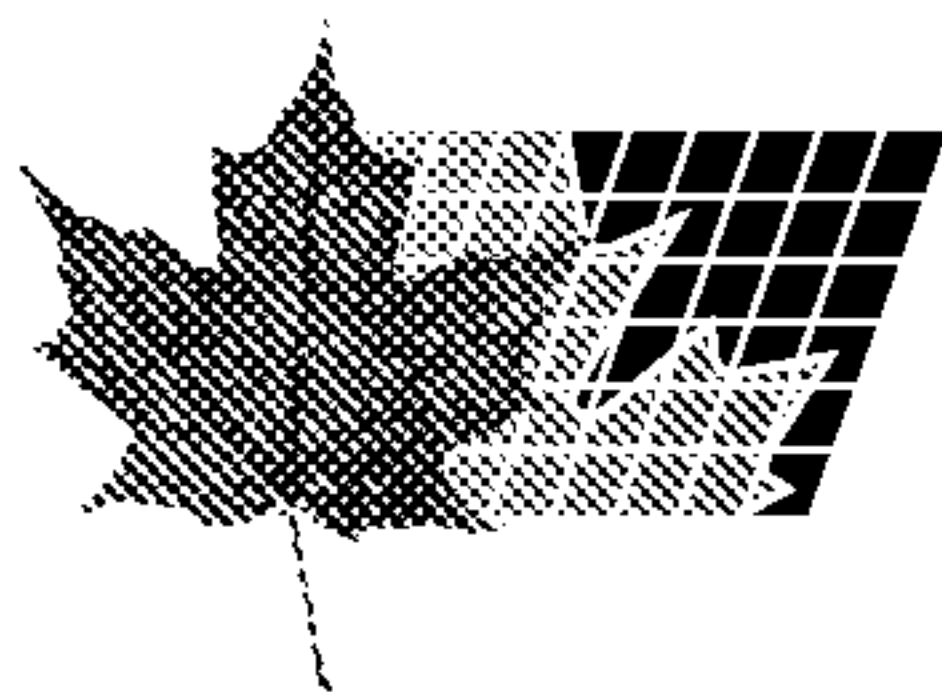




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(54) **ENCRES FLUORESCENTES**

(54) **FLUORESCENT INKS**

(57) A fluorescent ink has been conceived that has particular use in devices such as inking components of postage meters. The inks are in the form of solutions, and contain a soluble fluorescent toner that is dissolved within a polar organic solvent. Additives can be used to modify the properties of the ink.



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FLUORESCENT INKS

Abstract of the Disclosure

A fluorescent ink has been conceived that has particular use in devices such as inking components of postage meters. The inks are in the form of solutions, and contain a soluble fluorescent toner that is dissolved within a polar organic solvent. Additives can be used to modify the properties of the ink.

FLUORESCENT INKS

Background of the Invention

There are certain situations in which a fluorescent ink is used for detecting purposes. Such fluorescent inks will have one color, such as black or red, when viewed in ambient light, but upon being exposed to ultraviolet light, will display another color such as green or yellow. Examples of where such inks can be used is in the machine processing of various types of information on tickets, tags, labels, postage indicia or imprints, and the like. In the case of postage indicia, facer canceller tables and metered mail handling equipment are fitted with luminescent ink detecting devices that expose the postage indicia to an ultraviolet light during the automatic processing of mail. If the specified luminescent signal is not viewed during exposure, the postal clerk is required to hand cancel the postage indicia.

Fluorescent inks that have been used in postage meters to print postage indicia in the past have worked well, but they have certain short-comings. The composition of these fluorescent inks has been in the form of a dispersion. In such dispersions, one has to control the particle sizes and agglomeration size in order to prevent settling. In short, there is always a settling problem in dispersion inks, particularly when one recognizes that coloring toners and fluorescent pigments can settle at different rates. It has long been recognized that a fluorescent ink in solution form would be more desirable because of its advantageous properties of Newtonian viscosities that are not dependent on shear rates under normal conditions. Thus, the flow properties of solutions can be controlled more easily than dispersions. To date no adequate solution fluorescent ink has been found because certain properties are required that

could not be achieved in the past. Fluorescent inks require a high boiling temperature and low freezing point. Also, they should have a low evaporation rate. In addition, they should have a long shelf life, and high stability despite
5 having a relatively large number of components. It should also be noted that a characteristic of an ink used in a postage meter is that they are constantly moving, and therefore it is advantageous to have a homogeneous fluid. Particularly, the fluid should not clog the printing system
10 since no cleaning or maintenance is available to the user of a postage meter due to security reasons.

SUMMARY OF THE INVENTION

A solution fluorescent ink has been discovered that is formulated by the use of polar organic solvents. The
15 solvent normally makes up 60 to 90% of the solution and the soluble fluorescent resin accounts for 10-40% of the ink. Preferably, not more than 5% of toning dye is added to the solution. Viscosity modifiers and luminescence enhancers can be added as needed. It has been found preferable to
20 have a combination of fluorescent resins and polar organic solvents such as triethylene glycol, glycerine and glycol ethers, for example.

Fluorescent inks of the solution type have been formulated by using polar organic solvents to which fluorescent toners are added. The polar organic solvents should have a matching polarity to the fluorescent resins with which it is used, having a boiling point of greater than 250°C, low vapor pressure at ambient, i.e. less than 0.05 mm of mercury and should be water tolerant but not absorb water.

For purposes of this invention, polar organic solvents are defined as those solvents that have a total solubility parameter, S_1 , of approximately 18 to 32. Reference can be had to page 156 of the CRC Handbook of Solubility Parameters and Other Cohesion Parameters (1983) published by CRC Press, Inc., Boca Raton, Florida. Solvents which have been found suitable are triethylene glycol, glycerine, ethylene glycol phenyl-ether, tripropylene glycol methyl-ether and tripropylene glycol. The solvents will constitute 60 to 90% of the solution. The fluorescent resins will constitute 10 to 40% of the solution and should be polar resins such as amino - aldehyde plastics or polyesters. Fluorescent resins which have been found suitable are FC 1206 (4029)* available from Radiant Color Div., Magruder Corp. Richmond, California, Ra 4030* and Ra 4031* also available from Radiant Color and Ax and HMS series* resins available from Dayglo Color Corp., Cleveland, Ohio. The toning or coloring dyes should constitute less than 5% of the solution, preferably less than 3%. Other additives such as viscosity modifiers, print quality enhancers and fluorescence enhancers can be used, up to 5% each as needed. Examples of such formulations are as follows:

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Example 1

<u>Ingredient</u>	<u>Amount</u>
Triethylene glycol (TEG)	20
Glycerine	20
Ethylene glycol phenyl-ether (EPH)	10
Tripropylene glycol methyl- ether (TPM)	20
Fluorescent resin such as * FC 1206	25
p - Toluene Sulfonamide	<u>5</u>
	100%

Example 2

<u>Ingredient</u>	<u>Amount</u>
* Klucel	3%
* FC 1206	10%
Tripropylene glycol methyl-ether (TPM)	85%
Tributyl phosphate	2%

Klucel is a viscosity modifier available from Hercules Corp., Wilmington, Delaware.

Example 3

*Ra - 4029	9.0%
*Ra - 4030	4.0%
Diethylene Glycol	21.0%
*Ketjenflex	53.0%
*AX - 8800-5 Magenta	9.0%
*AX - 17N Yellow	4.0%

*
Ketjenflex is a solvent composed of p-toluene sulfonamide, o-toluene sulfonamide and substituted sulfonamides available from Akzo Chemical Co., and AX-8800-5 Magenta* and AX-17N yellow* are fluorescent resins available from Dayglo Color Corp.

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Example 4

*Ra 4029	16%
*Ra 4030	4%
Oleic Acid	10%
*Neptun Yellow 076 Dye	0.93%
*Neptun Red 543 Dye	0.562%
Tripropylene Glycol	45.5%
Triethylene Glycol	23%

Neptun yellow 076 Dye and Neptun Red 543 Dye are available from BASF.

Example 5

* Ra 4029	20%
* Yel 4030	5%
Tripropylene Glycol	25%
* G-4031 Radiant CHEM	5%
* Ameroxol - Amerchol Corp. (oleyl alcohol ethyo lates)	5%
* G-2109, (polyoxyethylene C ₁₂ fatty acid available from ICI Americas)	40%

The above inks were tested in conditions that simulated the conditions of a postage meter and were found to be satisfactory in terms of printing postage indicia, shelf life, and resistance to temperature extremes. Most importantly, the components of the ink did not settle when the inks were not in use.

* Trade-Mark

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE
PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A homogeneous fluorescent ink for use with porous foam applicators, comprising: 10 to 40% soluble
5 fluorescent resin toner, 60 to 85% polar organic solvent, and not more than 5% dye, wherein said polar organic solvent has a boiling point greater than 250°C and a vapor pressure less than 0.05 mm Hg at 25°C.
2. The fluorescent ink of claim 1 wherein said
10 solvent is selected from the group consisting of triethylene glycol, glycerine, tripropylene glycol methyl-ether, tripropylene glycol and ethylene glycol phenyl-ether.
3. A fluorescent ink comprising: 20% triethylene glycol, 20% glycerine, 10% ethylene glycol phenyl-ether, 20%
15 tripropylene glycol methyl-ether, 25% soluble fluorescent resin and 5% p-toluene sulfonamide.
4. A fluorescent ink, comprising: 3% viscosity modifier, 10% soluble fluorescent resin, 85% tripropylene glycol methyl-ether and 2% tributyl phosphate.