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34, chemin des Colombettes
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FILING DATE: *November 26, 2018*
RELATED PCT APPLICATION NUMBER: *PCT/US19/63215*

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS *US62/917,159*

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U.S. PTO
62/917159
11/26/2018

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PROVISIONAL APPLICATION FOR PATENT COVER SHEET – Page 1 of 2

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No. _____

INVENTOR(S)		
Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
John F	Cooper	Hendersonville, NC
Tonya	Tremitiere	Bradenton, FL
Mandy	Smith	North Port, FL
Jana	Petrova	Ellenton, FL
Mark	Cummings	Bradenton, FL

Additional inventors are being named on the _____ separately numbered sheets attached hereto.

TITLE OF THE INVENTION (500 characters max):

Process For Using Disperse Dye Based Inks for Pad Printing

Direct all correspondence to: **CORRESPONDENCE ADDRESS**

☐ The address corresponding to Customer Number: _____

OR

☑ Firm or Individual Name Esprix Technologies

Address 7680 Matoaka Road

City Sarasota	State FL	Zip 34243
Country USA	Telephone 941-315-6320	Email tonya@espriximpres

ENCLOSED APPLICATION PARTS (*check all that apply*)

☐ Application Data Sheet. See 37 CFR 1.76.
☐ CD(s), Number of CDs _____
☐ Drawing(s) *Number of Sheets* _____
☐ Other (specify) _____
☑ Specification (e.g., description of the invention) *Number of Pages* 2

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PROVISIONAL APPLICATION FOR PATENT COVER SHEET – Page 2 of 2

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☑ No.

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SIGNATURE Tonya Tremitiere DATE 11/9/18

TYPED OR PRINTED NAME Tonya Tremitiere REGISTRATION NO. _____ (*if appropriate*)

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PROCESS FOR USING DISPERSE DYE BASED INKS FOR PAD PRINTING

This invention relates to environmentally and consumer friendly disperse dye ink compositions that can be used for pad printing and subsequent dye transfer for decoration of textiles or dye-receptive objects. The inventive process involved saturation of an ink pad with a specific sublimation ink, applying the ink to a receptive stamp, using the inked stamp to create an image on an intermediate substrate such as plain paper, placing a dye-receptive surface in contact with the ink image and transferring the sublimation dye using a suitable combination of heat, pressure and time. The composition comprised from about 60 to 90% water, from about 5 to 45% water miscible solvent, from about 0.1 to 10% disperse dye particles of approximately 300 nm or smaller, from 0.1 to 5% pigment dispersant and optionally additional components such as biocides, surfactants, viscosity adjustors, and UV light stabilizers. A preferred version of the inventive ink also includes from 0 to 5% of one or more fluorescent dyes also capable of transferring under the same conditions as the disperse dyes. Another preferred version of the sublimation ink is the use of disperse dyes that are Ames negative.

BACKGROUND

The use of sublimation inks for pad printing is known in the art. For example, U.S. 7,563,834 issued to Gambling Partners International discloses a transfer ink to be used with stamp pads for marking gambling chips. While this ink composition may be suitable for its intended purpose it suffers from a number of disadvantages if the ink is to be used by consumers to decorate certain textiles or hard goods. A first issue is the use of a thinner which typically is based on non-aqueous solvents and chemicals that could be considered either toxic or environmentally unfriendly. A more important issue is that 7,563,834 requires the use of a base with thermosetting properties. The inks of the current invention do not include essentially any thermoplastic or thermosetting polymer for their successful utilization. Referring to the above described process implementation, the intermediate sheet is printed with the transfer ink and this is then dried and then placed in contact with an item to be decorated, such as a ceramic mug or metal plate. These items will have a dye receptive surface. Application of heat to the reverse side of the printed sheet transfers the dye only to the item's surface. If thermoplastic or thermosetting polymer is included in the ink, that polymer will soften during the transfer process and will act as an adhesive between the substrate and decorated object making separation of the sheet difficult. Even after separating the printed substrate there is an additional issue in that some of the polymer, if included in an ink, remains on the decorated item and this is undesirable and difficult to remove even with harsh solvents.

PROCESS FOR CARRYING OUT THE INVENTION

A disperse dye is typically milled with a type and quantity of water and dispersant required to produce a particle size dispersion that once combined with additional ink components will provide a dye dispersion that will remain in a stable dispersed form for an extensive time period even under varying environmental conditions. The preferred average particle will be in the 5 to 200 nm size range. The particular technique used to

mill the dye particles can be one common to the pigment milling industry and could include (for example) ball mills, attritors, or continuous media mills. The invention is not limited to specific disperse dyes and could include ones that are typically used to decorate textile fibers of coated novelty items. Preferably the dyes are free of impurities and toxic components and are environmentally friendly. It is preferred that the particular dyes pass an AMES test for potential mutagenicity. The quantity and type of dispersant will depend on the specific disperse dye and could range (typically) from 0.5 to 50% of the weight of pigment. The specific dispersant is limited only to one that provides the desired pigment dispersion stability and could include such materials (for example) as polymeric acrylic acids, ethoxylated compounds, block and graft polymers, oxazolines, and sulfonate compounds. Additional ink components could be included during the process of preparing the dye dispersion or alternatively added during dilution of the dispersion.

The above dispersion is then diluted with water, co-solvents and additional ink components such that the final dye concentration will be in the 0.1 to 10%, depending on the particular dye and its tintorial strength. The final concentration of water is 60 to 90% of the total ink. A secondary water-miscible solvent or mixture of solvents is used to reduce evaporation and prevent premature ink drying. The total quantity of water-miscible co-solvents is typically in the 5 – 45% range. Examples of suitable co-solvents include alcohols, glycols, glycerin, and pyrrolidone. The ink may also include additional components such as pH adjusters, surfactants, biocides, viscosity modifiers, and light stabilizers. The ink is placed in a Clearsnap pad and a rubber stamp used to transfer ink from the pad to a plain paper substrate. The inked portion of the substrate was placed in contact with a polyester based textile and the combination placed in a heat press for 30 seconds at 350 degrees F to produce a dye image on the textile.