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PRINTER SUBLIMATION MATRIX

HP INC

Printer Sublimation Matrix

Abstract: A matrix of sublimating heaters and corresponding fans of a fabric printer is operated according to the areas of fabric onto which ink has been printed in order to reduce power consumption and improve throughput of the printing process.

This disclosure relates to the field of dye sublimation printing.

A sublimation matrix technique is disclosed that enables the selection of the areas of the print which are to be sublimated using hot air mechanisms.

Currently the process of printing on T-Shirts and other garments using dye sublimation inks for polyester fabric or cotton is basically divided in two phases. First, a printing phase, either on-transfer or direct-to-garment. Second, an ink sublimation phase using a heating press, a "hot air shot" method, or a curing process for cotton or pretreated surfaces. Usually, when decorating a fabric/garment, not all its area has ink deposited on it. However, sublimation is currently accomplished by uniformly heating the entire surface of the printed area, including areas which contain no ink to be sublimated.

Printing throughput is an issue. The preparation time is a parameter to be considered as the T-Shirt or garment must be positioned carefully to avoid wrinkles, and centered in the printing area. If the process is too slow, it limits the volume of prints that can be made. This can be problematic for printing orders for events with hundreds or thousands of people. In order to satisfy such large orders, the throughput for printing and curing/sublimating needs to be quite high. Along with throughput, the energy consumption utilized to produce the necessary heat is also a concern.

According to the present disclosure, and as understood with reference to the Figure, in one example a matrix of small sublimating devices is created that enables the application of heat by hot air devices only in the areas in which is needed (i.e., to sublimate the ink deposited in those areas. By using this technique, the energy consumed in the sublimation process will be reduced significantly when the area that has ink coverage is significantly less than 100%.

The printing device has three differentiated layers: a PCT heaters matrix 10, a fans matrix 20, and the fabric 30 onto which the ink has been deposited for sublimation. A support frame 40 may be used to hold the fabric stably without wrinkles when printing and sublimating. A high-temperature-resistant protective grill 50 may be used to support the fabric.

A PTC heater of the heaters matrix 10 is a heater that comprises PTC thermistors. PTC thermistors are ceramic components whose electrical resistance rapidly increases when a certain temperature is exceeded. Thus when no air is applied (e.g. as a result of the fans being off), the thermistors quickly reduce power consumption.

Information included in the printing workflow defines the areas of the fabric onto which ink has been transferred. This information is analyzed and then used to control operation of the fans. In this way, only those fans of the fan matrix 20 which correspond to the areas of the fabric 30 covered with ink are activated. The result is that energy consumption is lowered to the minimum required to sublime the ink.

The smaller the size of the fans, the more effective the system is at energy conservation. If a fan is off, the corresponding PTC is always hot at its maximum temperature which consumes the lowest power. Only those fans which correspond to the areas of the fabric 30 onto which ink has been deposited are turned on to cause ink sublimation. In this way, overall power consumption is minimized.

In addition, in some examples cycle time can be reduced by about a factor of 10, as the smaller heaters with less thermal mass can be heated and cooled more quickly. This, in turn, significantly increases throughput.

The disclosed technique can print and sublimate on a large print surface without moving the fabric, and sublimating all the printed surface areas at the same time. Sublimation occurs only in printed areas. Lower power consumption results in less heat emission from the printer. And there are other advantages such as a lack of ghosting, sketching, and iron/heatpress marks.

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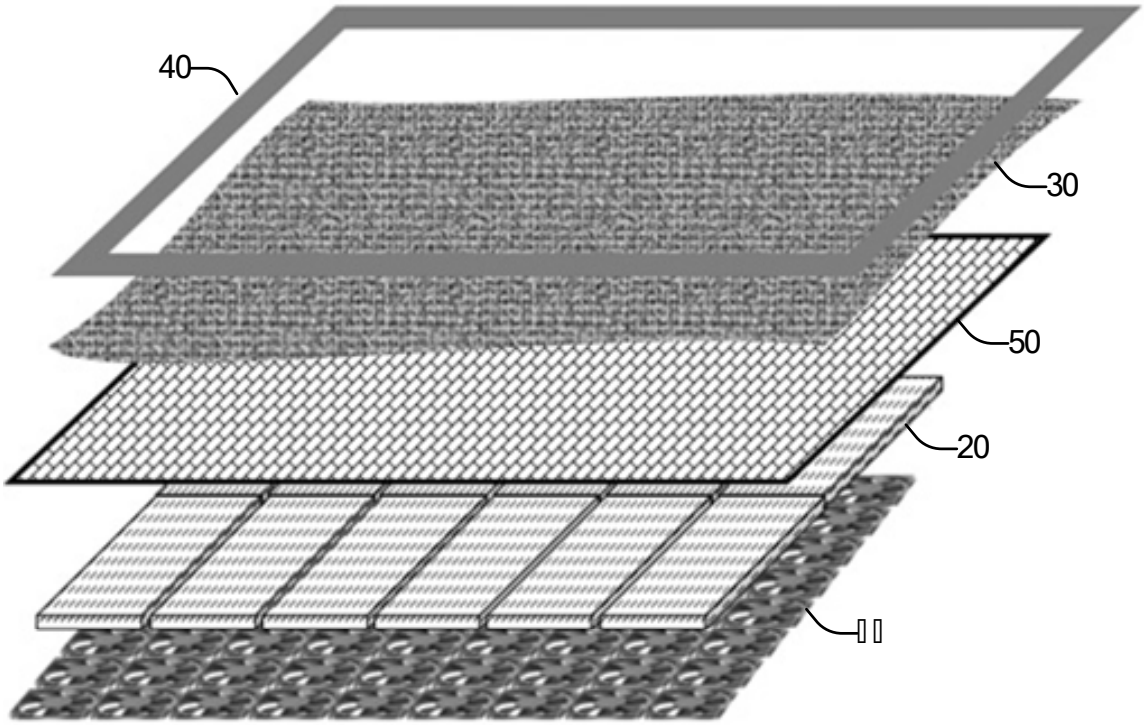
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