



(19)

Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 814 383 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
29.12.1997 Bulletin 1997/52

(51) Int. Cl.⁶: **G03G 11/00**

(21) Application number: **96201736.4**

(22) Date of filing: **22.06.1996**

(84) Designated Contracting States:
**AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC
NL PT SE**
Designated Extension States:
SI

(71) Applicant: **Passalacqua, Antonino**
20146 Milano (IT)

(72) Inventor: **Passalacqua, Antonino**
20146 Milano (IT)

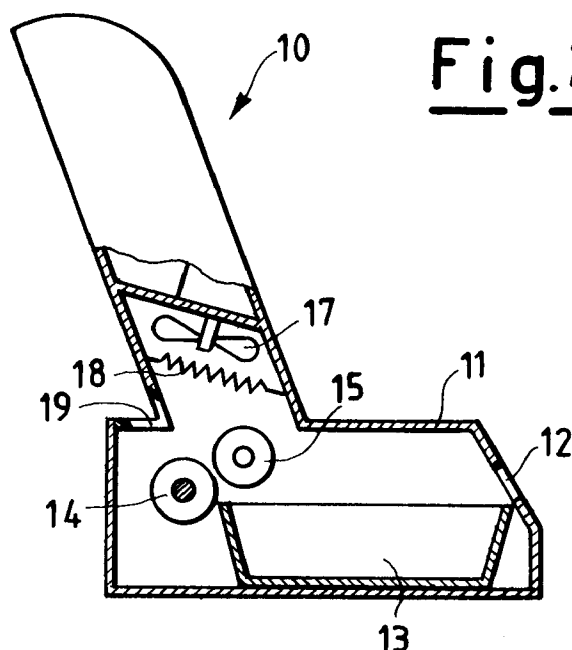
(74) Representative:
Fusina, Gerolamo et al
Ing. Barzanò & Zanardo Milano S.p.A,
Via Borgonuovo, 10
20121 Milano (IT)

(54) Method for black tone enhancement in a print obtained using toner

(57) A method is provided for black tone enhancement in a print obtained using toner, in which the print is immersed in at least one bath of a solution containing surfactant, and then undergoes a drying stage by means of a hot air stream.

An apparatus is also provided for treating prints obtained using toner, provided with a print entry section, a free surface container containing a surfactant solution, a device for automatically advancing the print, a print drying device and a print exit section.

The method and apparatus can be used for preparing letterpress printing plates, tampographic printing plates, or plates for hot printing, or for silk-screen frames.



EP 0 814 383 A1

Description

This invention relates to a method for black tone enhancement in prints obtained using toner.

In electrostatic photocopying transfer processes, such as the well known xerox process, the print is prepared in the following manner. Firstly an aluminium plate on which a layer of high photoconductivity material (amorphous selenium in the case of the xerox process) has been suitably deposited is electrostatically charged. The plate is exposed to the image to be copied, in such a manner as to discharge the points struck by the light and to maintain the remaining points charged (because of the presence of selenium). A black powder, known as toner, comprising a thermoplastic resin incorporating a pigment is spread over the plate together with extremely minute plastics-coated glass balls (diameter about 3 μ) known as the carrier. By virtue of the difference in charge, the toner is fixed by the positively charged image by electrostatic attraction, the carrier sliding away to be easily removed.

The paper sheet, also positively charged, is finally pressed onto the plate so as to transfer the toner onto the paper, on which it is fixed by heating it to 200°C so as to melt the thermoplastic resin and cause it to adhere to the sheet.

In other cases, direct electrostatic processes are used to reproduce the image directly onto the paper, which is prepared in a particular manner. This is the case for example with the Electrofax process, which uses zinc oxide as the photoconducting layer and paper coated with a layer of insulating resin (such as silicone, polystyrene or butadiene copolymers).

A similar process employing the same principle is used by laser printers, the use of which is now extremely widespread. In this respect, the definition capacity of laser printers is in continuous increase, so that they represent an increasingly valid alternative to photocomposition.

However, in none of the aforesaid cases is the image always produced in a perfect manner. The greatest problem and drawback is that the black tone achievable is never the maximum. The print is discoloured, the colour being closer to dark or very dark grey than to black. Because of this, the print does not have that brightness and prominence typical of an ink print, and which for many practical applications (visiting cards, publicity material, brochures etc.) is essential.

An object of the present invention is to obviate the aforesaid problems of the state of the art.

A particular object of the present invention is to make it possible to employ photocopying techniques using toner, in which the print has the maximum black tone.

A further object of the present invention is to obtain, by photocopying techniques, prints of a quality very similar to, if not identical with, that of an ink print.

These and further objects are attained by a method for treating a print obtained using toner, wherein the

print is immersed in at least one bath of a solution containing surfactant and then undergoes a drying stage by means of a hot air stream.

Advantageously, the solution in which the print is immersed is an aqueous solution containing as main substances a mixture of glycolethers, surfactants and antimildew and antifoaming substances.

The glycolether mixture has a concentration of between 60 and 65% by weight, the surfactant mixture has a concentration of between 0.5 and 1% by weight, the antimildew substances have a concentration of between 0.1 and 0.2% by weight, and the antifoaming substances have a concentration of between 0.05 and 0.1% by weight.

All the given percentages refer to weight concentration on the total mixture.

The aqueous solution (distilled water) is present in a concentration of between 30 and 35% by weight, on the total.

Usable surfactants include for example anionic surfactants (such as alkylarylsulphonates, primary or secondary alkylsulphates), cationic surfactants (such as fatty amines, alkylanilines, substituted amides), or non-ionic surfactants (such as monoglycerides, diglycerides, polyoxyethylenates with alcohols, acids, alkylphenols, glycol monoesters, polyglycol monoesters and polyalcohol monoesters with fatty acids).

The retention time of the print in the surfactant bath is preferably between 1 and 60 seconds, the advantageous preferred time being between 1 and 10 seconds. In much preferred embodiments, said retention time is between 1 and 5 seconds.

The bath containing the solution is maintained at a temperature of between 20 and 40°C, in advantageous embodiments of the present invention the bath being maintained at a temperature of between 30 and 35°C.

On leaving the bath the print is struck by a hot air stream at a temperature of between 30 and 90°C to facilitate its drying. Said temperature is advantageously between 50 and 60°C. The drying time is between 5 and 60 seconds, and is advantageously about 15 seconds.

It has been found that the method of the present invention is particularly suitable for enhancing the black tone of prints obtained using toner on transparent polyester film, whether matt or clear. In this respect, in such prints, after enhancing the black tone in accordance with the present invention, the dark region has a degree of concealment considerably greater than an untreated print, a very important characteristic for a number of subsequent applications.

The transparencies obtained by laser printing are then used to form printing matrices in silk-screen frames, letterpress printing plates obtained from photopolymeric material, stamp plates, hot printing plates and tampographic printing plates. In all these operations it is very important for forming the matrix that the black of the transparency is completely opaque (a characteristic not attained in current printing) and that the white is perfectly transparent. By treating the printed

transparency by the method of the present invention, an intense concealing black and a perfectly transparent white are obtained.

The present invention further provides an apparatus for treating prints obtained using toner, provided with a print entry section, a free surface container containing a surfactant solution, a device for automatically advancing the print, a print drying device and a print exit section.

Further characteristics and advantages of the present invention will be more apparent from the description thereof given hereinafter by way of non-limiting example with reference to the accompanying drawings.

Figure 1 is a perspective view of one possible embodiment of the apparatus according to the present invention;

Figure 2 is a section through the apparatus shown in Figure 1.

The apparatus of the present invention, indicated on the figures by the reference number 10, consists of a casing 11 for example of metal, comprising a transverse horizontal slot 12 for the insertion of the print (said print is generally in the form of sheets of A4 or A3 format), immediately adjacent to which there is a tray 13 containing the surfactant solution used for black tone enhancement of the image reproduced.

Said tray has for example a depth of 3 cm, a width of 43 cm and a length (ie the dimension in the direction parallel to the direction of insertion of the sheet) of 8 cm.

After manual insertion, the sheet is advanced by a pair of rubber-coated rollers 14 and 15 driven by a geared motor (not shown), operated by a switch 16 positioned on the apparatus casing 11.

The peripheral velocity of rotation of the two rubber-coated rollers is 15 revolutions per minute.

On leaving the rollers the sheet is directed upwards and is struck by a stream of hot air generated by a fan 17 and an electrical resistance element 18. The sheet then leaves from the exit slot 19.

The method and apparatus of the present invention are applicable to the black tone enhancement of prints obtained by photocopying using toner.

The form in which said prints exist, ie the paper on which they are printed, the paper format and the form of the image, do not influence the applicability of the method of the present invention. If necessary, the equipment used can be designed specifically to accommodate the print format, by providing wider entry and exit slots or larger drying sections.

Claims

1. A method for treating a print obtained using toner, wherein the print is immersed in at least one bath of a solution containing surfactant, and then undergoes a drying stage by means of a hot air stream.

2. A method as claimed in claim 1, characterised in that the solution in which the print is immersed is a solution containing between 0.5 and 1% of surfactant.

3. A method as claimed in claim 1, characterised in that the print retention time in the surfactant bath is between 1 and 60 seconds.

4. A method as claimed in claim 1, characterised in that the print retention time in the surfactant bath is between 1 and 10 seconds.

5. A method as claimed in claim 1, characterised in that the print retention time in the surfactant bath is between 1 and 5 seconds.

6. A method as claimed in claim 1, characterised in that the bath is maintained at a temperature of between 20 and 40°C.

7. A method as claimed in claim 1, characterised in that the bath is maintained at a temperature of between 30 and 35°C.

8. A method as claimed in claim 1, characterised in that the drying takes place at a temperature of between 30 and 90°C.

9. A method as claimed in claim 1, characterised in that the drying takes place at a temperature of between 50 and 60°C.

10. A method as claimed in claim 1, characterised in that the drying takes place for a time of between 5 and 60 seconds.

11. A method as claimed in any one of the preceding claims, for treating printed film sheets.

12. A method as claimed in any one of the preceding claims, characterised by being used for preparing letterpress printing plates, silk-screen frames, or plates for hot printing, for tampographic printing and for stamps.

13. An apparatus for treating prints obtained using toner by a method in accordance with claims 1 to 12, characterised by being provided with a print entry section, a free surface container containing a surfactant solution, a device for automatically advancing the print, a print drying device and a print exit section.

14. An apparatus as claimed in claim 13, characterised in that said automatic advancement device is formed from two rubber-coated rollers and a geared motor.

15. An apparatus as claimed in claim 13, characterised in that said print drying device is formed from a fan and an electrical resistance element.

5

10

15

20

25

30

35

40

45

50

55

Fig.1

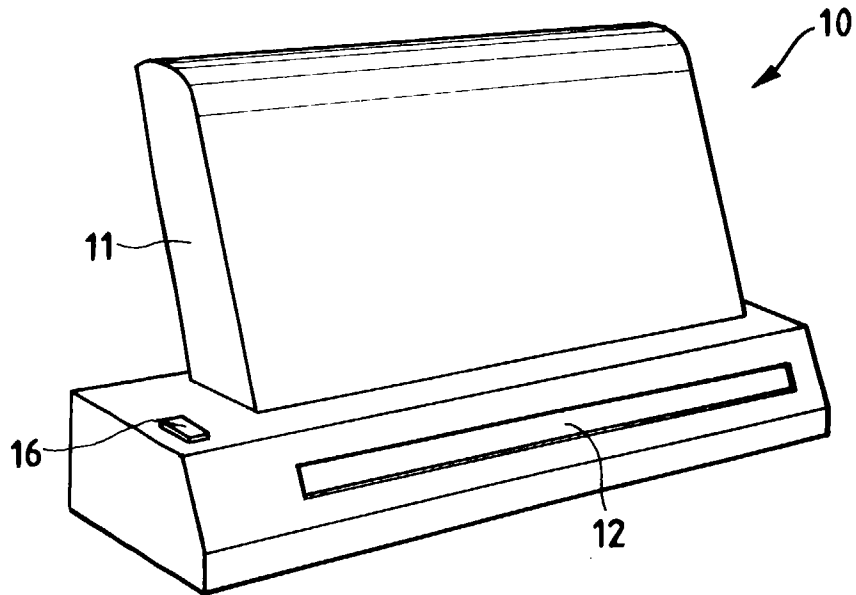
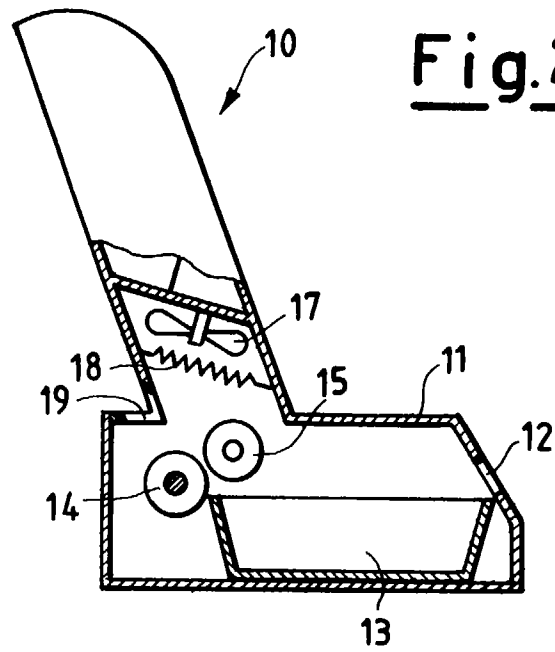


Fig.2





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 20 1736

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP-A-0 636 946 (UNICO) * page 6, line 40 - page 13, line 40 * ---	1-15	G03G11/00
X	US-A-5 476 739 (Y.TAKAMA) * column 4, line 12 - line 61; claim 1 * ---	1-15	
A	PATENT ABSTRACTS OF JAPAN vol. 7, no. 57 (P-181), 9 March 1983 & JP-A-57 202575 (FUJIRETSUKUSU), 11 December 1982, * abstract * -----	13	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			G03G
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 28 January 1997	Examiner Vanhecke, H
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

EPO FORM 1503 01.82 (P04C01)