



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
08.10.2003 Bulletin 2003/41

(51) Int Cl.7: **B05B 5/08**, B05B 5/10,
B05B 5/14, B05C 5/02

(43) Date of publication A2:
02.06.1999 Bulletin 1999/22

(21) Application number: **98121648.4**

(22) Date of filing: **12.11.1998**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(72) Inventors:
• **Borsuk, James M.**
Westlake, Ohio 44145 (US)
• **Schmitkons, James W.**
Lorain, Ohio 44053 (US)

(30) Priority: **25.11.1997 US 977796**

(74) Representative: **Eisenführ, Speiser & Partner**
Martinistrasse 24
28195 Bremen (DE)

(71) Applicant: **NORDSON CORPORATION**
Westlake, OH 44145 (US)

(54) **Electrostatic dispensing apparatus and method**

(57) An electrostatic dispensing system (10) for dispensing flowable material (12) on a moving substrate. The electrostatic dispensing system preferably includes a dispensing nozzle (16) supported in spaced, non-contacting relationship on one side of the moving substrate (14) and an electrostatic field generator (26) supported in spaced, non-contacting relationship on the opposite side of the moving substrate (14). The electrostatic field generator (26) is operable to generate an electrostatic field through the moving substrate (14), which itself is

substantially non-conductive, for attracting flowable material (12) from the dispensing nozzle (16) in a series of spaced, continuous streams or beads (24) which intersect a surface of the moving substrate (14) facing the nozzle (16). The beads of flowable material (12) are deposited on the surface of the moving substrate (14) in a series of uniform, continuous beads (24) which are formed generally parallel to a direction of travel of the moving substrate (14). Methods of electrostatically dispensing flowable material on a moving substrate are also disclosed.

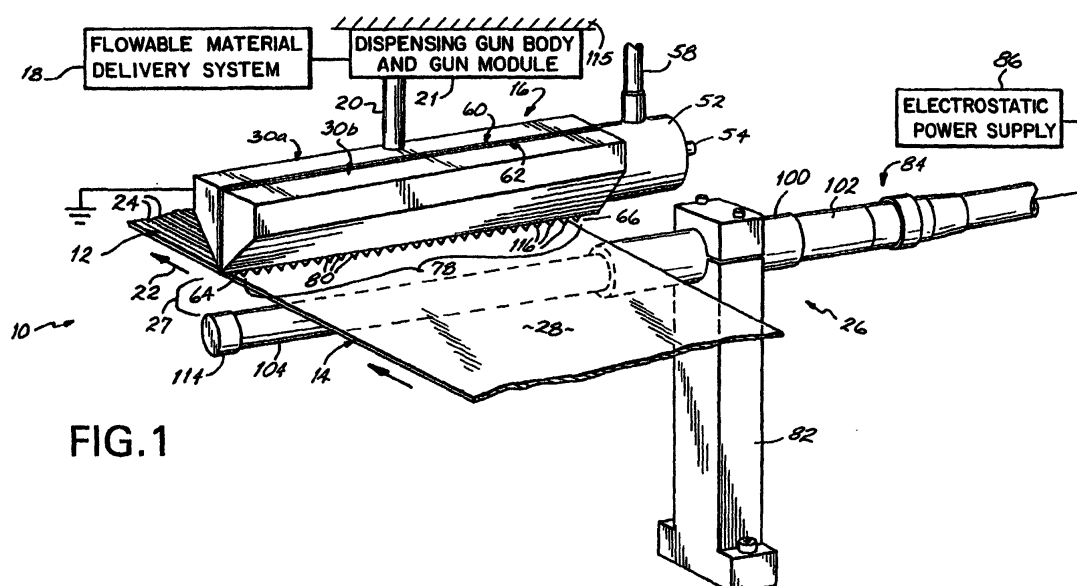


FIG. 1



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 12 1648

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 A	US 3 484 275 A (LEWICKI WALTER J JR) 16 December 1969 (1969-12-16) * column 5, line 69 - column 6, line 15 * * column 6, line 42 - line 53 * * column 7, line 28 - line 32 * * figures * ---	1,4-6, 10,11,14 2,3,7-9, 12,13	B05B5/08 B05B5/10 B05B5/14 B05C5/02
X A	US 5 552 012 A (MORRIS MARION C ET AL) 3 September 1996 (1996-09-03) * abstract * * column 1, line 5 - line 12 * * column 2, line 52 - line 57 * * column 3, line 40 - line 47 * * column 6, line 31 - line 38 * * column 9, line 50 - line 57 * * column 10, line 12 - line 43 * * column 11, line 12 - line 54 * * figures 1-3 * ---	10-12,14 1,4	
A	US 5 209 410 A (WICHMANN FREDERICK R ET AL) 11 May 1993 (1993-05-11) * abstract * * figures 1,4 *	2,3,5, 7-10,13	B05B B05C B03C
X	DE 22 51 148 A (ELEKTRISKA AB ELETTA) 25 April 1974 (1974-04-25) * the whole document *	15-17	
A	US 4 335 419 A (HASTINGS EDWARD E) 15 June 1982 (1982-06-15) * abstract; figures *	15	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 12 August 2003	Examiner Barré, V
CATEGORY OF CITED DOCUMENTS 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 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			

EPO FORM 1503 03/82 (P04C01)



European Patent
Office

Application Number
EP 98 12 1648

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



European Patent
Office

LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 98 12 1648

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-14

Apparatus for electrostatically dispensing flowable material on a substantially non-conductive moving substrate, comprising:

- a support structure;
- a nozzle supported by said support structure in a first location and
- an electrostatic field generator supported by said support structure in a second location, said first and second locations being spaced relative to each other to define a receiving space for a moving substrate therebetween, whereby said electrostatic field generator is operable to generate an electrostatic field through the moving substrate for attracting flowable material from said dispensing outlet of said nozzle in a direction which intersects said moving substrate to thereby deposit said flowable material on one side thereof

2. Claims: 15-17

An electrostatic field generator

- an electrostatic power supply having an electrostatic cable coupled thereto, said electrostatic cable terminating in a conductive end;
- a resistive element coupled to said conductive end of said electrostatic cable;
- an insulative sleeve mounted substantially about said conductive end of said electrostatic cable and said resistive element; and
- a conductive sleeve mounted substantially about said insulative sleeve and coupled to said conductive end of said electrostatic cable and said resistive element whereby an electrostatic field is generated proximate said conductive sleeve.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 98 12 1648

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

12-08-2003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3484275 A	16-12-1969	BE 681169 A DE 1646093 A1 DK 123338 B FR 1480519 A GB 1126539 A LU 51122 A NL 6606746 A NO 119826 B SE 303677 B	17-11-1966 22-07-1971 12-06-1972 12-05-1967 05-09-1968 18-07-1966 18-11-1966 06-07-1970 02-09-1968
US 5552012 A	03-09-1996	CA 2157945 A1 US 5585170 A	10-03-1996 17-12-1996
US 5209410 A	11-05-1993	AU 3813593 A EP 0583467 A1 JP 6507577 T WO 9317794 A1	05-10-1993 23-02-1994 01-09-1994 16-09-1993
DE 2251148 A	25-04-1974	DE 2251148 A1	25-04-1974
US 4335419 A	15-06-1982	NONE	