



US009409390B1

(12) **United States Patent**  
**Nishikori et al.**

(10) **Patent No.:** **US 9,409,390 B1**  
(45) **Date of Patent:** **Aug. 9, 2016**

(54) **PRINTING APPARATUS AND CONTROL METHOD THEREFOR**

B41J 2/04585; B41J 2/04586; B41J 2/04588;  
B41J 2/0459; B41J 2/04591; B41J 2/04595;  
B41J 2/04596; B41J 2/04598

(71) Applicant: **CANON KABUSHIKI KAISHA**,  
Tokyo (JP)

See application file for complete search history.

(72) Inventors: **Hitoshi Nishikori**, Inagi (JP); **Shigeyasu Nagoshi**, Yokohama (JP); **Yutaka Kano**, Yokohama (JP); **Nobuyuki Hirayama**, Fujisawa (JP)

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,280,310 A 1/1994 Otsuka et al.  
5,359,355 A 10/1994 Nagoshi et al.  
5,477,248 A 12/1995 Sugimoto et al.  
5,500,661 A 3/1996 Matsubara et al.

(Continued)

FOREIGN PATENT DOCUMENTS

JP H09-104113 4/1997  
JP 2009-006676 1/2009

OTHER PUBLICATIONS

U.S. Appl. No. 14/854,269, Yutaka Kano, filed Sep. 15, 2015.

(Continued)

(73) Assignee: **CANON KABUSHIKI KAISHA**,  
Tokyo (JP)

(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/055,996**

(22) Filed: **Feb. 29, 2016**

(30) **Foreign Application Priority Data**

Mar. 6, 2015 (JP) ..... 2015-045082

(51) **Int. Cl.**  
**B41J 2/355** (2006.01)  
**B41J 2/045** (2006.01)

(52) **U.S. Cl.**  
CPC ..... **B41J 2/04573** (2013.01); **B41J 2/04586** (2013.01)

(58) **Field of Classification Search**  
CPC ..... B41J 2/04501; B41J 2/04503; B41J 2/04505; B41J 2/04506; B41J 2/04508; B41J 2/0451; B41J 2/04511; B41J 2/04513; B41J 2/04515; B41J 2/04516; B41J 2/04518; B41J 2/04525; B41J 2/04526; B41J 2/0453; B41J 2/04531; B41J 2/07; B41J 2/072; B41J 2/075; B41J 2/08; B41J 2/085; B41J 2/09; B41J 2/095; B41J 2/10; B41J 2/105; B41J 2/0457; B41J 2/04571; B41J 2/04573; B41J 2/04575; B41J 2/04576; B41J 2/04578; B41J 2/0458; B41J 2/04581; B41J 2/04583;

*Primary Examiner* — Kristal Feggins

(74) *Attorney, Agent, or Firm* — Fitzpatrick, Cella, Harper & Scinto

(57) **ABSTRACT**

According to an embodiment, a printing apparatus for printing an image on a print medium by a printhead while relatively scanning the printhead, and discharging ink from the printhead to the print medium is controlled as follows. That is, a time corresponding to a print resolution in a scanning direction of the printhead is divided into a plurality of times, and these print elements are time-divisionally driven by using the divided times as driving timings. At this time, it is controlled to form a plurality of groups each including a predetermined number of adjacent print elements of the print elements, and change the driving timings for each of the groups using the divided time as a unit.

**20 Claims, 44 Drawing Sheets**

