



US009409407B2

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

(10) **Patent No.:** **US 9,409,407 B2**
(45) **Date of Patent:** **Aug. 9, 2016**

(54) **LIQUID EJECTION APPARATUS AND TANK**

(71) Applicant: **SEIKO EPSON CORPORATION**,
Tokyo (JP)

(72) Inventors: **Shoma Kudo**, Nagano (JP); **Naomi Kimura**, Nagano (JP); **Hidenao Suzuki**, Nagano (JP); **Munehide Kanaya**, Nagano (JP)

(73) Assignee: **Seiko Epson Corporation**, 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.: **14/760,507**

(22) PCT Filed: **Jan. 10, 2014**

(86) PCT No.: **PCT/JP2014/000093**

§ 371 (c)(1),
(2) Date: **Jul. 13, 2015**

(87) PCT Pub. No.: **WO2014/112344**

PCT Pub. Date: **Jul. 24, 2014**

(65) **Prior Publication Data**

US 2015/0352853 A1 Dec. 10, 2015

(30) **Foreign Application Priority Data**

Jan. 18, 2013 (JP) 2013-006996

(51) **Int. Cl.**

B41J 2/175 (2006.01)

B41J 29/02 (2006.01)

B41J 29/13 (2006.01)

(52) **U.S. Cl.**

CPC **B41J 2/17523** (2013.01); **B41J 2/175** (2013.01); **B41J 2/17513** (2013.01); **B41J 2/17553** (2013.01); **B41J 29/02** (2013.01); **B41J 29/13** (2013.01)

(58) **Field of Classification Search**

CPC B41J 2/175
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2005/0151782 A1 7/2005 Ishida et al.
2009/0058917 A1* 3/2009 Takata B41J 2/175
347/18
2012/0013687 A1* 1/2012 Ishizawa B41J 2/175
347/85
2012/0182364 A1 7/2012 Takeda et al.

FOREIGN PATENT DOCUMENTS

JP 2006-035662 A 2/2006
JP 2011-126292 A 6/2011
JP 2012-144016 A 8/2012
JP 2013-000949 A 1/2013

* cited by examiner

Primary Examiner — Geoffrey Mruk

(74) *Attorney, Agent, or Firm* — Global IP Counselors, LLP

(57) **ABSTRACT**

A liquid ejection apparatus includes a tank; a liquid ejection head; and a casing configured to integrally cover the tank and the liquid ejection head. The tank includes a container portion configured to contain a liquid, an air introducing path arranged to introduce the air into the container portion, an inlet port configured to pour the liquid into the container portion, and an outlet port formed to supply the liquid into the liquid ejection head. In an attitude that the liquid is ejectable from the liquid ejection head, the liquid is contained in the container portion such that a liquid level of the liquid in the container portion is located at a higher position than a nozzle of the liquid ejection head in a vertical direction. In the attitude that the liquid is ejectable from the liquid ejection head, the inlet port is covered by the casing.

12 Claims, 12 Drawing Sheets

