US009950377B2

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

(10) **Patent No.: US 9,950,377 B2**
(45) **Date of Patent: Apr. 24, 2018**

(54) **PLURAL RESISTANCE-CAPACITANCE (PRC) ELECTRICAL DISCHARGE MACHINING SYSTEM**

(71) Applicant: **National Taiwan Normal University**, Taipei (TW)

(72) Inventors: **Shun-Tong Chen**, Taipei (TW); **Chi-Hung Chen**, Taipei (TW); **Po-Yuan Shih**, Taipei (TW)

(73) Assignee: **National Taiwan Normal University**, Taipei (TW)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 691 days.

(21) Appl. No.: **14/560,460**

(22) Filed: **Dec. 4, 2014**

(65) **Prior Publication Data**

US 2015/0343544 A1 Dec. 3, 2015

(30) **Foreign Application Priority Data**

May 30, 2014 (CN) 103118922

(51) **Int. Cl.**
B23H 1/02 (2006.01)

(52) **U.S. Cl.**
CPC ***B23H 1/02*** (2013.01); *B23H 2300/20* (2013.01)

(58) **Field of Classification Search**
CPC B23H 1/022; B23H 2300/20; B23H 1/02
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,987,271 A * 10/1976 Bell, Jr. B23H 1/028 219/69.13
4,071,729 A * 1/1978 Bell, Jr. B23H 7/20 219/69.13
4,320,279 A * 3/1982 Bell, Jr. B23H 7/20 219/69.18

(Continued)

FOREIGN PATENT DOCUMENTS

CN 101468415 A 7/2009
JP 56-21728 A * 2/1981

(Continued)

OTHER PUBLICATIONS

Machnine translation of Japan Patent document No. 63-150,112, Jul. 2017.*

Primary Examiner — Geoffrey S Evans
(74) *Attorney, Agent, or Firm* — Foster Pepper PLLC

(57) **ABSTRACT**

The present invention provides a plural resistance-capacitance (PRC) electrical discharge machining system comprising a control module, a digital electronic module, a driving module, and a discharge module. The control module allows the user to input a command and output a control signal accordingly. The digital electronic module processes the control signal and outputs a sequence signal to the driving circuit. The driving module amplifies the sequence signal and then outputs a driving signal to the discharge module. The discharge module then controls and drives a plurality of transistors to open circuits and break circuits according to the driving signal for controlling the charging and discharging of a plurality of capacitors of the discharge module in the electrical discharge machining. The present invention can increase the amount of discharge in a machining process, and improves the efficiency thereof.

9 Claims, 6 Drawing Sheets