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Epstein

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(54) **DRIVE CIRCUIT FOR MAGNETIC STIMULATION**

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(51) **Int. Cl.**
A61N 2/00 (2006.01)

(52) **U.S. Cl.** **600/9**

(58) **Field of Classification Search** 600/9-15
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,712,558 A 12/1987 Kidd et al.
4,940,453 A 7/1990 Cadwell
5,047,005 A 9/1991 Cadwell
5,061,234 A 10/1991 Chaney
5,116,304 A 5/1992 Cadwell
5,766,124 A 6/1998 Polson
6,066,084 A 5/2000 Edrich et al.
6,123,658 A * 9/2000 Schweighofer et al. 600/13
6,179,769 B1 1/2001 Ishikawa et al.
6,179,770 B1 1/2001 Mould
6,366,814 B1 4/2002 Boveja et al.
6,463,328 B1 10/2002 John

6,537,197 B1 3/2003 Ruohonen et al.
6,551,233 B2 4/2003 Perreault et al.
6,591,138 B1 7/2003 Fischell et al.
6,663,556 B2 12/2003 Barker
2001/0031906 A1 10/2001 Ishikawa et al.
2002/0087201 A1 7/2002 Firlík et al.
2002/0091419 A1 7/2002 Firlík et al.
2002/0103515 A1 8/2002 Davey et al.
2003/0088274 A1 5/2003 Gliner et al.
2003/0097161 A1 5/2003 Firlík et al.
2003/0125786 A1 7/2003 Gliner et al.
2003/0130706 A1 7/2003 Sheffield et al.
2004/0077921 A1 4/2004 Becker et al.
2005/0228209 A1 10/2005 Schneider et al.
2005/0261542 A1 * 11/2005 Riehl 600/14

FOREIGN PATENT DOCUMENTS

WO WO 02/32504 A2 4/2002
WO WO 02/072194 A2 9/2002
WO WO 02/085449 A2 10/2002
WO WO 02/085454 A1 10/2002
WO WO 02/094997 A2 11/2002
WO WO 2005/000401 A1 1/2005

* cited by examiner

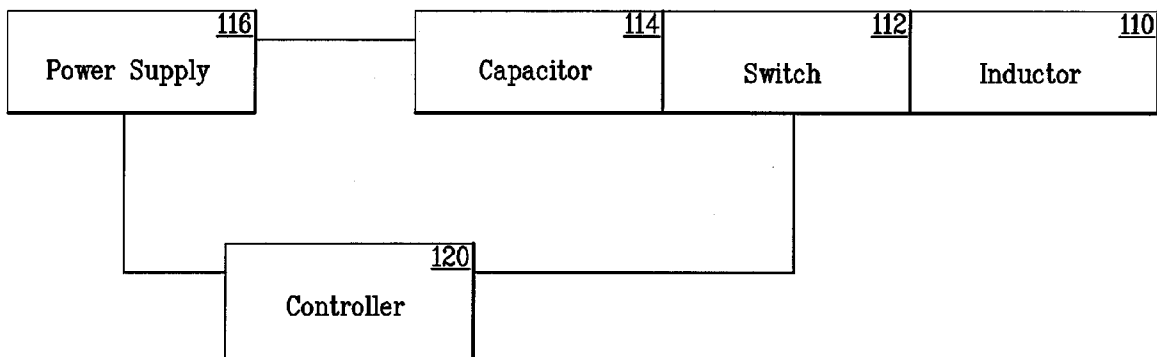
Primary Examiner—Samuel G Gilbert

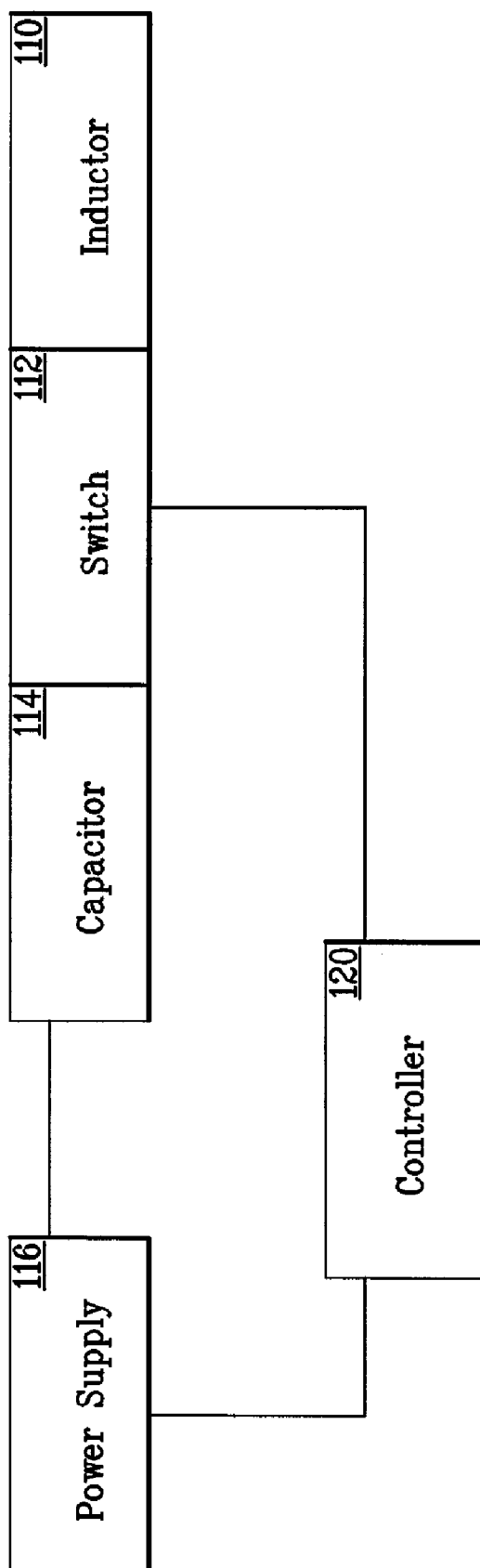
(74) *Attorney, Agent, or Firm*—Woodcock Washburn LLP

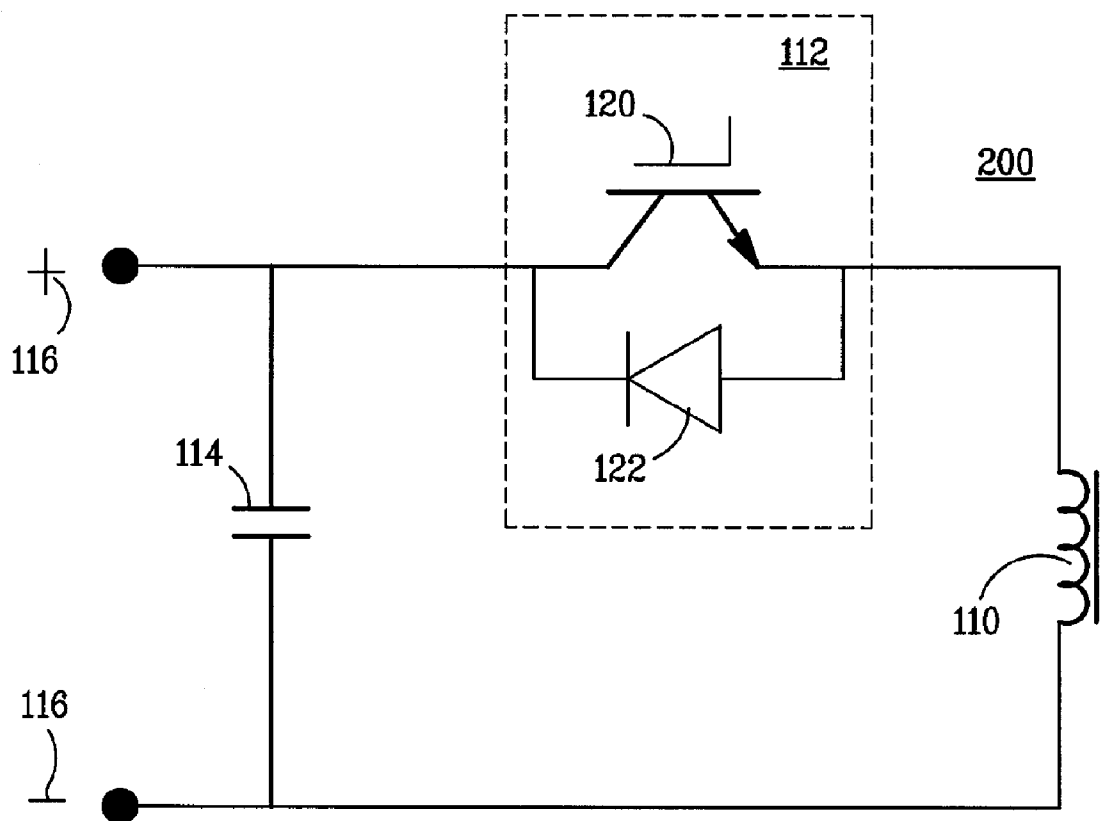
(57) **ABSTRACT**

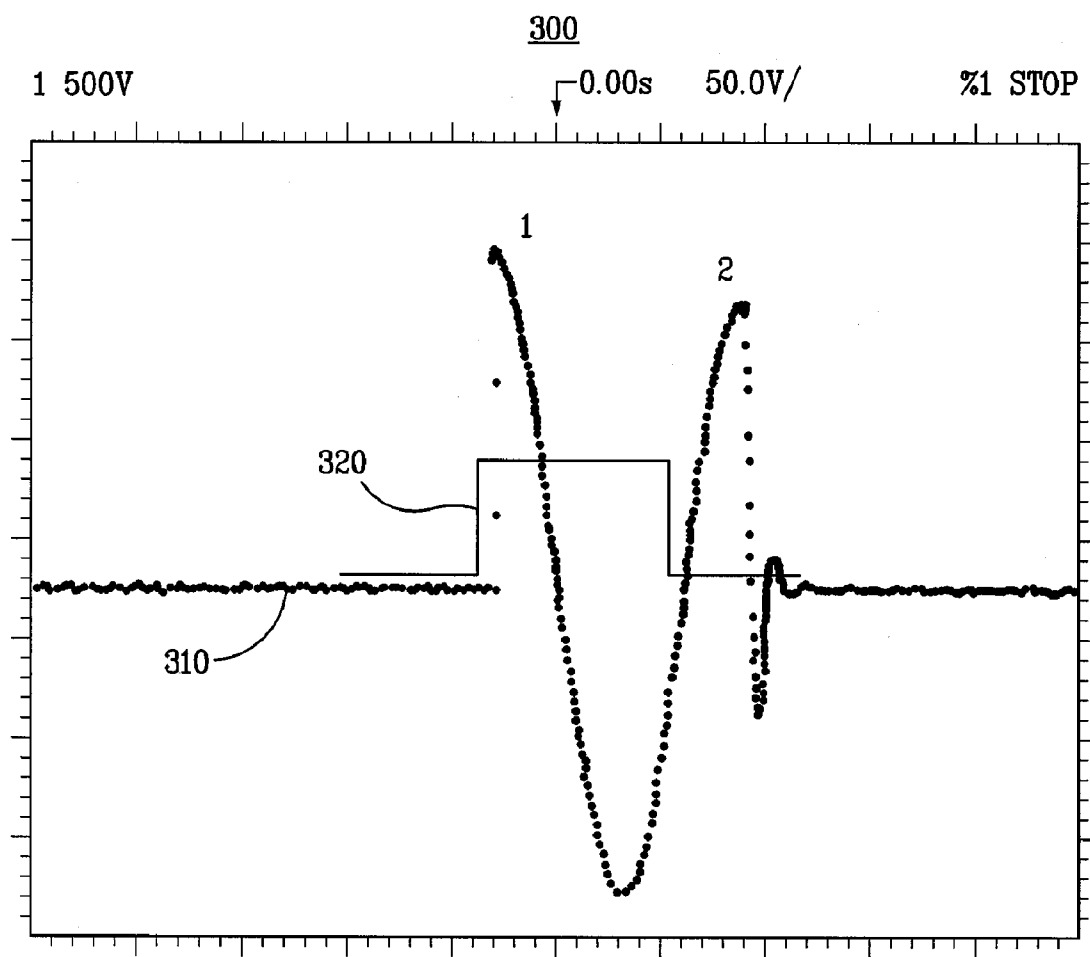
The inventive technique includes devices and methods for generating a magnetic field. One such device may include an inductor for generating a magnetic field and a power source for providing power. Such a device may also include a semiconductor switching device that operatively couples the inductor and power source, wherein the semiconductor switching device directs power from the power source to the inductor to generate the magnetic field.

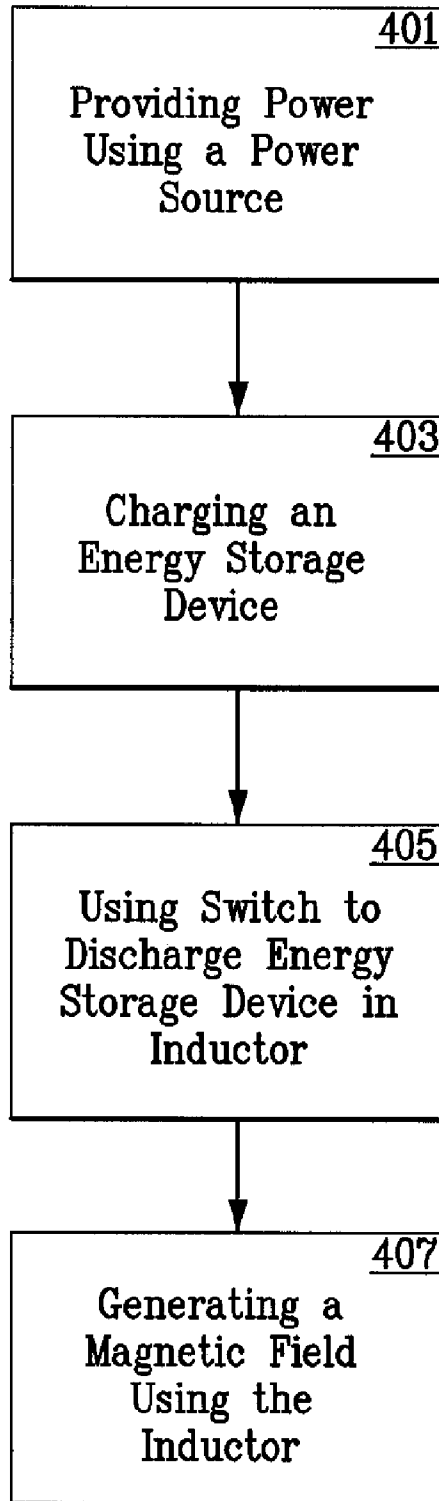
44 Claims, 4 Drawing Sheets



*FIG. 1*

*FIG. 2*

*FIG. 3*

*FIG. 4*

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