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Published:

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- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

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(54) Title: COMPACT, CONFIGURABLE POWER SUPPLY FOR ENERGIZING OZONE-PRODUCING CELLS

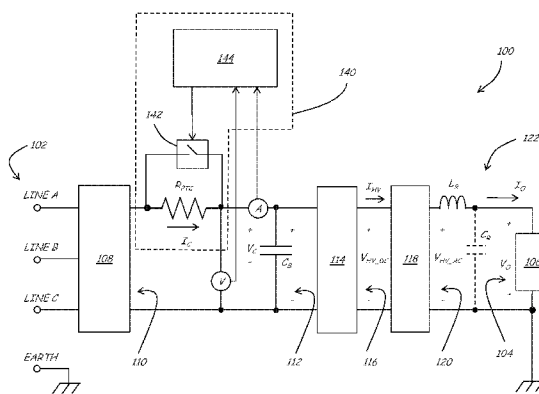


FIG. 1

(57) Abstract: Improvements in the supply of high-frequency electrical power to ozone-producing cells can be accomplished using the systems and techniques described herein. Application of a DC-DC converter operating at a switching frequency substantially greater than a load frequency, supports generation of a high-voltage AC for powering such cells, while allowing for reductions in component size and reductions in a quality factor of a load tuning circuit. Controllable power inverters used in obtaining one or more of the switching and load frequencies can be controlled using feedback techniques to provide stable, high-quality power to ozone-producing cells under variations in one or more of externally supplied power and load conditions. An inrush protection circuit can also be provided to selectively introduce a current-limiting resistance until an input DC bus has been sufficiently initialized as determined by measurements obtained from the DC bus. The current limiting resistance can be a positive-temperature coefficient thermistor.



# INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2013/032920

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> INV. C01B13/11 H02M7/537 H02M3/335 H02M1/36 H02M7/48 H02M7/538 ADD. According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) C01B H02M Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2007/035216 A1 (MKS INSTR INC [US]; ELKIN IGOR [US]; MILLNER ALAN ROY [US]; TRAN KEN [ ] 29 March 2007 (2007-03-29) the whole document -----	1-16, 18-23
A	ORDIZ C ET AL: "Development of a high-voltage closed-loop power supply for ozone generation", APPLIED POWER ELECTRONICS CONFERENCE AND EXPOSITION, 2008. APEC 2008. TWENTY-THIRD ANNUAL IEEE, IEEE, PISCATAWAY, NJ, USA, 24 February 2008 (2008-02-24), pages 1861-1867, XP031253506, ISBN: 978-1-4244-1873-2 section II on pages 1861 and 1862; figure 1 ----- -/--	1-23
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <span style="margin-left: 200px;"><input checked="" type="checkbox"/> See patent family annex.</span>		
* Special categories of cited documents :		
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	
"P" document published prior to the international filing date but later than the priority date claimed		
Date of the actual completion of the international search	Date of mailing of the international search report	
17 June 2013	15/10/2013	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer  van Wesenbeeck, R	

# INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2013/032920

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1 708 351 A2 (NEWAGE INT LTD [GB]) 4 October 2006 (2006-10-04) abstract paragraphs [0048] - [0053]; figure 3 -----	1-23

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2013/032920

## Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-23

### Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-23

power converter for ozone-producing cell comprising DC-to-DC converter and high-frequency power inverter, wherein second controller (AC output power controller) comprises a target DC high voltage output in communication with the reference input of the first controller (HV-DC level controller)

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2. claims: 24-30

power converter for ozone-producing cell, comprising controllable current-limiting resistance for limiting current flowing into rectifier capacitor at time of initialization

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2013/032920

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2007035216	A1	29-03-2007	
		CN 101288219 A	15-10-2008
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		EP 1929615 A1	11-06-2008
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		US 2007108040 A1	17-05-2007
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