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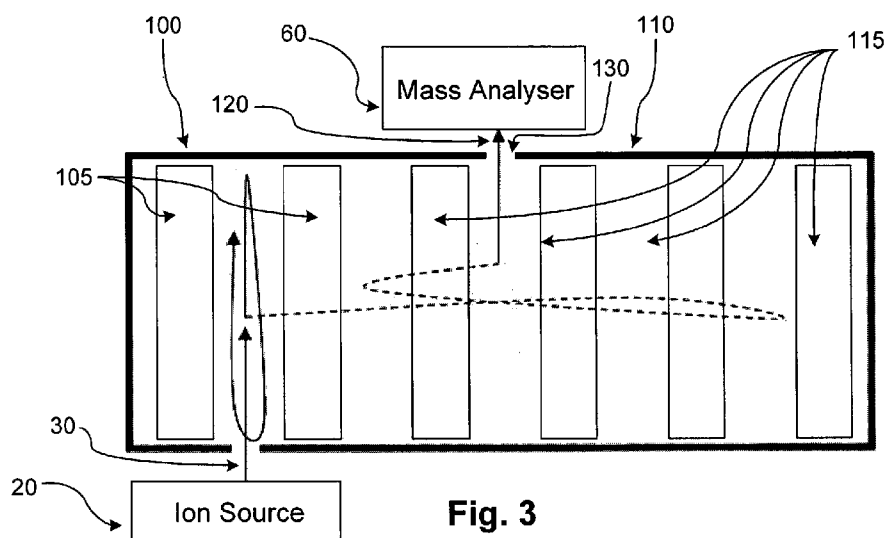


Fig. 3

(57) Abstract: An ion spectrometer is provided, comprising: an ion source, arranged to generate ions continuously with a first range of mass to charge ratios; and an ion trap, arranged to receive ions from the ion source along an axis, and to eject ions with a second range of mass to charge ratios orthogonally to that axis, the second range of mass to charge ratios being narrower than the first range of mass to charge ratios. In some embodiments, ions generated by the ion source continuously flow into the ion trap. Additionally or alternatively, ion optics receive ions ejected from the ion trap and cool the ions without substantial fragmentation. An ion analyser receives ions ejected from the ion trap or ion optics and separates the ions in accordance with at least one characteristic of the ions.

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A. CLASSIFICATION OF SUBJECT MATTER
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ADD.
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B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
H01J
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)
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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2007/045533 A1 (KRUTCHINSKY ANDREW N [US] ET AL) 1 March 2007 (2007-03-01) paragraph [0038] paragraph [0045] - paragraph [0046] paragraph [0068] - paragraph [0071] paragraph [0089] figure 2	1-35
X	----- CN 101 320 016 A (UNIV FUDAN [CN]) 10 December 2008 (2008-12-10) page 9, line 21 - line 26 page 15, line 26 - page 16, line 1 page 20, line 27 - page 22, line 11 claims 1,3 figures 3, 8, 9 ----- -/--	4-19, 23-35

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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 Cornelussen, Ronald
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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A	US 2011/057097 A1 (BATEMAN ROBERT HAROLD [GB] ET AL) 10 March 2011 (2011-03-10) paragraphs [0012], [0032], [0041] figures 2,13 -----	19,35
A	US 2008/185511 A1 (SENKO MICHAEL W [US]) 7 August 2008 (2008-08-07) paragraph [0025] - paragraph [0027] paragraph [0035] - paragraph [0039] paragraph [0047] figures 1,4,6 -----	1-35
A	US 5 783 824 A (BABA TAKASHI [JP] ET AL) 21 July 1998 (1998-07-21) column 21, line 39 - column 22, line 58 figures 13-15 -----	1-35
A	US 5 763 878 A (FRANZEN JOCHEN [DE]) 9 June 1998 (1998-06-09) figures 1,3 column 4, line 63 - column 5, line 14 -----	1-35

INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2007045533	A1	01-03-2007	CA 2620608 A1 08-03-2007 EP 1928582 A2 11-06-2008 JP 2009506515 A 12-02-2009 US 2007045533 A1 01-03-2007 WO 2007027764 A2 08-03-2007

CN 101320016	A	10-12-2008	CN 101320016 A 10-12-2008 WO 2009094954 A1 06-08-2009

US 2011057097	A1	10-03-2011	EP 2113129 A2 04-11-2009 GB 2447325 A 10-09-2008 US 2011057097 A1 10-03-2011 WO 2008102155 A2 28-08-2008

US 2008185511	A1	07-08-2008	CA 2676716 A1 14-08-2008 EP 2115765 A2 11-11-2009 US 2008185511 A1 07-08-2008 WO 2008098081 A2 14-08-2008

US 5783824	A	21-07-1998	NONE

US 5763878	A	09-06-1998	DE 19511333 C1 08-08-1996 GB 2299446 A 02-10-1996 US 5763878 A 09-06-1998
