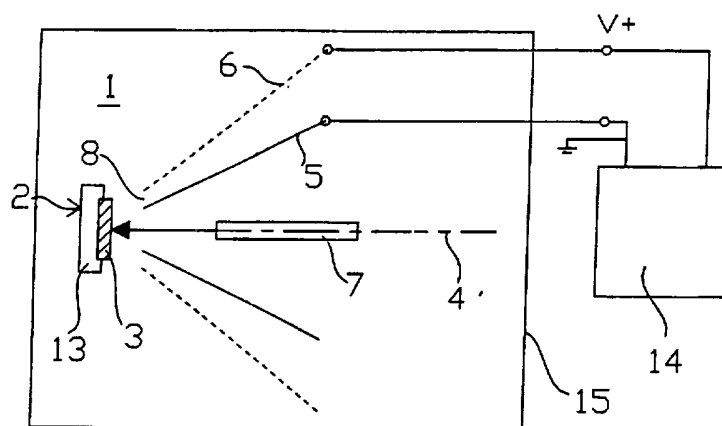


PCTWORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁵ : H01J 49/48	A3	(11) International Publication Number: WO 94/07258 (43) International Publication Date: 31 March 1994 (31.03.94)
(21) International Application Number: PCT/GB93/01957 (22) International Filing Date: 15 September 1993 (15.09.93) (30) Priority data: 9220097.1 23 September 1992 (23.09.92) GB (71) Applicant (for all designated States except US): UNIVERSITY OF YORK [GB/GB]; Heslington, York YO1 5DD (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): PRUTTON, Martin [GB/GB]; 15 Main Street, Copmanthorpe, York YO2 3ST (GB). (74) Agent: STANLEY, David, William; Appleyard Lees, 15 Clare Road, Halifax HX1 2HY (GB).	(81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, KZ, LK, LU, LV, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 11 May 1994 (11.05.94)	

(54) Title: ELECTRON ENERGY SPECTROMETER**(57) Abstract**

A sample (2) is mounted in a sample holder (13) with a surface (3) of the sample (2) normal to the axis (4) of a pair of truncated electrically conductive frusto-cones (5, 6) which are coaxial and whose apices meet at the sample surface (3). An exciting source (7) is mounted within the inner cone (5), which is solid and is maintained at ground potential to serve as a first electrode. The outer cone (6) is made of high transparency metallic mesh and is maintained at a positive potential +V (e.g. 1000v) with respect to the sample surface (3), to serve as a second electrode. These components of the spectrometer (1) are contained within a vacuum system (15), and the potentials are applied to the cones (5, 6) by a biasing means (14). Electrons generated where the beam from the exciting source (7) strikes the sample are emitted into 2π steradians towards an entrance annulus (8). A small fraction of these electrons enter the entrance annulus (8) and find themselves in an electric field which deflects them towards the mesh of the outer cone (6). Electrons of a fixed kinetic energy leaving the sample (2) and entering the annulus (8) are accelerated towards the outer cone (6) on trajectories which will intersect. Those electrons that pass through the outer cone (6) enter a region of field-free space, in which their straight-line trajectories intersect on the surface of a third cone (11, Figure 2), which is the focal locus of the spectrometer. As electrons of fixed kinetic energy enter the spectrometer through the annulus (8) between the cones (5, 6) they are focused into a ring on the focal locus.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LJ	Liechtenstein	SK	Slovakia
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LU	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Latvia	TC	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 93/01957

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 H01J49/48

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 5 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 practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP-A-0 470 478 (PERKIN-ELMER) 12 February 1992 see abstract see column 5, line 10 - line 25; claim 22; figure 1	1-5, 14
Y	see column 6, line 25 - line 41 ---	12, 13
Y	GB-A-2 183 898 (TEXAS INSTRUMENTS) 10 June 1987 see abstract; figure 1 ---	12, 13
A	US-A-4 983 864 (FUMIO MURAI) 8 January 1991 see claim 1; figure 1 ---	1
	--- -/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *I* 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)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *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
- *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
- *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.
- *&* document member of the same patent family

Date of the actual completion of the international search

13 January 1994

Date of mailing of the international search report

30.03.94

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+31-70) 340-3016

Authorized officer

HULNE S.L.

INTERNATIONAL SEARCH REPORT

International Application No
PC1/GB 93/01957

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
D,A	JOURNAL OF PHYSICS E. SCIENTIFIC INSTRUMENTS, vol.13, 1980, BRISTOL GB pages 114 - 122 D F C BREWER 'A COAXIAL CONE ELECTROSTATIC VELOCITY ANALYSER I , ANALYSIS OF ELECTRON OPTICAL PROPERTIES' see page 114, right column, last paragraph - page 115, left column, paragraph 1; figure 1A ---	1
D,A	NUCLEAR INSTRUMENTS AND METHODS, vol.A298, 1990, AMSTERDAM NL pages 421 - 425 S. YA. YAVOR ET AL. 'OPTICS OF CONICAL ELECTROSTATIC ANALYSING AND FOCUSING SYSTEMS' see page 421, paragraph 1-4; figures 1,2 -----	1

INTERNATIONAL SEARCH REPORT

International application No.

PCT/GB93/01957

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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 II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

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

1. Claims 1-15,24 (24, as far as depending upon 1-15)
 2. Claims 16-23,24 (24, as far as depending upon 22 or 23)
- For further information please see form PCT/ISA/206 mailed 02.02.94.

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 fee, this Authority did not invite payment of any additional fee.

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.:

1-15,24 (24, as far as depending upon 1-15)

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No

PCI/GB 93/01957

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0470478	12-02-92	US-A- 5032724 JP-A- 4233152	16-07-91 21-08-92
GB-A-2183898	10-06-87	NONE	
US-A-4983864	08-01-91	JP-A- 1248517	04-10-89