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- **Miller, Jeffery A.**
Coraopolis, PA 15108 (US)
- **Shea, John J.**
Pittsburgh, PA 15237 (US)
- **Mrenna, Stephen Albert**
Beaver, Pennsylvania 15009 (US)

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(71) Applicant: **Eaton Corporation**
Cleveland, Ohio 44114-2584 (US)

(72) Inventors:
• **Hanna, William K.**
Pittsburgh, PA 15211 (US)

(74) Representative: **Geyer, Ulrich F.**
WAGNER & GEYER,
Patentanwälte,
Gewürzmühlstrasse 5
80538 München (DE)

(54) **Current-limiting device**

(57) A current-limiting device includes a current-limiting material having first and second sides, and first and second electrodes structured for carrying current through the current-limiting material. Each of the electrodes has first and second sides, with the second side of the first electrode engaging the first side of the current-limiting material, and with the first side of the second electrode engaging the second side of the current-limiting material. The current-limiting device also includes first and second insulators, each of which has

first and second sides. The second side of the first insulator engages the first side of the first electrode, and the first side of the second insulator engages the second side of the second electrode. The current-limiting device further includes first and second clips which engage different portions of the first side of the first insulator and the second side of the second insulator, and which compress the first insulator, the first electrode, the current-limiting material, the second electrode and the second insulator.

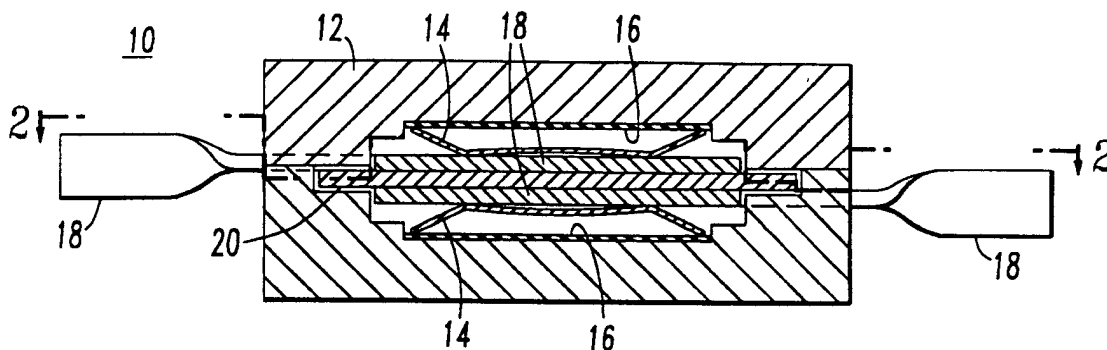


FIG. 1

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EUROPEAN SEARCH REPORT

Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 4 698 614 A (WELCH ET AL) 6 October 1987 (1987-10-06)	1	H01C7/02 H01C7/13
X	* column 5, lines 30-60; figure 9 *	1	
Y	* figures 4,6 *	2-6, 15-25	

Y	EP 0 853 322 A (EATON CORPORATION) 15 July 1998 (1998-07-15)	1,2	
Y	* pages 12,20; figures 1,2 *	1-7, 18-25	
	* the whole document *		
Y	* claims 19-21; figure 1 *	15-17	

A	US 5 644 283 A (GROSSE-WILDE ET AL) 1 July 1997 (1997-07-01)	1-7, 15-25	
	* claims 1,10,22,23; figure 4 *		

A	US 5 565 826 A (KARLSTR+E,UML O+EE M ET AL) 15 October 1996 (1996-10-15)	1-7, 15-25	
	* the whole document *		

A	EP 0 487 920 A (ASEA BROWN BOVERI AB) 3 June 1992 (1992-06-03)	1	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
Y	* claims 2,4; figures 2-4 *	4-7,18, 19,21	H01C H01H H02H H05B
A	* the whole document *	1-3, 15-17, 20,22-25	

A	US 4 331 861 A (MEIXNER ET AL) 25 May 1982 (1982-05-25)	1-7, 15-25	
	* the whole document *		

2 The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 23 June 2005	Examiner Dessaux, C
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04C01)



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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-7,15-25



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LACK OF UNITY OF INVENTION
SHEET B

Application Number
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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-7,15-25

A current limiting device comprises clips which engage different portion of the insulators sheets and compresse the first insulator, the first electrode, the current limiting material, the second electrode and the second insulator.

2. claims: 8-14

A shunt is associate to a current limiting device to protect it from overcurrent.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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23-06-2005

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 4698614	A	06-10-1987	CA	1258139 A1	01-08-1989
			DE	3789723 D1	09-06-1994
			DE	3789723 T2	18-08-1994
			EP	0240447 A2	07-10-1987
			JP	62239501 A	20-10-1987

EP 0853322	A	15-07-1998	US	5841111 A	24-11-1998
			CA	2225212 A1	19-06-1998
			CN	1185635 A ,C	24-06-1998
			DE	69725692 D1	27-11-2003
			DE	69725692 T2	22-07-2004
			EP	0853322 A1	15-07-1998
			JP	10199706 A	31-07-1998
			US	5928547 A	27-07-1999
			US	5886324 A	23-03-1999

US 5644283	A	01-07-1997	DE	4228297 A1	03-03-1994
			AT	150580 T	15-04-1997
			WO	9406130 A1	17-03-1994
			DE	59305896 D1	24-04-1997
			EP	0657062 A1	14-06-1995
			ES	2099462 T3	16-05-1997
			JP	8500703 T	23-01-1996
			JP	3499240 B2	23-02-2004

US 5565826	A	15-10-1996	SE	470296 B	10-01-1994
			AU	5437194 A	24-05-1994
			CZ	9501095 A3	17-04-1996
			EP	0667050 A1	16-08-1995
			FI	952040 A	28-04-1995
			HU	73126 A2	28-06-1996
			JP	8505731 T	18-06-1996
			NO	951615 A	27-04-1995
			PL	308547 A1	21-08-1995
			SE	9203234 A	10-01-1994
			WO	9410734 A1	11-05-1994
			DE	69309949 D1	22-05-1997
			DE	69309949 T2	20-11-1997
			AT	151925 T	15-05-1997

EP 0487920	A	03-06-1992	SE	467513 B	27-07-1992
			AT	143169 T	15-10-1996
			CA	2054487 A1	01-05-1992
			DE	69122216 D1	24-10-1996
			DE	69122216 T2	30-04-1997
			EP	0487920 A1	03-06-1992

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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EP 01 12 8172

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The members are as contained in the European Patent Office EDP file on
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23-06-2005

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
EP 0487920	A	ES 2094180 T3	16-01-1997	
		JP 4266001 A	22-09-1992	
		SE 9003448 A	01-05-1992	
		US 5382938 A	17-01-1995	
		SE 9003814 A	31-05-1992	

US 4331861	A	25-05-1982	DE 2939470 A1	02-04-1981
			EP 0026456 A2	08-04-1981
			ES 8105915 A1	01-09-1981
			JP 56057288 A	19-05-1981
