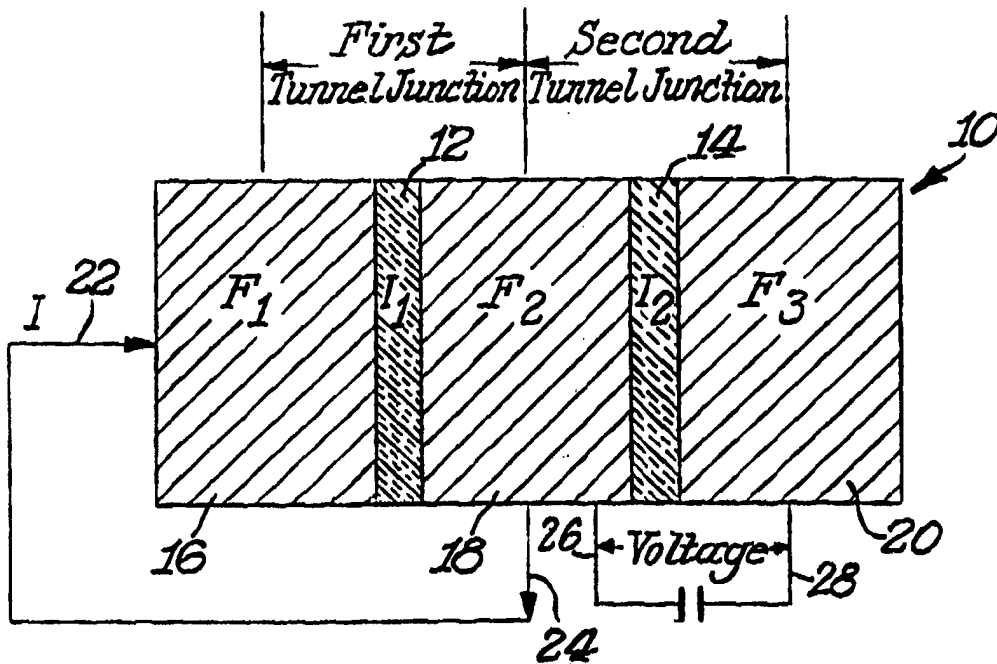




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/US97/20419 (22) International Filing Date: 4 November 1997 (04.11.97) (30) Priority Data: 08/745,815 12 November 1996 (12.11.96) US (71)(72) Applicant and Inventor: CHUI, Siu-Tat [US/US]; 1001 Lafayette Road, Newark, DE 19711 (US). (74) Agent: OLSEN, James, M.; 1220 Market Street, P.O. Box 2207, Wilmington, DE 19899 (US).</p>	<p>(81) Designated States: CA, CN, JP, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> (88) Date of publication of the international search report: 8 October 1998 (08.10.98)</p>	

(54) Title: MULTIPLE MAGNETIC TUNNEL STRUCTURES



(57) Abstract

A double tunnel junction is disclosed that can be used as a magnetic sensor or as random access memories. The preferred embodiment comprises three magnetic metal materials (16, 18 and 20) separated by two insulating layers (12 and 14). A current is passed through the first tunnel junction thereby developing a voltage in the second junction. The resistance of this device can be changed over a 100 % when an external magnetic field of just a few gauss is applied.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/20419

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :H01L 29/82, 43/00
US CL :257/295, 421, 424; 365/65
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)

U.S. : 257/295, 421, 424; 365/32, 48, 50, 55, 65, 66-70, 74; 324/249, 260, 263

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)


C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,471,467 A (DE JONGE et al) 11 September 1984 (11.09.84), see column 4, lines 23 to column 5, line 66.	1-4
A	US 5,218,512 A (NAKAMURA) 08 June 1993 (08.06.93).	1-4
A	US 5,390,142 A (GENDLIN) 14 February 1995 (14.02.95).	1-4
A	US 5,477,482 A (PRINZ) 19 December 1995 (19.12.95).	1-4
A	US 5,565,695 A (JOHNSON) 15 October 1996 (15.10.96).	1-4
A, P	US 5,629,549 A (JOHNSON) 13 May 1997 (13.05.97).	1-4

Further documents are listed in the continuation of Box C. See patent family annex.

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Date of the actual completion of the international search 09 MARCH 1998	Date of mailing of the international search report 22 JUL 1998
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/20419

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A, P	US 5,629,922 A (MOODERA et al) 13 May 1997 (13.05.97).	1-4
A, P	US 5,638,252 A (DRAB et al) 10 June 1997 (10.06.97).	1-4