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**Bibilashvili et al.**

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- (54) **QUANTUM INTERFERENCE DEVICE**
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5,336,547 A	8/1994	Kawakita et al.
5,371,388 A	12/1994	Oda
5,432,362 A	7/1995	Lippens et al.
5,497,015 A	3/1996	Ishibashi et al.
5,503,963 A	4/1996	Bifano
5,504,388 A	4/1996	Kimura et al.
5,519,232 A	5/1996	Park et al.
5,521,735 A	5/1996	Shimizu et al.
5,579,232 A	11/1996	Tong et al.
5,604,357 A	2/1997	Hori

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(Continued)

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**FOREIGN PATENT DOCUMENTS**

DE 3404137 A1 8/1985

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- (52) **U.S. Cl.** ..... **257/9; 257/24**
- (58) **Field of Classification Search** ..... **257/9, 257/24**

**OTHER PUBLICATIONS**

Chou et al., "Imprint Lithography with 25 Nanometer Resolution", Science, Apr. 5, 1996, pp. 85-87, vol. 272.

(Continued)

See application file for complete search history.

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- (56) **References Cited**  
U.S. PATENT DOCUMENTS

(57) **ABSTRACT**

3,740,592 A	6/1973	Engdahl et al.
4,011,582 A	3/1977	Cline et al.
4,039,352 A	8/1977	Marinescu
4,063,965 A	12/1977	Cline et al.
4,686,162 A	8/1987	Stangl et al.
5,023,671 A	6/1991	DiVincenzo et al.
5,068,535 A	11/1991	Rabalais
5,119,151 A	6/1992	Onda
5,130,766 A *	7/1992	Arimoto et al. .... 257/192
5,204,588 A	4/1993	Ugajin et al.
5,229,320 A	7/1993	Ugajin
5,233,205 A	8/1993	Usagawa et al.
5,247,223 A	9/1993	Mori et al.
5,332,952 A	7/1994	Ugajin et al.

A quantum interference transistor comprising an source region for emitting electron waves into a vacuum, a drain region for collecting the electron waves, a repeating nanostructure in a region between the source and drain regions for introducing a constant phase shift between a plurality of electron waves, and a gate for controlling the phase shift introduced by the nanostructure; wherein the repeating nanostructure is characterized by having sharply defined geometric patterns or indents of a dimension that creates de Broglie wave interference.

**18 Claims, 2 Drawing Sheets**

