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Neal et al.

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[54] **METHOD AND APPARATUS FOR DEFEATING BALLISTIC PROJECTILES**

4,648,136	3/1987	Higuchi .	
5,196,252	3/1993	Harpell .	
5,326,606	7/1994	Labock .	
5,443,917	8/1995	Tarry	428/545
5,515,541	5/1996	Sacks et al.	2/2.5
5,738,925	4/1998	Chaput	428/101
5,824,940	10/1998	Chediak et al.	89/36.05

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OTHER PUBLICATIONS

X-2 Promotional Materials; Bain, Allan D.; Jan. 1996.

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[52] **U.S. Cl.** **2/2.5**; 428/101; 89/36.01

[58] **Field of Search** 2/2.5; 428/293.1, 428/293.4, 325, 323, 329, 911; 89/36.01

[57] **ABSTRACT**

A method and apparatus for defeating high-velocity projectiles. A plurality of disks of equal size comprised of fiber induced ceramic composites are provided. The disks are laid out in an imbricated pattern row by row such that each disk in a row is in substantially a straight line with the other disks in the row and overlaps a segment of a disk in an adjacent row. The imbricated pattern is then adhered to a flexible, high tensile strength substrate and overlaid by a second high tensile strength layer such that the imbricated pattern is enveloped between the substrate and the second layer. The envelope is then coupled to a soft body armor backing.

[56] **References Cited**

U.S. PATENT DOCUMENTS

921,352	5/1909	Blaker et al. .	
1,021,804	4/1912	Schneider .	
1,282,411	10/1918	Golembiowski .	
1,290,799	1/1919	Talley .	
1,513,766	11/1924	Spooner .	
1,739,112	10/1929	Wisbrod .	
3,179,553	4/1965	Franklin .	
3,813,281	5/1974	Burgess et al. .	
3,829,899	8/1974	Davis .	
4,633,756	1/1987	Rudoj	89/36.02

21 Claims, 2 Drawing Sheets

