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# United States Patent [19]

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Ravipati et al.

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[54] **MULTILAYER HARD BIAS FILMS FOR LONGITUDINAL BIASING IN MAGNETORESISTIVE TRANSDUCER**

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[57] **ABSTRACT**

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A magnetoresistive transducer includes a magnetoresistive layer having end portions spaced by a central active portion. The longitudinal bias for the magnetoresistive layer is cooperatively furnished by a pair of hard magnetic bias regions. Each of the two hard magnetic bias regions includes a plurality of magnetized layers and each bias region is disposed in contact with one of the end portions of the magnetoresistive transducer. The magnetic flux required for the magnetoresistive layer to maintain a single domain state is adequately provided by the hard magnetic bias regions. In one embodiment, a substantially uniform thickness for the entire transducer is achieved, allowing the longitudinal bias to be continuously supplied to the magnetoresistive layer. In another embodiment, thinner hard magnetic bias regions provide improved step coverage for the second read gap thereby increasing yield. Also the thinner hard magnetic bias regions provide a significant increase of planarization of the write poles.

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[51] Int. Cl.<sup>6</sup> ..... **H01L 43/00; G11B 5/39**

[52] U.S. Cl. .... **367/140; 360/113**

[58] Field of Search ..... **367/140; 360/113; 324/252; 338/32 R**

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**19 Claims, 6 Drawing Sheets**

