134 and 134 are deposited on the protective layer 15, improving the characteristics of the magnetoresistive-effect device.

[0478] When the magnetoresistive-effect device shown in FIG. 22 is produced using the manufacturing method to be described later, the angle θ22 made between the end face 134*a* of the electrode layer 134, extending over the insensitive region of the multilayer film 202 and in contact with the insulator layer 135, and the top surface 80*a* of the antiferromagnetic layer 80, is set to be 60 degrees or greater, or 90 degrees or greater. This arrangement allows a certain quantity of sense current to continuously flow through the electrode layer 134, way down to the tip thereof. The magnetoresistive-effect device shown in FIG. 22 is more effective than the magnetoresistive-effect device shown in FIG. 12 in the prevention of the sense current from shunting into the insensitive region, thereby in the control of the generation of noise.

[0479] In the magnetoresistive-effect device shown in FIG. 22, the location of the insulator layer 135 on the multilayer film 202 is accurately set using the manufacturing method to be described later and the electrode layer 134 is prevented from extending beyond the insensitive region and from narrowing the area of the magnetoresistive-effect device capable of detecting the magnetic field.

[0480] Referring to FIG. 22, the width dimension T66 of the electrode layer 134 extending over the insensitive region D of the multilayer film 202 is preferably within a range from 0 μm to 0.08 μm. The width dimension T66 of the electrode layer 134 is more preferably within a range of 0.05 μm to 0.08 μm.

[0481] Referring to FIG. 22, the magnetic coupling junction M between the multilayer film 202 and each of the hard bias layers 89 and 89 is fabricated of an interface with the end face of only the first free magnetic layer 87, of both the first free magnetic layer 85 and the second free magnetic layer 87.

[0482] By producing the magnetoresistive-effect device of FIG. 22 through the manufacturing method to be described later, the side face of the multilayer film 202 and the side face of the insulator layer 135 are set to be parallel to each other.

[0483] FIG. 23 is a cross-sectional view of the magnetoresistive device of an eighteenth embodiment of the present invention, viewed from an ABS side thereof.

[0484] The magnetoresistive-effect device shown in FIG. 23 includes, on the multilayer film 203 having the same construction as the one in the magnetoresistive-effect device shown in FIG. 13, a laminated insulator layer 137 constructed of Al_2O_3, and electrode layers 136 and 136 with their end faces 136*a* and 136*a* in direct contact with both sides of the insulator layer 137.

[0485] The construction and materials of the layers of the multilayer film 203 remain the same as those of the magnetoresistive-effect device shown in FIG. 13. Referring to FIG. 23, however, the layer 15 is deposited on top of the multilayer film 203.

[0486] The metallic layers 113 and 113, the hard bias layers 114 and 114 and the intermediate layers 115 and 115 formed on the substrate 10 are identical, coextending the width dimension T67 of the antiferromagnetic layer 100 extending in the X direction, are identical, in construction and material, to the counterparts in the magnetoresistive-effect device shown in FIG. 13.

[0487] The first pinned magnetic layer 103 and the second pinned magnetic layer 101 are in a ferrimagnetic state with the magnetization directions thereof being antiparallel. The first pinned magnetic layer 103 and the second pinned magnetic layer 101 pin each other in magnetization direction, thereby stabilizing the magnetization direction of the pinned magnetic layer P_1 in one direction as a whole. The first pinned magnetic layer 103 and the fourth pinned magnetic layer 111 are in a ferrimagnetic state with the magnetization directions thereof being antiparallel.

[0488] In the magnetoresistive-effect device shown in FIG. 23, the first free magnetic layer 105 and the second free magnetic layer 107, having different magnetic moments and in a ferrimagnetic state with the magnetization directions thereof being antiparallel, are laminated with the nonmagnetic material layer 106 interposed therebetween, and function as a single free magnetic layer F.

[0489] The two end portions of the free magnetic layer F, having disturbed magnetization directions, present a poor reproduction gain, and become insensitive regions unable to exhibit no substantial magnetoresistive effect.

[0490] In the eighteenth embodiment again, the sensitive region E and the insensitive regions D and D of the multilayer film 203 are measured using the micro track profile method. Referring to FIG. 23, the portion, having the width dimension T68, of the multilayer film 203 is the sensitive region E, and the portions, each having the width dimension T69, on both sides of the sensitive region E are the insensitive regions D and D.

[0491] In the sensitive region E, the magnetization directions of the pinned magnetic layers P_1 and P_2 are correctly aligned in a direction parallel to the Y direction, and the magnetization of the free magnetic layer F is correctly aligned in the X direction. The pinned magnetic layers P_1 and P_2 and the free magnetic layer F are perpendicular to each other in magnetization direction. The magnetization of the free magnetic layer F varies sensitively in response to an external magnetic field from the recording medium. An electrical resistance varies in accordance with the relationship between the variation in the magnetization direction of the free magnetic layer F and the pinned magnetic field of the pinned magnetic layers P_1 and P_2. A leakage magnetic field from the recording medium is thus detected in response to a variation in voltage due to the electrical resistance variation.

[0492] The electrode layers 136 and 136 formed above the multilayer film 203 extend over the multilayer film 203. The width dimension of the top surface of the multilayer film 203 not covered with the electrode layers 134 and 134 is the optical read track width O-Tw.

[0493] The magnetic read track width M-Tw, determined by the width dimension of the sensitive region E not covered with the electrode layers 136 and 136, is the width dimension T68, which is also the dimension of the sensitive region E.

[0494] In the eighteenth embodiment, the electrode layers 136 and 136 formed on the multilayer film 203 fully cover