field generated by the hard bias layers **77** and **77** while the magnetization direction of the second free magnetic layer **75** is 180 degrees opposite.

[**0261**] The first free magnetic layer **73** and the second free magnetic layer **75**, which are in a ferrimagnetic state with magnetization directions thereof being antiparallel, namely different from each other by 180 degrees, achieve the same effect, which can be provided by the use of a thin free magnetic layer F. This arrangement reduces the saturation magnetization, causing the magnetization of the free magnetic layer F to easily vary, and thereby improving the magnetic field detection sensitivity of the magnetoresistive-effect device.

[**0262**] The direction of the sum of the magnetic moments of the first free magnetic layer **73** and the second free magnetic layer **75** becomes the magnetization direction of the free magnetic layer F.

[**0263**] Because of the relationship with the magnetization direction of the pinned magnetic layer **71**, only the magnetization direction of the first free magnetic layer **73** contributes to the reproduction output.

[**0264**] The hard bias layers **77** and **77** are magnetized in the X direction (i.e,, the direction of the track width), and the magnetization of the free magnetic layer F is aligned with the X direction under the bias magnetic field in the X direction given by the hard bias layers **77** and **77**.

[**0265**] The second free magnetic layer **75** having a magnetization direction thereof 180 degrees opposite from the direction of the magnetic field generated by the hard bias layers **77** and **77**, is subject to disturbance in magnetization direction in the vicinity of two end portions thereof magnetically coupled with the hard bias layers **77** and **77**. In response to this disturbance, the first free magnetic layer **73** suffers from magnetization direction disturbance on its end portions together therewith.

[**0266**] The two end portions of the free magnetic layer F having disturbed magnetization directions have a poor reproduction gain, and become insensitive regions unable to exhibit no substantial magnetoresistive effect.

[**0267**] In the tenth embodiment again, the sensitive region E and the insensitive regions D and D of the multilayer film **200** are measured using the micro track profile method. Referring to **FIG. 10**, the portion having the width dimension T**41** of the multilayer film **200** is the sensitive region E, and the portions having the width dimension T**42** are the insensitive regions D and D.

[**0268**] In the sensitive region E, the magnetization direction of the pinned magnetic layer **71** is pinned correctly in a direction parallel to the Y direction, and the magnetization direction of the free magnetic layer F is correctly aligned in the X direction. The pinned magnetic layer **71** and the free magnetic layer F are thus perpendicular 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 layer **71**. A leakage magnetic field from the recording medium is thus detected in response to a variation in voltage due to the electrical resistance variation. However, those which directly contribute to the variation in the electrical resistance (i.e., the reproduction output) are a relative angle made between the magnetization direction of the pinned magnetic layer **71** and the magnetization direction of the first free magnetic layer **73**. These magnetization directions are preferably perpendicular with a sense current conducted in the absence of a signal magnetic field.

[**0269**] Electrode layers **79** and **79**, deposited on both sides of the multilayer film **200**, extend over the multilayer film **200**. The width dimension of the top layer of the multilayer film **200** not covered with the electrode layers **79** and **79** is the optical read track width O-Tw.

[**0270**] The magnetic read track width M-Tw, determined by the width dimension of the sensitive region E not covered with the electrode layers **79** and **79**, is a width dimension T**41**, which is also the dimension of the sensitive region E.

[**0271**] In the tenth embodiment, the electrode layers **79** and **79** formed above the multilayer film **200** fully cover the insensitive regions D and D, setting the optical read track width O-Tw and the magnetic read track width M-Tw (i.e., the width dimension of the sensitive region E) to approximately the same dimension.

[**0272**] It is not a requirement that the electrode layers **79** and **79** formed above the multilayer film **200** fully cover the insensitive regions D and D, and the electrode layer **79** may be narrower than the insensitive region D. In this case, the optical read track width O-Tw becomes larger than the magnetic read track width M-Tw.

[**0273**] The percentage of the sense current flowing from the electrode **79** to the multilayer film **200** without passing through the hard bias layers **77** and **77** is increased in this invention.

[**0274**] The electrode layers **79** and **79** extending over the insensitive regions D and D prevent the sense current from flowing into the insensitive regions D and D, thereby controlling the generation of noise.

[**0275**] Referring to **FIG. 10**, the width dimension T**43** of each of the electrode layers **79** and **79** extending over the insensitive region D of the multilayer film **200** preferably falls within a range from 0 μm to 0.08 μm. More preferably, the width dimension T**43** of the electrode layer **79** falls within a range from 0.05 μm to 0.08 μm.

[**0276**] The angle θ**10** made between the top surface **15***a* of the protective layer **15** and an end face **79***a* of the electrode layer **79** extending over the insensitive region of the multilayer film **200** is preferably 20 degrees or greater, and more preferably 25 degrees or greater. This arrangement prevents the sense current from shunting into the insensitive region, thereby controlling the generation of noise.

[**0277**] If the angle θ**10** made between the top surface **15***a* and the end face **79***a* is too large, a short is likely to occur between the electrode layer **79** and a top shield layer of a soft magnetic material when the top shield layer is deposited over the protective layer **15** and the electrode layers **79** and **79**. The angle θ**10** made between the top surface **15***a* and the end face **79***a* is preferably 60 degrees or smaller, and more preferably, 45 degrees or smaller.

[**0278**] **FIG. 11** is a cross-sectional view showing the construction of the magnetoresistive-effect device of an eleventh embodiment of the present invention, viewed from an ABS side thereof.