FIG. 1 through **FIG. 5**. The layer lying at the bottom is the substrate **10**, while the layer lying on the top is a protective layer **15**. The laminate, composed of the layers from the substrate **10** through the protective layer **15**, constitutes a multilayer film **48**.

[**0211**] In the sixth embodiment of the present invention, the antiferromagnetic layers **41** and **47** are is made of a Pt—Mn (platinum-manganese) alloy. Instead of the Pt—Mn alloy, the antiferromagnetic layers **41** and **47** may be made of an X—Mn alloy where X is a material selected from the group consisting of Pd, Ir, Rh, Ru, and alloys thereof, or a Pt—Mn—X' alloy where X' is a material selected from the group consisting of Pd, Ir, Rh, Ru, Au, Ag, and alloys thereof.

[**0212**] The pinned magnetic layers **42** and **46** and the free magnetic layer **44** are made of an Ni—Fe (nickel-iron) alloy, Co (cobalt), an Fe—Co (iron-cobalt) alloy, or an Fe—Co—Ni alloy, and the nonmagnetic electrically conductive layers **43** and **45** are made of a low electrical-resistance nonmagnetic electrically conductive material such as Cu (copper).

[**0213**] The hard bias layers **49** and **49** are deposited on both sides of the multilayer film **48** as shown in **FIG. 6**, and the hard bias layers **49** and **49** are made of a Co—Pt (cobalt-platinum) alloy or a Co—Cr—Pt (cobalt-chromium-platinum) alloy.

[**0214**] The hard bias layers **49** and **49** are magnetized in the X direction (i.e., the direction of the track width) as shown, and the magnetization direction of the free magnetic layer **44** is thus aligned in the X direction under the bias field in the X direction caused by the hard bias layers **49** and **49**.

[**0215**] In the sixth embodiment again, the sensitive region E and the insensitive regions D and D of the multilayer film **48** are measured using the micro track profile method. As shown in **FIG. 6**, the portion having the width dimension T15 centrally positioned on the multilayer film **48** is the sensitive region E, and the portions having the width dimension T14 are the insensitive regions D and D.

[**0216**] In the sensitive region E, the magnetization direction of the pinned magnetic layers **42** and **46** is pinned correctly in the Y direction, and the magnetization direction of the free magnetic layer **44** is correctly aligned in the X direction. The pinned magnetic layers **42** and **46** and the free magnetic layer **44** are thus perpendicular in magnetization direction. The magnetization of the free magnetic layer **44** 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 **44** and the pinned magnetic field of the pinned magnetic layers **42** and **46**. A leakage magnetic field from the recording medium is thus detected in response to a variation in voltage due to the electrical resistance variation.

[**0217**] Referring to **FIG. 6** in this invention, intermediate layers **50** and **50** made of a nonmagnetic material are respectively deposited on the hard bias layers **49** and **49** on both sides of the multilayer film **48**. Electrode layers **51** and **51** are then respectively deposited on the intermediate layers **50** and **50** and respectively extend over the insensitive regions D and D of the multilayer film **48**. The electrode layers **51** and **51** are made of Cr, Au, Ta, or W film, for instance.

[**0218**] The width dimension of the top surface of the multilayer film **48** not covered with the electrode layers **51** and **51** is defined as an optical read track width O-Tw. The width dimension T15 of the sensitive region E not covered with the electrode layers **51** and **51** is defined as the magnetic read track width M-Tw. In the sixth embodiment, the electrode layers **51** and **51** extending over the multilayer film **48** fully cover the insensitive regions D and D. The optical read track width O-Tw is approximately equal to the magnetic read track width M-Tw (i.e., the width dimension of the sensitive region E).

[**0219**] It is not a requirement that the electrode layers **51** and **51** fully cover the insensitive regions D and D, and the width dimension T5 of the electrode layer **51** extending over the multilayer film **48** is smaller 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.

[**0220**] This arrangement makes it easier for the sense current to directly flow from the electrode layer **51** into the multilayer film **48** without passing through the hard bias layer **49**. With the electrode layers **51** and **51** respectively extending over the insensitive regions D and D, the junction area between the multilayer film **48** and the hard bias layer **49** and the electrode layer **51** is increased, reducing the direct current resistance (DCR) and thereby improving the reproduction characteristics.

[**0221**] Furthermore, the electrode layers **51** and **51** respectively extending over the insensitive regions D and D prevent the sense current flowing into the insensitive regions D and D, thereby controlling the generation of noise.

[**0222**] Referring to **FIG. 6**, the width dimension T16 of each of the electrode layers **51** and **51** extending over the insensitive regions D and D of the multilayer film **48** preferably falls within a range from 0 μm to 0.08 μm. More preferably, the width dimension T16 falls within a range from 0.05 μm to 0.08 μm.

[**0223**] The angle θ**6** made between the top surface **15***a* of the protective layer **15** and an end face **51***a* of the electrode layer **51** extending over the insensitive region of the multilayer film **48** 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.

[**0224**] If the angle θ**6** made between the top surface **15***a* and the end face **51***a* is too large, a short is likely to occur between the electrode layer **51** 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 **51** and **51**. The angle θ**6** made between the top surface **15***a* and the end face **51***a* is preferably 60 degrees or smaller, and more preferably, 45 degrees or smaller.

[**0225**] A dual spin-valve type thin-film device of a seventh embodiment of the present invention shown in **FIG. 7** has a construction identical to that of the dual spin-valve type thin-film device shown in **FIG. 6**. However, the width dimension of a multilayer film **60** in the spin-valve type thin-film device in **FIG. 7** is set to be larger in the X direction than that of the multilayer film **48** in the spin-valve type thin-film device shown in **FIG. 6**.

[**0226**] Referring to **FIG. 7**, the multilayer film **60** is formed to be longer than the multilayer film **48** shown in