end face **58***a* is preferably 60 degrees or smaller, and more preferably, 45 degrees or smaller.

[**0243**] An AMR device of a ninth embodiment of the present invention shown in **FIG. 9** has a construction identical to that of the AMR shown in **FIG. 8**. However, the width dimension of a multilayer film **62** is set to be larger than the width dimension of the multilayer film **61** in the X direction, as shown in **FIG. 8**. The sensitive region E of the multilayer film **62** shown in **FIG. 9** is therefore larger in width dimension than the sensitive region E of the multilayer film **61** shown in **FIG. 8**.

[**0244**] Each of electrode layers **58** and **58** formed on both sides of the multilayer film **62** extends over the multilayer film **62**. The insensitive regions D and D are thus covered with the electrode layers **58** and **58**.

[**0245**] The width dimension T23 of each of the electrode layers **58** and **58** extending over the insensitive regions D and D of the multilayer film **62** preferably falls within a range from 0 μm to 0.08 μm. More preferably, the width dimension T23 falls within a range from 0.05 μm to 0.08 μm.

[**0246**] The angle θ9 made between the top surface **55***a* of the protective layer **55** and an end face **58***a* of the electrode layer **58** extending over the insensitive region of the multilayer film **62** is preferably 20 degrees or greater, and more preferably 25 degrees or greater, and preferably 60 degrees or smaller, and more preferably, 45 degrees or smaller.

[**0247**] **FIG. 10** is a cross-sectional view showing the construction of the magnetoresistive-effect device of a tenth embodiment of the present invention, viewed from an ABS side thereof.

[**0248**] The spin-valve type thin-film device shown in **FIG. 10** includes an antiferromagnetic layer **70** which has a long portion extending on and along a substrate **10** in the X direction as shown. The antiferromagnetic layer **70** is projected upward in a central portion thereof. Laminated on the projected portion of the antiferromagnetic layer **70** are a pinned magnetic layer **71**, a nonmagnetic electrically conductive layer **72**, a first free magnetic layer **73**, a nonmagnetic material layer **74**, a second free magnetic layer **75**, and a protective layer **15**. The laminate, composed of the layers from the substrate **10** through the protective layer **15**, forms a multilayer film **200**.

[**0249**] The pinned magnetic layer **71** is deposited on and in contact with the antiferromagnetic layer **70**, and is subjected to annealing in the presence of a magnetic field. An exchange anisotropic magnetic field takes place through exchange coupling at the interface between the antiferromagnetic layer **70** and the pinned magnetic layer **71**. The magnetization of the pinned magnetic layer **71** is thus pinned in the Y direction.

[**0250**] In accordance with the present invention, the antiferromagnetic layer **71** is made of a Pt—Mn (platinum-manganese) alloy. Instead of the Pt—Mn alloy film, the antiferromagnetic layer **71** 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.

[**0251**] The pinned magnetic layer **71**, the first free magnetic layer **73**, and the second free magnetic layer **75** are made of an Ni—Fe (nickel-iron) alloy, Co (cobalt), an Fe—Co (iron-cobalt) alloy, or an Fe—Co—Ni alloy.

[**0252**] The nonmagnetic electrically conductive layer **72** is made of a low electrical-resistance nonmagnetic electrically conductive material such as Cu (copper).

[**0253**] Referring to **FIG. 10**, metallic layers **76** and **76**, made of Cr or the like, and functioning as a buffer layer or a alignment layer, extend from a horizontal portion thereof coextending a width dimension T**40** of the antiferromagnetic layer **70** in the X direction, rising along the side end faces of the pinned magnetic layer **71**, the nonmagnetic electrically conductive layer **72**, the first free magnetic layer **73**, the nonmagnetic material layer **74**, and the second free magnetic layer **75**. The use of the metallic layers **76** and **76** helps increase the strength of the bias magnetic field created by hard bias layers **77** and **77** to be described later.

[**0254**] Deposited on top of the metallic layers **76** and **76** are the hard bias layers **77** and **77** which are made of a Co—Pt (cobalt-platinum) alloy or a Co—Cr—Pt (cobalt-chromium-platinum) alloy.

[**0255**] Intermediate layers **78** and **78**, made of a nonmagnetic material such as Ta, are respectively deposited on the hard bias layers **77** and **77**. Electrode layers **79** and **79**, made of Cr, Au, Ta, or W, are respectively deposited on top of the intermediate layers **78** and **78**.

[**0256**] Since the antiferromagnetic layer **70** extends beneath and along the hard bias layers **77** and **77** as shown in **FIG. 10**, the thickness of the hard bias layers **77** and **77** can be made thinner. The hard bias layers **77** and **77** are thus easily produced using a sputtering technique.

[**0257**] The first free magnetic layer **73** and the second free magnetic layer **75** are formed to have different magnetic moments. The magnetic moment is expressed by the product of the saturation magnetization (Ms) and the thickness (t) of the layer. For example, the first free magnetic layer **73** and the second free magnetic layer **75** are manufactured of the same material with thicknesses thereof made different so that the two layers have different magnetic moments.

[**0258**] The nonmagnetic material layer **74**, interposed between the first free magnetic layer **73** and the second free magnetic layer **75**, is preferably made of a material selected from the group consisting of Ru, Rh, Ir, Cr, Re, Cu, and alloys thereof.

[**0259**] Referring to **FIG. 10**, the first free magnetic layer **73**, and the second free magnetic layer **75**, having different magnetic moments, are laminated with the nonmagnetic material layer **74** interposed therebetween, and function as a single free magnetic layer F.

[**0260**] The first free magnetic layer **73** and the second free magnetic layer **75** are in a ferrimagnetic state with magnetization directions thereof being antiparallel, namely different from each other by 180 degrees. The magnetization direction of the first free magnetic layer **73** or the second free magnetic layer **75**, whichever has a greater magnetic moment, is aligned with the direction of the magnetic field generated by the hard bias layers **77** and **77**. Assuming that the first free magnetic layer **73** has a greater magnetic moment, the magnetization direction of the first free magnetic layer **73** is aligned with the direction of the magnetic