[0620] Referring to **FIG. 38**, hard bias layers **349** and **349** are formed on both sides of the multilayer film **348**, and are made of a Co—Pt (cobalt-platinum) alloy or a Co—Cr—Pt (cobalt-chromium-platinum) alloy.

[0621] The hard bias layers **349** and **349** are magnetized in the X direction (i.e., the direction of a track width), and the magnetization of the free magnetic layer **344** is aligned in the X direction under the bias magnetic field in the X direction from the hard bias layers **349** and **349**.

[0622] Intermediate layers **350** and **350** are formed to be separated from the hard bias layers **349** and **349** by non-magnetic material layers **327** and **327**, made of Ta. Each of the intermediate layers **350** and **350** is made of a high-resistivity material having a resistance higher than that of electrode layers **351** and **351**, for example, a material selected from the group consisting of $TaSiO_2$, TaSi, $CrSiO_2$, CrSi, WSi, $WSiO_2$, TiN, and TaN, or is made of an insulating material selected from the group consisting of Al_2O_3, SiO_2, Ti_2O_3, TiO, WO, AlN, Si_3N_4, B_4C, SiC, and SiAlON. The electrode layers **351** and **351**, made of Ta or Cr, are then respectively separated from the intermediate layers **350** and **350** by the nonmagnetic material layers **328** and **328**.

[0623] Referring to **FIG. 38**, the electrode layers **351** and **351** extend over the multilayer film **348**.

[0624] The intermediate layers **350** and **350**, made of the high-resistivity material or the insulating material, formed between the hard bias layers **349** and **349** and the electrode layers **351** and **351**, control the sense current shunting into the hard bias layer **349**. With the electrode layers **351** and **351** extending over the top surface of the multilayer film **348**, the sense current directly flows from the electrode layer **351** to the multilayer film **348**. The magnetoresistive-effect device thus results in a high reproduction gain and a high reproduction output.

[0625] Even if the thickness h3 of the electrode layer **350** formed in contact with the multilayer film **340** is made smaller, the use of the intermediate layer **350** permits the sense current to flow from the electrode layer **351** to the multilayer film **348** without passing through the hard bias layer **349**. This arrangement reduces the size of a step between the top surface of the electrode layer **351** and the top surface of the multilayer film **348**, and forms an upper gap layer **379** over the border area between the electrode layer **351** and the multilayer film **348**, with an improved step coverage and with no film discontinuity involved, and provides sufficient insulation.

[0626] In the twenty-third embodiment, the sensitive region E and insensitive regions D and D of the multilayer film **348** are measured using the micro track profile. The portion having a width dimension T15 centrally positioned in the multilayer film **348** as shown in **FIG. 38** is the sensitive region E, while the portions, each having a width dimension T14, are the insensitive regions D and D.

[0627] In the sensitive region E, the magnetization of the pinned magnetic layers **342** and **346** is correctly pinned in the Y direction as shown. Since the magnetization of the free magnetic layer **344** is correctly aligned in the X direction, the magnetization of the pinned magnetic layers **342** and **346** is perpendicular to the magnetization of the free magnetic layer **344**. The magnetization of the free magnetic layer **344** 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 **344** and the pinned magnetic field of the pinned magnetic layers **342** and **346**. A leakage magnetic field from the recording medium is thus detected in response to a variation in voltage due to the electrical resistance variation.

[0628] Referring to **FIG. 38**, the electrode layers **351** deposited on the multilayer film **348** respectively extend over the insensitive regions D and D by a width dimension T16.

[0629] The width dimension of the top surface of the multilayer film **348** not covered with the electrode layer **351** is defined as the optical read track width O-Tw. The width dimension T15 of the sensitive region E is defined as the magnetic read track width M-Tw. In this embodiment, the electrode layers **451** and **451** deposited on the multilayer film **348** respectively fully cover the insensitive regions D and D. 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) are approximately equal to each other.

[0630] It is not a requirement that the electrode layers **351** and **351** fully cover the insensitive regions D and D. The width dimension T15 of the electrode layer **351** extending over the multilayer film **348** 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.

[0631] This arrangement allows the sense current to predominantly flow from the electrode layer **351** into the sensitive region E, thereby increasing the reproduction output.

[0632] **FIG. 39** is a cross-sectional view of a twenty-fourth embodiment of the magnetoresistive-effect device of the present invention, viewed from an ABS side thereof.

[0633] The magnetoresistive-effect device shown in **FIG. 39** is called an anisotropic magnetoresistive-effect (AMR) device. A soft magnetic layer (a SAL layer) **352**, a nonmagnetic layer (a shunt layer) **353**, a magnetoresistive layer (MR layer) **354**, and a protective layer **355** are successively laminated in that order from below to form a multilayer film **361**. Hard bias layers **356** and **356** are formed on both sides of the multilayer film **361**. Typically, the soft magnetic layer **352** is made of an NiFeNb alloy, the nonmagnetic layer **353** is made of Ta, the magnetoresistive layer **354** is made of an NiFe alloy, and the hard bias layers **356** and **356** are made of a CoPt alloy.

[0634] Intermediate layers **357** and **357** are formed to be separated from the hard bias layers **356** and **356** by non-magnetic material layers **329** and **329**, made of Ta. Each of the intermediate layers **357** and **357** is made of a high-resistivity material having a resistance higher than that of electrode layers **358** and **358**, for example, a material selected from the group consisting of $TaSiO_2$, TaSi, $CrSiO_2$, CrSi, WSi, $WSiO_2$, TiN, and TaN, or is made of an insulating material selected from the group consisting of Al_2O_3, SiO_2, Ti_2O_3, TiO, WO, AlN, Si_3N_4, B_4C, SiC, and SiAlON. The electrode layers **358** and **358**, made of Ta or Cr, are then respectively separated from the intermediate layers **357** and **357** by the nonmagnetic material layers **362** and **362**.

[0635] Referring to **FIG. 39**, the electrode layers **358** and **358** extend over the multilayer film **361**.