that are propagated over the surface of the third substrate are blocked by the contact portion of the resin film and the third substrate, and are sufficiently changed (attenuated) at this contact portion. The position detector detects the pressed position with a high degree of accuracy based on the position where the surface waves are changed.

In this electro-optical device, the surface waves are generated on the surface of the third substrate (between the third and the fourth substrates), and are propagated over the surface. As the surface of the third substrate which propagates the surface waves is not exposed to the outside, it is possible to prevent foreign matter, impurities and the like from adhering to the surface. Furthermore, one is able to prevent changes in the surface waves due to the adhesion of foreign matter, impurities and the like to the surface. As a result, it is possible to prevent the malfunctioning of the touch panel.

Here, an electro-optical device is collectively referred to not only as a device that changes the refractive index of a substance by an electric field and that has electro-optical effects by changing the transmittance of light, but also as a device that converts electrical energy to optical energy, and so on. Specifically, there are liquid crystal display devices using liquid crystal as the electro-optical substance, organic EL devices using organic electro-luminescence as the electro-optical substance, plasma display devices using plasma gas as the electro-optical substance, and so on. Furthermore, there are electrophoretic display devices (EPD: electrophoretic display), field emission display devices (FED: field emission display), electrochromic display devices (ECD: electrochromic display), and so on.

In this electro-optical device, it is preferable that the electro-optical panel be a liquid crystal display panel, that the electro-optical substance be a liquid crystal, that a first polarization plate be arranged on the fourth substrate, and that a second polarization plate be arranged on the first substrate.

According to this configuration, the first polarization plate is arranged on the fourth substrate. Consequently, even in the case where, for example, the fourth substrate (i.e., the touch panel) is damaged by the shock of pressing or the like, the shattering of fragments of the damaged fourth substrate (i.e., the touch panel) to the outside is prevented.

In this electro-optical device, it is preferable that Young's modulus of the resin film be smaller than that of the fourth substrate and the first polarization plate.

According to this configuration, the contact area of the third substrate and the resin film is increased, and the surface waves can be adequately attenuated.

An electro-optical device according to a second aspect of the invention includes: an electro-optical panel having a first substrate, a second substrate, and an electro-optical substance interposed between the first and the second substrates; a third substrate having a flexibility and arranged on the second substrate via a spacer; a position detector provided on the second substrate and detecting a pressed position on the third substrate based on changes in surface waves generated on the second substrate; and a resin film provided on the third substrate and opposed to the second substrate.

In this electro-optical device, the second substrate, the third substrate, the position detector and the resin film constitute a touch panel. The second substrate also constitutes the electro-optical panel. This is advantageous from the standpoint of realizing a thinner electro-optical device. Moreover, with this configuration, it is possible to obtain the same effects as with the electro-optical device according to the first aspect.

In this electro-optical device, it is preferable that the electro-optical panel be a liquid crystal display panel, that the electro-optical substance be a liquid crystal, that a first polarization plate be arranged on the third substrate, and that a second polarization plate be arranged on the first substrate.

In this configuration, the first polarization plate is arranged on the third substrate. Consequently, even in the case where, for example, the third substrate (i.e., the touch panel) is damaged by the shock of pressing or the like, the shattering of fragments of the damaged first substrate (i.e., the touch panel) to the outside is prevented.

In this electro-optical device, it is preferable that Young's modulus of the resin film be smaller than that of the third substrate and the first polarization plate.

According to this configuration, the contact area of the second substrate and the resin film is increased, and the surface waves can be adequately attenuated.

An electro-optical device according to a third aspect of the invention includes: an electro-optical panel including a first substrate, a second substrate, and an electro-optical substance interposed between the first and the second substrates; a third substrate arranged on the second substrate; a resin film arranged on the third substrate via a spacer; and a position detector provided on the third substrate and detecting a pressed position on the resin film based on changes in surface waves generated on the third substrate.

In this electro-optical device, the outer face of the resin film (the face opposite the third substrate side) is the input face that is pressed by the user. With this configuration, the contact area of the resin film portion and the third substrate can be expanded due to the lower Young's modulus of the resin film. The surface waves propagated on the surface of the third substrate are blocked at the contact portion of the resin film and the third substrate, and are adequately changed (attenuated) at this contact portion. The position detector detects the pressed position with a high degree of accuracy based on the position at which the surface waves are changed.

In this electro-optical device, it is preferable that the electro-optical panel be a liquid crystal display panel, that the electro-optical substance be a liquid crystal, that the first polarization plate be arranged on the resin film, and that the second polarization plate be arranged on the first substrate.

According to this configuration, the first polarization plate is arranged on the resin film. Consequently, even in the case where, for example, the touch panel is damaged by the shock of pressing or the like, the shattering of fragments of the damaged touch panel to the outside is prevented.

Moreover, in this electro-optical device, it is preferable that Young's modulus of the resin film be smaller than that of the first polarization plate.

According to this configuration, it is possible to expand the contact area of the third substrate and the resin film, and to adequately attenuate the surface waves.

In this electro-optical device, it is preferable that the Young's modulus (elastic modulus) of the resin film be 4 GPa or less.

The position detector detects the position at which the surface waves are changed as the position where the touch panel is pressed. Here, the change in surface waves signifies the attenuation factor of the surface waves propagated over the substrate surface. The position detector detects the surface waves that are propagated in a prescribed direction on the substrate surface, and calculates the position at which the touch panel is pressed based on the attenuation factor of these detected surface waves. As elastic surface waves generally are from several MHz to several tens of MHz, and as the detection voltage is also very small, there are cases where the signals of surface waves are changed at a position that is not pressed due, for example, to the effects of electromagnetic noise or the like occurring in a different part of the product. This