

arranged in the concave portion H1 of the front surface-side substrate 8a of the touch panel 4 and the phase plate serving as the second optical film is arranged between the touch panel 4 and the liquid crystal panel 2). In such a manner, the input operation can be easily performed.

[0077] Input Operation on Touch Panel

[0078] Next, the input operation on the touch panel 4 will be described.

[0079] In the touch panel 4, an input control circuit (not shown) is connected to the terminal portion 16 and a predetermined voltage is applied between the low resistive films 14 and 14 disposed at both ends in the X direction of the rear surface-side substrate 8b at a certain point by the input control circuit. A voltage measuring unit (a voltage measuring circuit or a voltage measuring element, not shown) in the input control circuit is electrically connected between the low resistive films 13 and 13 disposed at both ends in the Y direction of the front surface-side substrate 8a. At this point, on the planar electrode 12b of the rear surface-side substrate 8b, a voltage linearly changes in the X direction, that is, a uniform voltage drop occurs. Then, a voltage distribution is configured such that portions having the same positional coordinate axis in the X direction have the same potential. At this time, if a portion of the coordinate input surface of the front surface-side substrate 8a is pressed with a tip of the input tool 3, the planar electrode 12a of the front surface-side substrate 8a comes in contact with the planar electrode 12b of the rear surface-side substrate 8b and, via the planar electrode 12a of the front surface-side substrate 8a, a voltage of the planar electrode 12b at a position corresponding to the portion pressed by the input tool 3 is measured by the input control circuit. The value of the measured voltage is related to a positional coordinate in the X direction of the pressed portion, and thus the input control circuit can detect a position in the X direction of the portion pressed by the input tool 3.

[0080] On the other hand, at another certain point, a predetermined voltage is applied between the low resistive films 13 and 13 disposed at both ends in the Y direction of the front surface-side substrate 8a by the input control circuit. Then, the voltage measuring unit is connected between the low resistive films 14 and 14 disposed both ends in the Y direction of the rear surface-side substrate 8b. At this point, on the planar electrode 12a of the front surface-side substrate 8a, a uniform voltage drop occurs in the Y direction and a voltage distribution in which a voltage linearly changes is formed. The input control circuit detects a voltage of the planar electrode 12a of the front surface-side substrate 8a at the position corresponding to the portion pressed by the input tool 3 via the planar electrode 12b of the rear surface-side substrate 8b. In such a manner, similarly to the position in the X direction, a position in the Y direction of the pressed portion can be detected.

[0081] Switching between two connection states with regard to the input control circuit is repeatedly performed for a short time, and thus the input control circuit can detect the positional coordinate value in the X direction and the positional coordinate value in the Y direction of the portion pressed by the input tool 3.

[0082] Manufacturing Method of Liquid Crystal Display Device

[0083] Next, a manufacturing method of the liquid crystal display device 1 of the present embodiment will be described.

[0084] First, a manufacturing method of the touch panel 4 will be described with reference to FIGS. 4A to 4D. In the present embodiment, a method in which a plurality of touch panels 4 are formed in a lump with large mother substrates, each having a plurality of substrate regions, and the respective touch panels 4 are separated from each other by cutting is adopted.

[0085] In this method, first, as shown in FIG. 4a, a first mother substrate 108a including a plurality of substrate regions, each serving as the front surface-side substrate 8a of the touch panel 4, and a second mother substrate 108b including a plurality of substrate regions, each serving as the rear surface-side substrate 8b, are prepared. Then, on each of the substrate regions 8d of the first mother substrate 108a, the planar electrode 12a and the low resistive films 13 are formed. On each of the substrate regions 8d of the second mother substrate 108b, the planar electrode 12b, the low resistive films 14, the auxiliary electrodes 18, and the terminal portion 16 are formed. Here, as the mother substrate 108a or 108b, a thick substrate having the thickness of 0.5 mm is used. If the two substrates 108a and 108b have the different thickness, in a step of FIG. 4C, when cutting the substrate, a stress is dispersed, such that cutting cannot be performed. Thus, both substrates 108a and 108b substantially have the same thickness.

[0086] Further, in the present embodiment, the conductive films for detecting coordinate information (the planar electrodes 12a and 12b, the low resistive films 13 and 14, the auxiliary electrodes 18, and the terminal portion 16) are formed with the vacuum process such as the sputtering method or the deposition method and are patterned in desired shapes by photolithography techniques. In the present embodiment, first, a transmissive conductive film made of ITO or the like and a low resistive metal film made of silver or the like are sequentially formed on a surface of the first mother substrate 108a by the sputtering method or the deposition method. Then, the metal film at an upper layer side is etched and patterned in a shape of each of the low resistive films 13. Subsequently, the transmissive conductive film disposed at a lower layer side is etched and patterned in a shape of the planar electrode 12a. The same can be applied to the counter substrate. That is, first, on a surface of the second mother substrate 108b, a transmissive conductive film made of ITO or the like and a low resistive metal film made of silver or the like are sequentially formed by the sputtering method or the deposition method. Then, the metal film at an upper layer side is etched and patterned in a shape of each of the low resistive films 14, the auxiliary electrodes 18, and the terminal portion 16. Subsequently, the transmissive conductive film disposed at a lower layer side is etched and patterned in a shape of the planar electrode 12b. Moreover, the film formation of each of the metal film and the transmissive conductive film is performed under a high temperature condition, such that a fine film with no defect is formed.

[0087] As a method of patterning the conductive film, the following method may be adopted. First, on the surface of