the orientation films is increased to the contrary, whereby the intermediate layer is hardly formed in principle.

[0032] Further, in the lateral electric field type liquid crystal display panel, since the liquid crystal molecules are arranged substantially in parallel, the intermolecular force between the liquid crystal molecules is structurally strengthened. Further, since the liquid crystal molecules are originally arranged horizontally, even when the substrate is pushed, the pushing force only serves to maintain this horizontal state, so that the intermediate layer is hardly formed.

[0033] Accordingly, it can be seen that this phenomenon is a phenomenon peculiar to the vertical orientation type liquid crystal display panel, and, hence, there has been neither a disclosure with respect to the phenomenon, nor the application of counter measures against the phenomenon in the conventional liquid crystal display devices.

[0034] Further, as a result of an analysis of the phenomenon as conducted by the inventors of the present invention, the following phenomenon has been discovered.

[0035] That is, it has been discovered that the phenomenon depends on the voltage. For example, in a normally black display (black when the voltage is small and white when the voltage is large), it has been found that when the liquid crystal display panel LPNL is pushed while the voltage is in a range of 30% to 100% with respect to the rated voltage, the occurrence of the phenomenon is particularly apparent.

[0036] Here, to facilitate an understanding of the foregoing explanation, the case of a normally black display (black when the voltage is small and white when the voltage is large) will be explained in more detail as an example. However, the case of a normally white display is similarly obtained by reversing the parameters of the normally black display.

[0037] **FIG. 25A** to **FIG. 25C** are views which show the behavior of the liquid crystal molecules when the applied voltage is in a range of 0% to 30%. Here **FIG. 25A** shows a state before the liquid crystal display panel LPNL is pushed; **FIG. 25B** shows a state in which the liquid crystal display panel LPNL is being pushed; and **FIG. 25C** shows a state which occurs after a pushing force which is applied to the liquid crystal display panel LPNL is released.

[0038] In these states, the voltage is small, and, hence, the liquid crystal molecules assume the approximately vertical state. The liquid crystal molecules of the intermediate portion of the liquid crystal layer also assume substantially an approximately vertical state, wherein the long axes of the liquid crystal molecules are directed in the vertical directions with respect to each other.

[0039] The following behavior has been discovered.

[0040] 1) The liquid crystal molecules disposed at the interfaces of the vertical orientation films AL**1**, AL**2** are subjected to the strong interaction from the vertical orientation films AL**1**, AL**2** and maintain the vertical state.

[0041] 2) The liquid crystal molecules are arranged in the vertical direction, and the intermolecular force acts to maintain the vertical direction.

[0042] 3) The intensity of the electric field that is generated between the upper and lower substrates is low, and, hence, even when the substrate is pushed, the electric field does not have enough power to shift the liquid crystal molecules from the vertical state to the horizontal state.

[0043] Accordingly, the intermediate layer is not formed, so that the liquid crystal molecules return to the original state after the pushing force applied to the substrate is released.

[0044] **FIG. 26A** to **FIG. 26C** are views showing the behavior of the liquid crystal molecules when the applied voltage is in a range of 70% to 100%. Also in this case, **FIG. 26A** shows a state before the liquid crystal display panel LPNL is pushed; FIG. **26**B shows a state in which the liquid crystal display panel LPNL is being pushed; and **FIG. 26C** shows a state which occurs after the pushing force applied to the liquid crystal display panel LPNL is released.

[0045] In this state, the voltage is high, and, hence, the liquid crystal molecules assume an approximately horizontal state. When the surface of the liquid crystal display panel is pushed, the distance between the substrates is narrowed and the intensity of the electric field is increased. Since the liquid crystal molecules originally assume an approximately horizontal state, along with the increase of the intensity of the electric field derived from narrowing of the distance between the substrates due to pushing of the substrate, the liquid crystal molecules assume a substantially horizontal state in the intermediate portion of the liquid crystal layer. Accordingly, the intermediate layer MIDL is generated, and this intermediate layer MIDL exhibits a memory property.

[0046] **FIG. 27A** to **27**C are views showing the behavior of the liquid crystal molecules when the applied voltage is in a range of 30% to 70%. Also, in this case, **FIG. 27A** shows a state before the liquid crystal display panel LPNL is pushed; **FIG. 27B** shows a state in which the liquid crystal display panel LPNL is being pushed; and **FIG. 27C** shows a state which occurs after the pushing force applied to the liquid crystal display panel LPNL is released.

[0047] In this state, the voltage assumes an intermediate level and the liquid crystal molecules assume the intermediate state between the vertical state and the horizontal state. When the surface of the liquid crystal display panel is pushed, this gives rise to a narrowing of the distance between the substrates and an increase in the intensity of the electric field.

[0048] Then, the liquid crystal molecules of the intermediate potion assume a substantially horizontally arranged state and hence, the intermediate layer MIDL is formed in the same manner as mentioned above.

[0049] On the other hand, the liquid crystal molecules that are disposed in the vicinity of the interfaces of the vertical orientation films AL**1**, AL**2** do not assume the horizontal state, due to the effects of the vertical orientation films AL**1**, AL**2**. Therefore, the liquid crystal molecules of the intermediate layer and the liquid crystal molecules disposed at the interfaces differ in the direction of arrangement of the long axes thereof, and, hence, the intermolecular force acting between the liquid crystal molecules in these two regions turns out to be weak. Accordingly, even after pressure is eliminated, the intermediate layer is maintained, and the intermediate layer exhibits a memory property.