

ing force lacks, the piezoelectric actuator **125** removed from the touch panel **24** and display means **29** moves within the part fitting space **102**.

[0015] ii. In addition, in the structure of the touch panel supporting vibrator **500** disclosed in the patent document 1, the two supporting portions **106**, **107** constituting the supporting points of the piezoelectric actuator **125** are composed of separate parts, and these separate parts must be individually attached to the support frame, piezoelectric actuator **125**, and others through a bonding member (adhesive material).

[0016] Further, it is required that the applying portion **108** constituting the applying point of the piezoelectric actuator **125** be attached at the middle top to the touch panel **24** through a bonding member. Thus a number of separate parts are needed, and further the bonding operations lower the workability in fitting the piezoelectric element, causing a problem of cumbersome fitting operation of the piezoelectric actuator **125**.

[0017] iii. When the structure of the touch panel supporting vibrator **500** is employed in a mobile device or the like, the structure in which the touch panel **24** cannot be surely fixed to the body substrate **501** or the position of the touch panel **24** cannot be specified possibly makes it difficult to improve the reliability of an electronic device having a haptic input function. Especially in an electronic device to which vibration is always applied from the outside, such as a car device, the above problem is serious.

[0018] Accordingly, the present application provides in an embodiment a substrate supporting vibration structure which is advantageous not only in that the vibration substrate is rigid, but also in that, irrespective of the position of the vibration substrate being used, high reliability with respect to the vibration transmission can be surely achieved, and an input device and an electronic device having a haptic function.

[0019] The issue lying in the related art is solved by a substrate supporting vibration structure being a structure for supporting and vibrating a substrate, which includes a spacer member; and a piezoelectric element. The spacer member is fixed between a first substrate and a second substrate, and has at least one form selected from a pillar form and a long strip form. The piezoelectric element is formed at a predetermined position between the first substrate and the second substrate or at a predetermined position of the long strip-form portion of the spacer member, and has a vibration supporting portion and a vibration applying portion. In the substrate supporting vibration structure, vibration supporting portion and vibration applying portion of the piezoelectric element are disposed in the thicknesswise direction of the first and second substrates stacked.

[0020] In a substrate supporting vibration structure according to an embodiment, in a case of supporting and vibrating a substrate, a spacer member having at least one form selected from a pillar form and a long strip form is fixed between a first substrate and a second substrate. A piezoelectric element has a vibration supporting portion and a vibration applying portion, and is formed at a predetermined position between the first substrate and the second substrate or at a predetermined position of the long strip-form portion of the spacer member. The vibration supporting portion and vibration applying portion of the piezoelectric element are disposed in the thicknesswise direction of the first and second substrates stacked.

[0021] Thus, there can be provided a vibration housing having fixed the first substrate and the second substrate and having rigidity that reduces a dimensional change caused due

to bending stresses or torsion stresses. Therefore, when the piezoelectric element is vibrated, irrespective of the position of the vibration housing being used, high reliability with respect to the vibration transmission can be surely achieved.

[0022] An input device having a haptic function according to an embodiment of the present invention is an input device having a haptic function for giving a haptic stimulus to an operating body during an information input operation. The input device includes: an input detector means; a display means formed under the input detector means; and a substrate supporting vibration structure for giving a haptic stimulus to the operating body in response to the input operation for the input detector means. The substrate supporting vibration structure is a vibration structure for supporting the input detector means, and includes: a spacer member; and a piezoelectric element. The spacer member is fixed between the input detector means and the display means, and has at least one form selected from a pillar form and a long strip form. The piezoelectric element is formed at a predetermined position between the input detector means and the display means or at a predetermined position of the long strip-form portion of the spacer member, and has a vibration supporting portion and a vibration applying portion. The vibration supporting portion and vibration applying portion of the piezoelectric element are disposed in the thicknesswise direction of the input detector means and display means stacked.

[0023] The input device having a haptic function according to the embodiment of the present invention includes the substrate supporting vibration structure of the present invention, and can give a haptic stimulus to an operating body in response to the input operation from the rigid vibration housing having fixed the input detector means and the display means.

[0024] Therefore, when the piezoelectric element is vibrated, irrespective of the position of the vibration housing being used, high reliability with respect to the vibration transmission can be surely achieved.

[0025] An electronic device according to an embodiment of the present invention is an electronic device having a haptic input function for giving a haptic stimulus to an operating body during an information input operation. The electronic device includes an input device having a haptic function. The input device has an input detector means; a display means formed under the input detector means; and a substrate supporting vibration structure for giving a haptic stimulus to the operating body in response to the input operation for the input detector means. The substrate supporting vibration structure is a vibration structure for supporting the input detector means, and includes: a spacer member; and a piezoelectric element. The spacer member is fixed between the input detector means and the display means, and has at least one form selected from a pillar form and a long strip form. The piezoelectric element is formed at a predetermined position between the input detector means and the display means or at a predetermined position of the long strip-form portion of the spacer member, and has a vibration supporting portion and a vibration applying portion. The vibration supporting portion and vibration applying portion of the piezoelectric element are disposed in the thicknesswise direction of the input detector means and display means stacked.

[0026] The electronic device of the present invention comprises the input device having a haptic function according to the embodiment of the present invention, and can give a haptic stimulus to an operating body in response to the input