

tion, and causing generation of vibration from the selected vibration generator in the case of detecting that a touch operation to the operation panel has been received.

[0049] According to the present invention, the electronic device switches the vibration generators driven in accordance with a touched position in the case of reporting to the user by vibration that a touch operation has been received.

[0050] Further, the present invention provides an electronic device provided with an operation panel for receiving a touch operation, a plurality of vibration generators for imparting vibration to the operation panel, detecting means for detecting a touched position at the operation panel, generating means for generating drive signals for driving the plurality of vibration generators so that an amplitude of vibration caused at a touched position of the touch operation detected by the detecting means is increased due to mutual interference of oscillatory waves generated from the plurality of vibration generators in the case of detecting that a touch operation on the operation panel has been received, and vibration control means for applying drive signals generated by the generating means to the vibration generators to cause vibration to be generated from the vibration generators. Further, the present invention provides a vibration-type reporting method in an electronic device comprising detecting a touched position and generating drive signals for application to a plurality of vibration generators to drive the vibration generators to give vibration to the user so that an amplitude of vibration caused at a touched position of the operation panel is increased due to mutual interference of oscillatory waves generated from the plurality of vibration generators provided in the electronic device in the case of detecting that a touch operation to an operation panel has been received.

[0051] According to the present invention, the electronic device increases the amplitude of the vibration generated at a touched position on the operation panel by mutual interference of oscillatory waves generated from the vibration generators in the case of reporting to the user that a touch operation has been received by causing generation of vibration from the plurality of vibration generators.

[0052] Further, the present invention provides an electronic device provided with an operation panel over which a deformation layer able to deform by vibration is superposed, a plurality of vibration generators each imparting vibration to the operation panel, detecting means for detecting a touched position on the operation panel, generating means for generating drive signals for driving the plurality of vibration generators so that the thickness of the deformation layer at a touched position of the touch operation detected by the detecting means becomes thinner or thicker than that at the time of non-touching due to mutual interference of oscillatory waves generated from the plurality of vibration generators, and vibration control means for applying drive signals generated by the generating means to corresponding vibration generators and causing vibration to be generated from the vibration generators.

[0053] According to the present invention, the electronic device makes the thickness of a deformation layer of a touched position on the operation panel thinner or thicker than that at the time of non-touching by mutual interference of oscillatory waves generated from the vibration generators in the case of reporting to the user that a touch operation has

been received by causing vibration to be generated from a plurality of vibration generators.

[0054] Further, the present invention provides a vibration generator provided with a weight, a support member for supporting the weight to be able to linearly reciprocate and connected to a vibratory member to which the vibration generator imparts vibration, or a base member of the vibration generator in contact with the vibratory member, excitation generating means for imparting excitation to cause reciprocation at the weight, and resistance imparting member for continually contacting a side surface parallel to a direction of reciprocation of the weight linearly reciprocating by excitation generated from the excitation generating means and imparting contact resistance to the weight.

[0055] According to the present invention, in the case that the generation of excitation from the excitation generating means stops, the reciprocation of the weight quickly stops due to contact resistance.

[0056] Further, the present invention provides a vibration generator provided with a weight, a support member for supporting the weight to be able to reciprocate and connected to a vibratory member given vibration by the vibration generator or a base member of the vibration generator in contact with the vibratory member, excitation generating means for imparting excitation for causing reciprocation to the weight, and brake means for contacting the weight and causing reciprocation of the weight to stop in the case that the generation of excitation from the excitation generating means has stopped.

[0057] According to the present invention, the brake means causes the reciprocation of the weight to immediately stop in the case that generation of excitation from the excitation generating means has stopped.

BRIEF DESCRIPTION OF THE DRAWINGS

[0058] FIG. 1 is a perspective view illustrating the appearance of a PDA according to a first embodiment of the present invention.

[0059] FIG. 2 is a block diagram illustrating a hardware configuration of a PDA according to the embodiment.

[0060] FIG. 3 is a sectional view schematically illustrating a state of placement of an oscillatory actuator in the main case of the PDA according to this embodiment.

[0061] FIG. 4 is a view illustrating a waveform of a drive signal applied to the oscillatory actuator according to this embodiment.

[0062] FIG. 5 is a flow chart for explaining the operation of a vibration control processing 1 executed by a CPU in the PDA according to this embodiment.

[0063] FIG. 6 is a block diagram illustrating the hardware configuration of a PDA according to a second embodiment of the present invention.

[0064] FIG. 7 is a sectional view schematically illustrating a state of placement of a vibrator in the main case of the PDA according to this embodiment.

[0065] FIG. 8 is a perspective view illustrating the appearance of a DC motor according to this embodiment.