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(54) **METHOD AND APPARATUS FOR PROVIDING HAPTIC FEEDBACK UTILIZING MULTI-ACTUATED WAVEFORM PHASING**

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USPC **345/173**; 340/407.1; 345/156

(58) **Field of Classification Search**
USPC 345/156–184; 178/18.03–18.11; 340/407.1, 407.2
See application file for complete search history.

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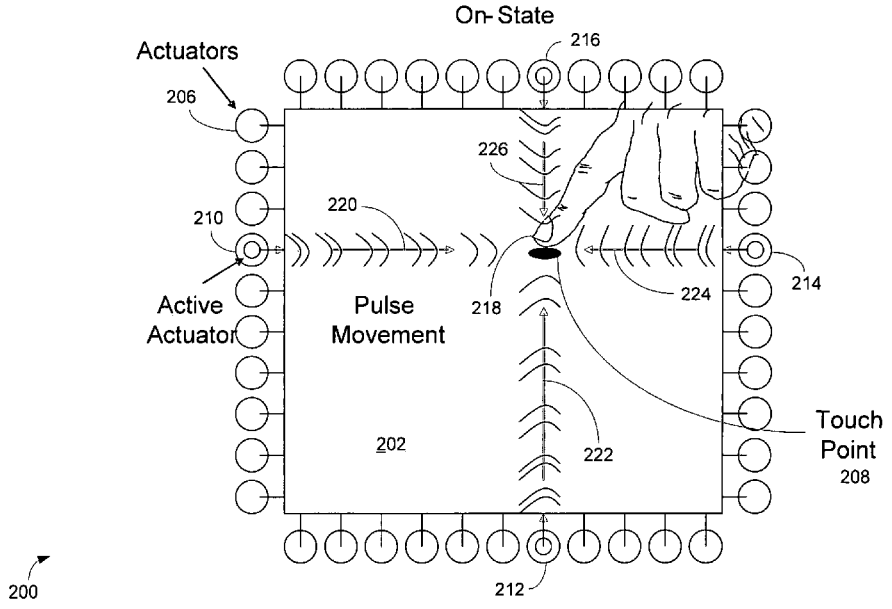
(57) **ABSTRACT**

A method and device for generating haptic feedback over a touch surface using multi-actuated waveform phasing are disclosed. A haptic device, in one embodiment, includes a touch surface and a group of haptic actuators. The touch surface is capable of sensing an event, wherein the event can be a contact on the touch surface or a movement nearby the surface. A portion of the haptic actuators, which are coupled to the touch surface, is configured to provide haptic feedback on the touch surface in response to the event. Another portion of the haptic actuators is used to minimize unwanted haptic effect on the touch surface.

22 Claims, 13 Drawing Sheets