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(54) **ACOUSTIC CONDITION SENSOR EMPLOYING A PLURALITY OF MUTUALLY NON-ORTHOGONAL WAVES**

(57)

ABSTRACT

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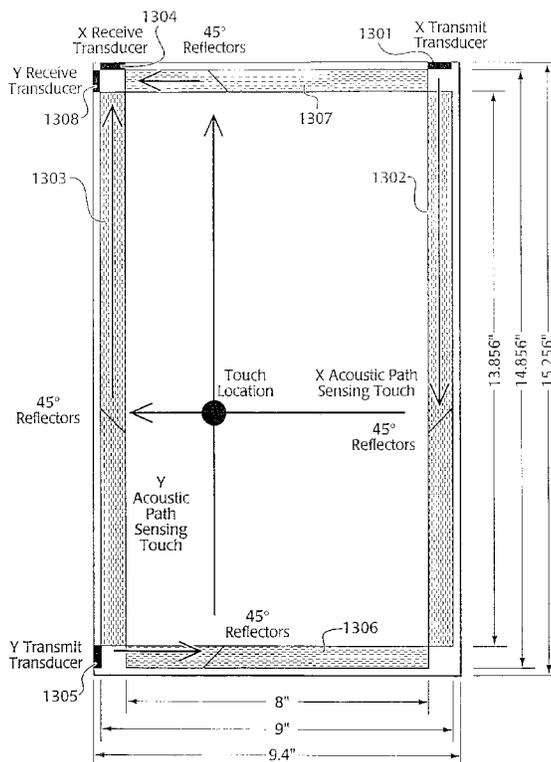
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(60) Continuation of application No. 09/440,725, filed on Nov. 16, 1999, which is a division of application No. 09/220,302, filed on Dec. 23, 1998, now Pat. No. 5,986,224, which is a division of application No. 08/695,716, filed on Aug. 12, 1996, now Pat. No. 5,854,450, which is a continuation-in-part of application No. 08/424,216, filed on Apr. 19, 1995, now Pat. No. 5,591,945.

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A touch sensor comprising an acoustic wave transmissive medium having a surface; a plurality of acoustic wave path forming systems, each generating a set of incrementally varying paths through said transmissive medium; and a receiver, receiving signals representing said sets of waves, a portion of each set overlapping temporally or physically by propagating in said transmissive medium along axes which are not orthogonal. The waves may also be of differing wave modes. The receiver system may include a phase, waveform or amplitude sensitive system. Reflective arrays are associated with said medium situated along a path, said path not being a linear segment parallel to a coordinate axis of a substrate in a Cartesian space, a segment parallel to an axial axis or perpendicular to a radial axis of a substrate in a cylindrical space nor parallel and adjacent to a side of a rectangular region of a small solid angle section of a sphere; situated along a path substantially not corresponding to a desired coordinate axis of a touch position output signal; situated along a path substantially non-parallel to an edge of said medium; has a spacing of elements in said array which differs, over at least one portion thereof, from an integral multiple of a wavelength of an incident acoustic wave; has elements in said array which are non-parallel; has an angle of acceptance of acoustic waves which varies over regions of said array; and/or coherently scatter at least two distinguishable acoustic waves which are received by said receiving system.



X, Y, 30° Sensor: (a) X & Y Subsystems