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United States Patent [19]

Shaw et al.

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| [54] | | LECTROMECHANICAL LATERAL ROMETER | 5,235,187 | 8/1993 | Tsuchitani |
|------|------------|---|-----------|---------|--|
| [75] | Inventors: | Kevin A. Shaw; Scott G. Adams; Noel C. MacDonald, all of Ithaca, N.Y. | 5,353,641 | 10/1994 | Sherman 73/517 R Tang 73/514.18 Lane 73/514.18 |
| [73] | Assignee: | Cornell Research Foundation, Inc., Ithaca, N.Y. | | | R PUBLICATIONS |

.35, 514.38, 514.36, 514.17

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Accelerometer's Micromachined Mass "Moves" In Plane of IC; On-Chip Circuit Controls It And Senses G With Force-Balance Techniques. Airbags Boom When IC Accelerometer Sees 50G. Electronic Design, Aug. 8, 1991, pp. 45–56. Zhang et al., "A RIE Process for Submicron, Silicon Electromechanical Structures", IOP Publishing Ltd., 1992, pp. 31–38.

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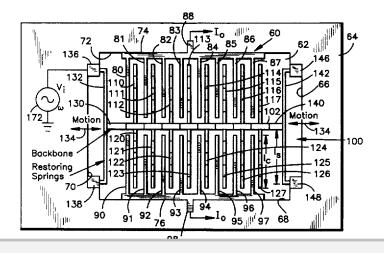
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Attorney, Agent, or Firm—Jones, Tullar & Cooper, P.C.

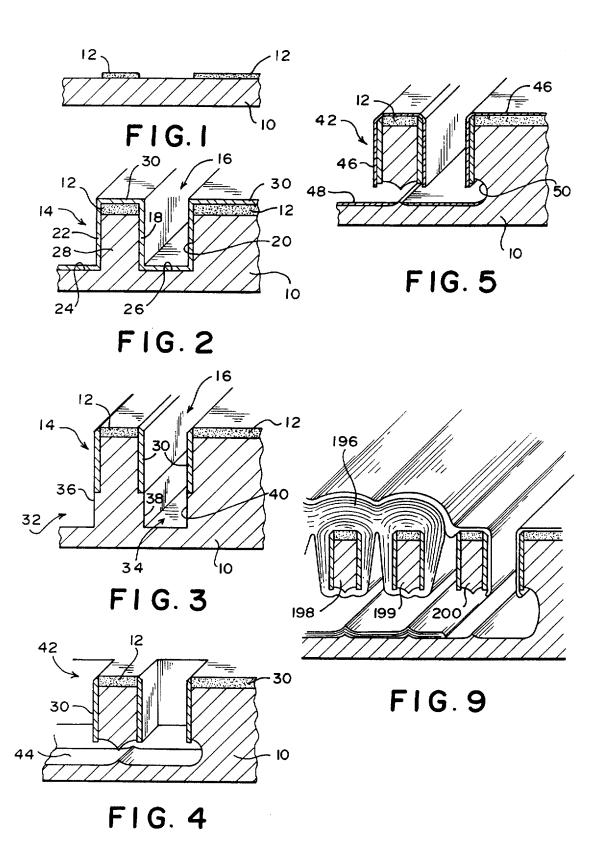
[57] ABSTRACT

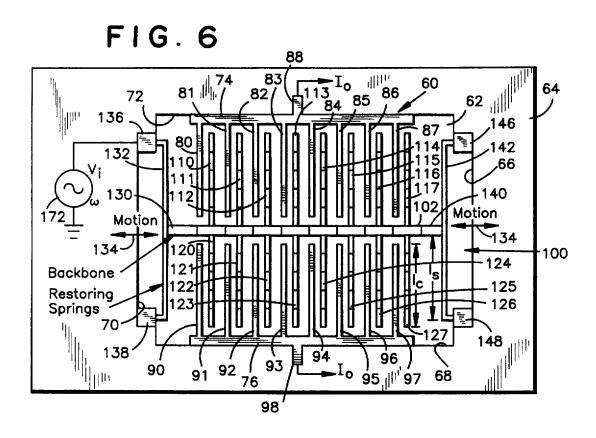
A microelectromechanical accelerometer having submicron features is fabricated from a single crystal silicon substrate. The accelerometer includes a movable portion incorporating an axial beam carrying laterally-extending high aspect ratio released fingers cantilevered above the floor of a cavity formed in the substrate during the fabrication process. The movable portion is supported by restoring springs having controllable flexibility to vary the resonant frequency of the structure. A multiple-beam structure provides stiffness in the movable portion for accuracy.

52 Claims, 5 Drawing Sheets









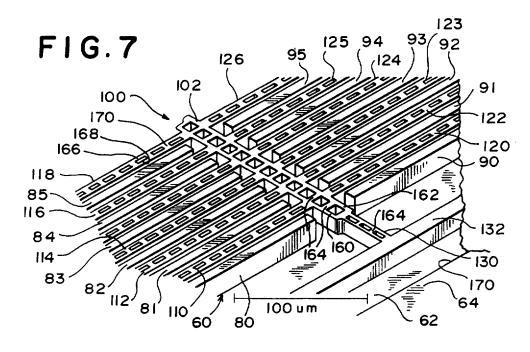
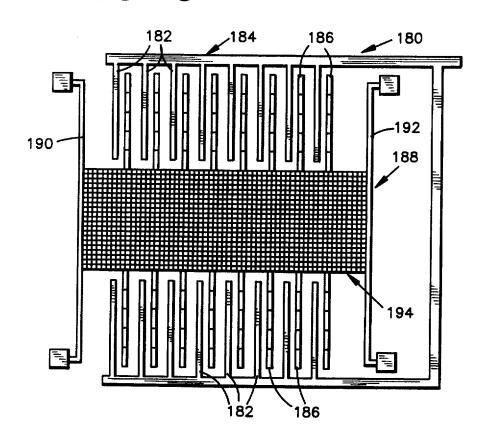




FIG. 8



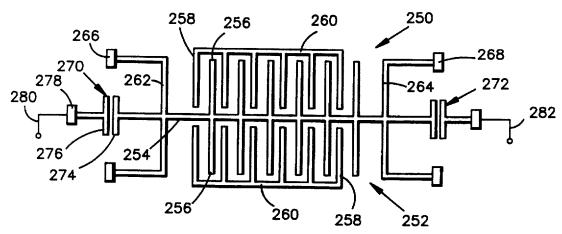
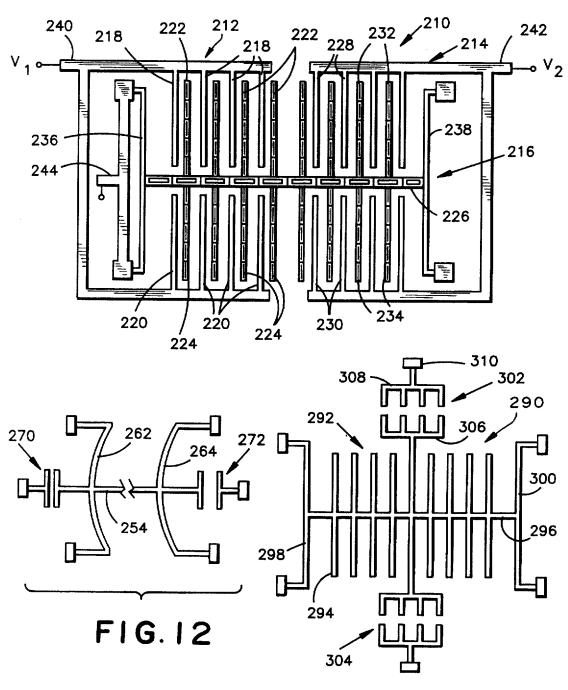


FIG. 11

FIG. 10





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