as by empirical means. Such methods may also be similarly employed to linearize the reactance response of a wide range of other capacitive force sensor variations that fall within the scope of the invention. Such variations include, for example, complex outlines, nonuniform thickness, flexure in one capacitor plate or both, multiple areas of support or single cantilevered support, etc. In all cases, the desired effect is achieved by shaping the surfaces of one or both capacitor plates to produce a gap that "bottoms out" simultaneously at all points.

[0158] Turning to FIGS. **12**A-**12**D, additional outline and mounting arrangements of force sensor principal elements are shown according to various embodiments of the present invention. All of the elements shown in FIGS. **12**A-**12**D may, for example, be made with uniform thickness. Principal elements **106***d,* **106***e,* and **106***f* provide regions variously narrowed so as to concentrate flexure in areas **1203***a-c* not serving as capacitor plates. This reduces flexure in capacitive areas **1202***a-c,* improving linearity of reactance change. Couplings **121***d-f* receive perpendicular force, which is passed to structures beyond via support areas **1201***a-c.* With the thicknesses of the principal elements **106***d-f* being greater, for a given stiffness, than elements of similar size without narrowed regions, clamped support of areas **1201***a-c* may receive less concentrated twisting stress. Conversely, the concentration of flexure into areas **1203***a-c* means that simple support of areas **1201***a-c* will see greater rotation. Couplings **121***d-f* may be elevated features as described previously, elastic features as described below, or any other coupling feature providing a defined path for entrance of the force to be measured.

[0159] Referring to **FIG. 12**C, principal element **106***f* is provided with three areas of support **1201***c,* whereas principal element **106***g* (shown in **FIG. 12D**) is a simple cantilever with a single area of support **1201***d.* Cantilevered element **106***g* must, of course, receive clamped support in area **1201***d;* whereas the other elements **106***d-f* may be adapted for either simple or clamped support in areas **1201***a-c,* respectively.

[0160] Turning to FIGS. **13**A-**13**B, additional variations for the cross-sectional shape and thickness of a principal element of a force sensor are shown according to embodiments of the present invention. For example, referring to **FIG. 13A, a** sensor **1300** is shown according to one embodiment of the present invention. The vertical dimensions of the sensor **1300** (and the sensor **1310**, shown in **FIG. 13B**) are exaggerated approximately tenfold in **FIG. 13A** with respect to the sensor's horizontal dimensions. Principal element **106***h* has relatively thin regions **1303** between mounting regions **1301** and capacitive region **1302**. These may be produced from planar feedstock by a process such as, for instance, coining. They may again serve to reduce the relative amount of flexure in capacitive area **1302**, thereby improving linearity. Referring to **FIG. 13**B, principal element **106***i* of sensor **1310** achieves a similar relative stiffening of capacitive region **1302** by laminating this portion. As depicted for principal element **106***h,* a principal element relatively thicker in support regions **1301** may advantageously reduce stress in the support attachments caused by the moments passing through them.

[0161] Referring to FIGS. **14**A-**14**C, an embodiment of a sensor according to another embodiment of the present invention is depicted in which the principal element is simply supported, and in which the second element is a discrete element of identical manufacture to the principal element.

[0162] More specifically, turning to **FIG. 14**A, principal element **106***j* (shown in solid outline) may be 300 mils wide and may be stamped or photoetched from beryllium-copper 15 mils thick. Tabs **1401***a-b* engage plastic spacers **1402**, allowing principal element **106***j* to be assembled opposite another identically manufactured element **1403**, which, flipped end-for-end with respect to **106***j,* is inserted into the same pair of spacers **1402**.

[0163] **FIG. 14B** presents a side view of plastic spacer **1402**. Rectangular holes **1404***a* receive tabs **1401***a* of one element (such as element **106***j*)), while rectangular hole **1404***b* receives tab **1401***b* of the opposing element (such as element **1403**). Elevations **1405**, on the sides of the spacers **1402** away from the principal element **106***j,* locate the force sensor by engaging holes (not shown) in the support surface. Thus at one end of the force sensor, the support surface corresponds to the plane of **1406***a,* and at the other, of **1406***b.*

[0164] **FIG. 14C** presents a partial cross-section in which principal element **106***j* and element **1403** are employed as a force sensor in a touch location device. Spacers **1402** are employed above and below the plane of section, and seat against the immediate support surface provided by outer frame **104***c.* Transparent touch overlay **1408** is secured within the inner frame **1407** by cement **1411**. The combination is then supported perpendicularly by plastic force transmission couplings **121***h,* one of which is associated with each sensor. Couplings **121***h* may be press fit into holes in inner frame **1407**, which align over the centers of the square capacitive areas afforded by each of the principal elements **106***j* employed. Inner frame **1407** is supported laterally by combination seal and lateral restraint means **1409**. Oversize clearance holes may be provided in inner frame **1407**, if necessary, to guarantee that there is no contact with the unused elevations **1405** that are on the surfaces of spacers **1402** directed upward. Discrete wiring **1410** may connect to the upper surfaces of tabs **1401** by soldering or wire welding. Application bezel **1412** seats against lateral restraint means **1409** and frame **104***c.*

[0165] When unloaded, principal element **106***j* rests about 10 mils above the surface of non-flexing element **1403**. Holes **1404***a-b* are somewhat larger at the surface of spacer **1402**, and taper to minimal cross-section at its center, which cross-section just matches tabs **1401***a-b.* Thus as force is applied to coupling **121***h,* principal element **106***j* flexes as a member having simply-supported end constraint with minimal friction.

[0166] The arrangement of **FIG. 14C** offers a touch location device of minimal thickness, but the inclusion of inner frame **1407** increases border width. The sensor is scalable to other, including smaller, sizes.

[0167] Since principal element **106***j* may be located quite close to the plane of touch, special provisions for handling tangential forces may be omitted without significant adverse consequences. For instance, the aggregate lateral stiffness of lateral restraint means **1409** need not substantially exceed the aggregate lateral stiffness of the force sensors and their