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(54) Title: MULTI-STAKE UNDERWATER TRANSDUCER AND ARRAY

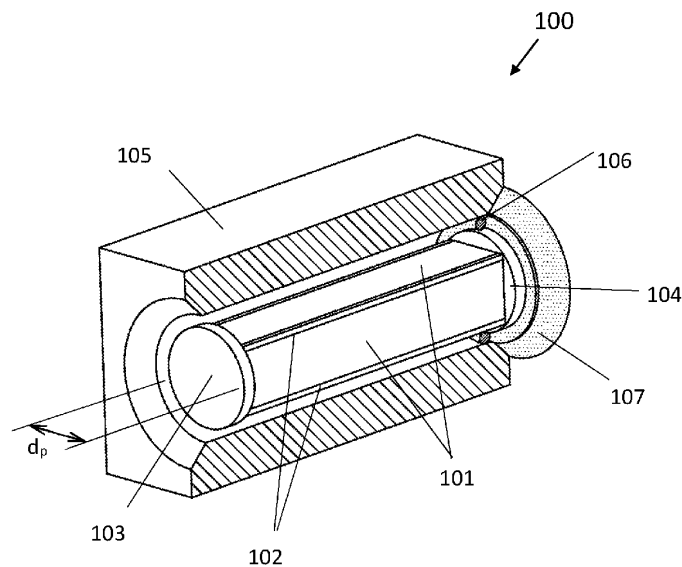


FIG. 3

(57) Abstract: The present invention relates to multi-stake underwater transducers and arrays for the generation and reception of sound waves in water. The invention provides the design and fabrication of compact piston-type underwater transducers of low-to-mid operating frequency made of piezoelectric single crystals without the need of any pre-stress mechanism. The invention uses a multi-stake pipe-like motor section made of piezoelectric single crystals of high transverse mode piezoelectric coefficients and low acoustic impedance, and small-diameter and light head mass(es). The present invention also discloses various means of increasing the bandwidth of the multi-stake underwater transducers as well as derivative transducers and arrays made of them, including compact 2D and 3D omni-directional transducers, planar, conforming and shaped arrays of various designs, high-density arrays and low-drop-down-ratio parametric arrays of either single or dual frequency bands.

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