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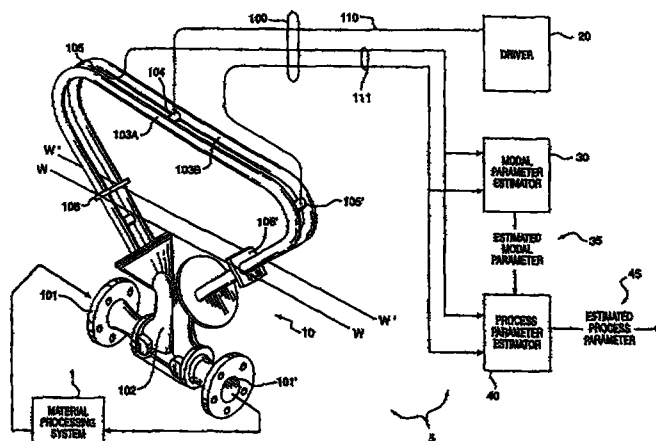
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(54) Title: **SELF-CHARACTERIZING VIBRATING CONDUIT PARAMETER SENSORS**



(57) Abstract: A self-characterizing vibrating conduit sensor (5) for measuring a process parameter in a material processing system (1) includes a conduit (103A-103B) configured to contain material from the material processing system (1) and a plurality of motion transducers (105-105') operative to produce a plurality of motion signals representing motion at a plurality of locations on the conduit (103A-103B). A modal parameter estimator (30) is configured to receive the plurality of motion signals and operative to estimate a modal parameter from the received plurality of motion signals. The modal parameter, e.g., a modal filter parameter or a force projection parameter, relates behavior of the conduit to behavior of a single degree of freedom (SDOF) system. A process parameter estimator 40 is configured to receive the plurality of motion signals, responsive to the modal parameter estimator and operative to estimate a process parameter associated with a material in the conduit from the received plurality of motion signals according to the estimated modal parameter. Techniques for estimating a modal parameter include a modified reciprocal modal vector (MRMV) estimation technique and an adaptive modal filtering technique.