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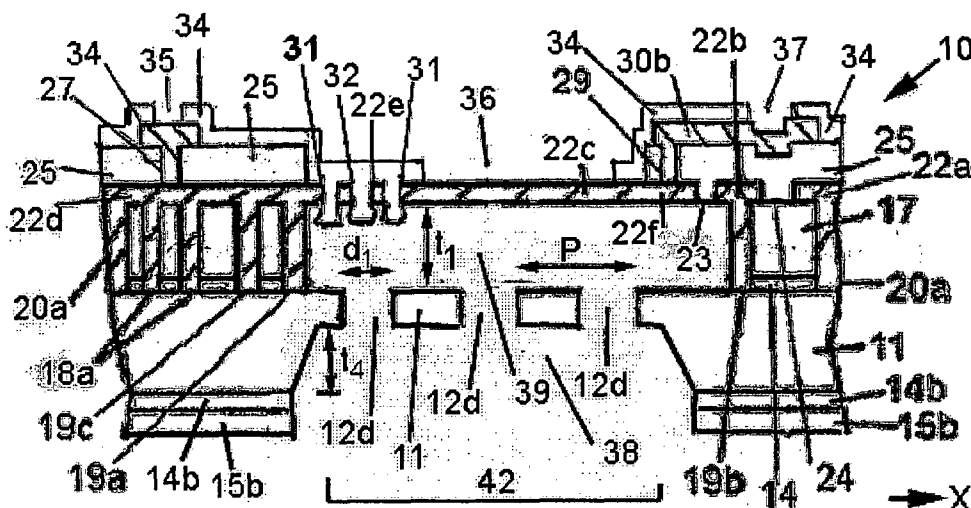
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(54) Title: A SILICON MICROPHONE WITH SOFTLY CONSTRAINED DIAPHRAGM



(57) Abstract: A microphone sensing element (10) and a method for making the same are disclosed. The sensing element (19) has a diaphragm (22c) and an attached electrical lead-out arm (22f) preferably made of polysilicon that are separated by an air gap from an underlying backplate region created on a conductive silicon substrate (11). The backplate region has acoustic holes (12d) created by removing an oxide filling in a continuous trench that surrounds the edges and by removing oxide to form the air gap. The diaphragm (22c) is softly constrained along its edge by an elastic element that connects to a surrounding rigid polysilicon layer. The elastic element is typically a polymer such as parylene having a Young's modulus substantially less than that of the diaphragm. First and second electrodes are connected to the diaphragm through the lead-out arm (22f) and to the substrate (11) through polysilicon via fillings, respectively, and thereby establish a variable capacitor circuit for acoustic sensing.

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