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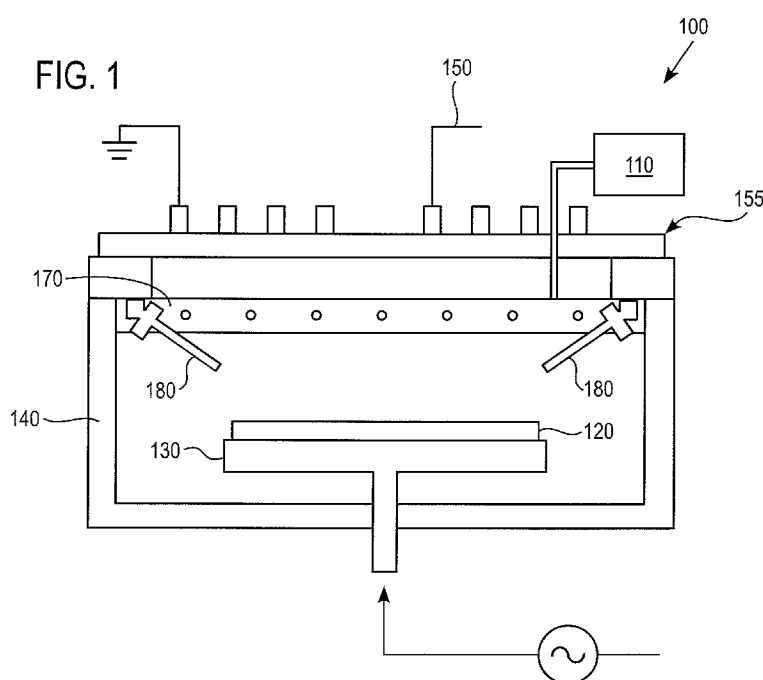
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Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

[Continued on next page]

- (54) **Title:** RAPID AND UNIFORM GAS SWITCHING FOR A PLASMA ETCH PROCESS



(57) **Abstract:** An inductively coupled plasma processing apparatus includes a processing chamber, a substrate support, a dielectric window, an antenna operable to generate and maintain a plasma, and a showerhead plate of dielectric material adjacent the dielectric window. The showerhead plate includes gas holes in fluid communication with a plenum below the dielectric window, the plenum having a gas volume of no greater than 500 cm³. The gas holes extend between the plenum and a plasma exposed surface of the showerhead plate and the gas holes have an aspect ratio of at least 2. A gas delivery system is operable to supply an etching gas and a deposition gas through the showerhead plate. The plasma processing apparatus can rapidly replace the etching gas in the plenum with the deposition gas within about 200 milliseconds and vice versa. The plasma processing apparatus is operable to etch silicon on the semiconductor substrate at a rate of 10 um/minute or higher.

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