

- [54] SINGLE WAFER PLASMA ETCH REACTOR
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- [51] Int. Cl.³ H01L 21/306; B44C 1/22; C03C 15/00; C23F 1/02
- [52] U.S. Cl. 156/345; 156/643; 204/298
- [58] Field of Search 156/345, 643, 646; 204/164, 192 E, 298; 427/38, 39; 118/728, 50, 620

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Primary Examiner—William A. Powell
 Attorney, Agent, or Firm—Douglas A. Lashmit

[57] ABSTRACT

A high pressure, high etch rate single wafer plasma reactor having a fluid cooled upper electrode including a plurality of small diameter holes or passages there-through to provide uniform reactive gas distribution over the surface of a wafer to be etched. A fluid cooled lower electrode is spaced from the upper electrode to provide an aspect ratio (wafer diameter: spacing) greater than about 25, and includes an insulating ring at its upper surface. The insulating ring protrudes above the exposed surface of the lower electrode to control the electrode spacing and to provide a plasma confinement region whereby substantially all of the RF power is dissipated by the wafer. A plurality of spaced apart, radially extending passages through the insulating ring provide a means of uniformly exhausting the reactive gas from the plasma confinement region. Affixed to the upper electrode is a first housing which supplies reactive gas and cooling fluid, and a baffle affixed to the first housing intermediate the upper electrode and a gas inlet forms a plenum above the upper electrode and ensures uniform reactive gas distribution thereover. The first housing and upper electrode are contained within a second housing with an insulating housing therebetween. The upper and lower electrodes are electrically isolated from each other and from ground, so that either or both electrodes may be powered.

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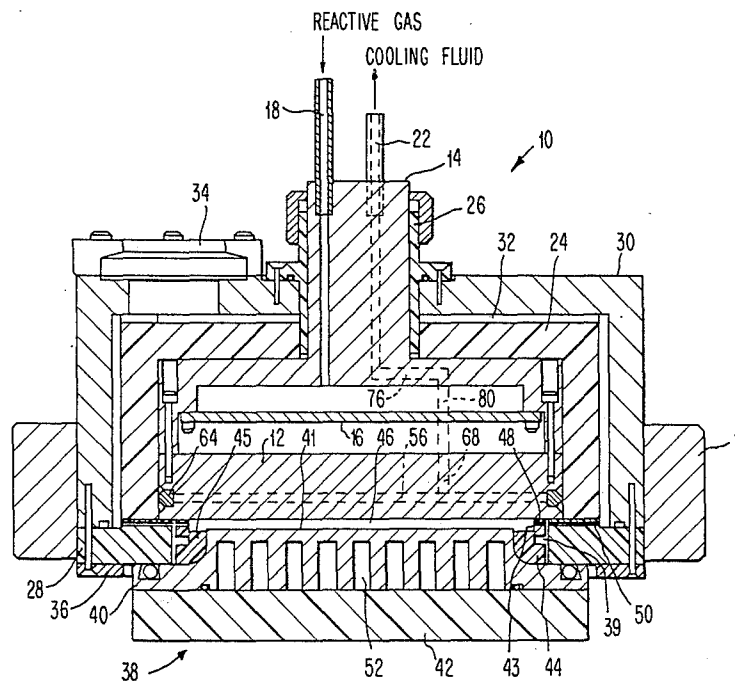
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14 Claims, 8 Drawing Figures



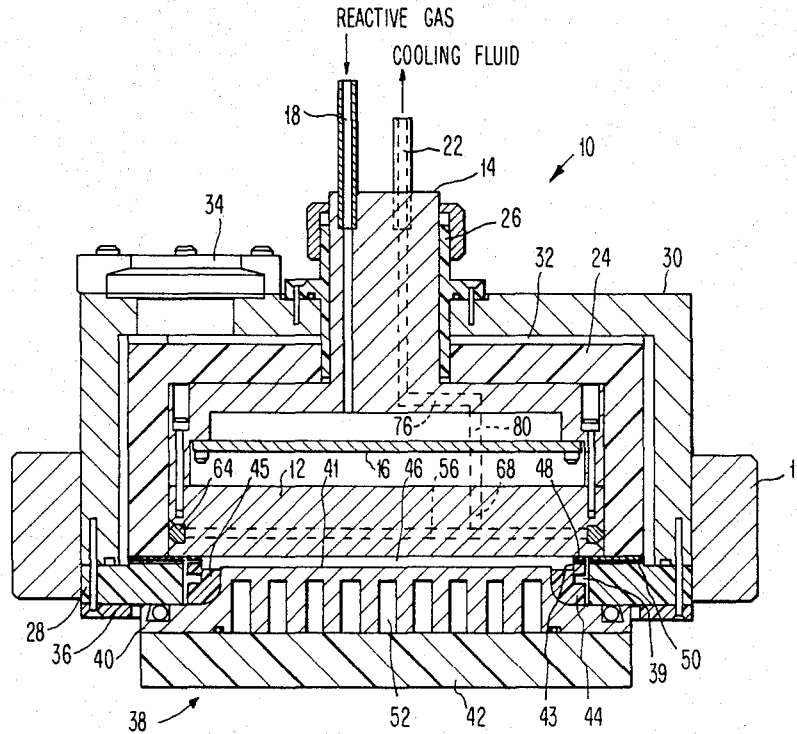


FIG. 1

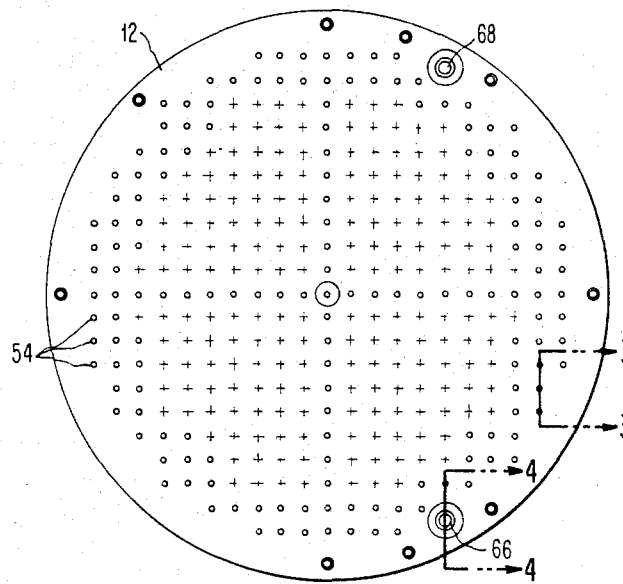


FIG. 2

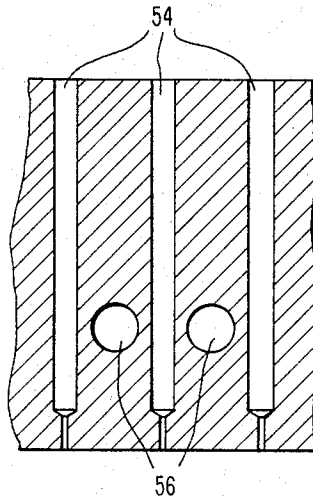


FIG. 3

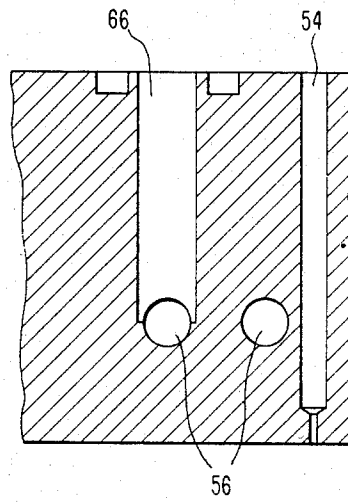


FIG. 4

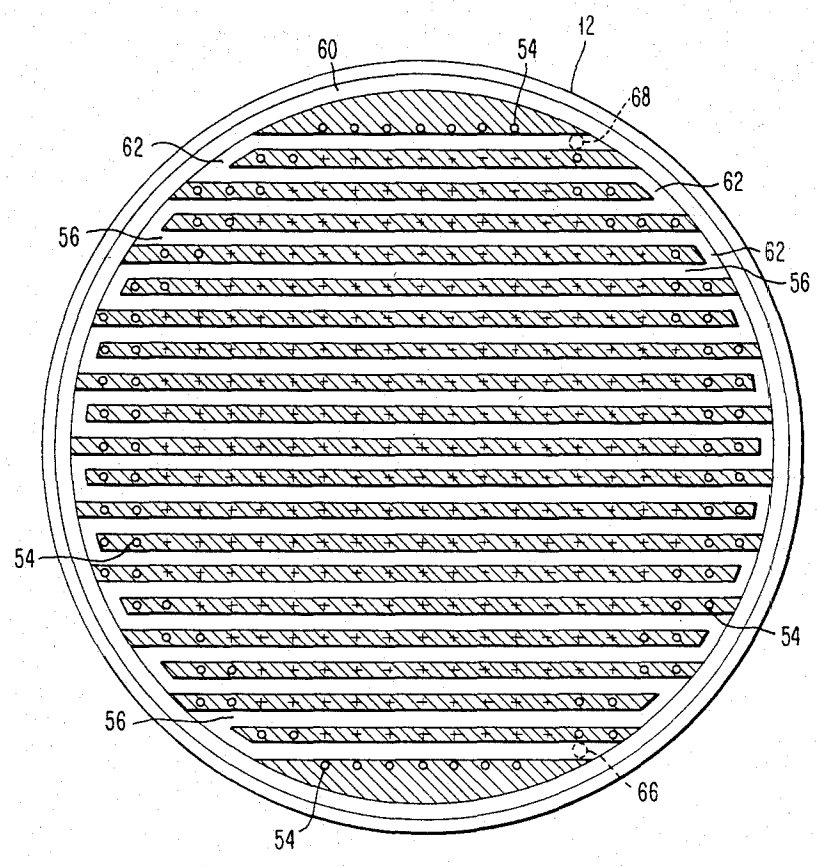


FIG. 5

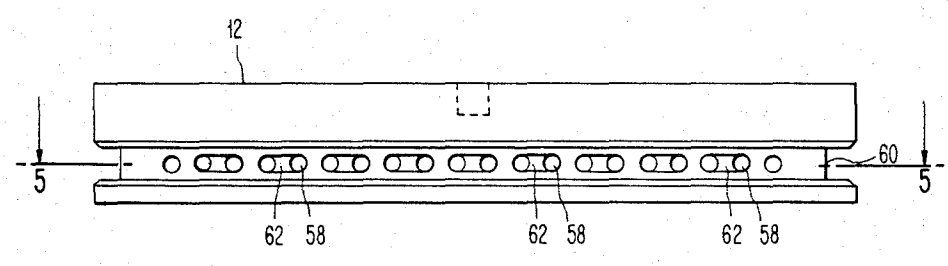


FIG. 6

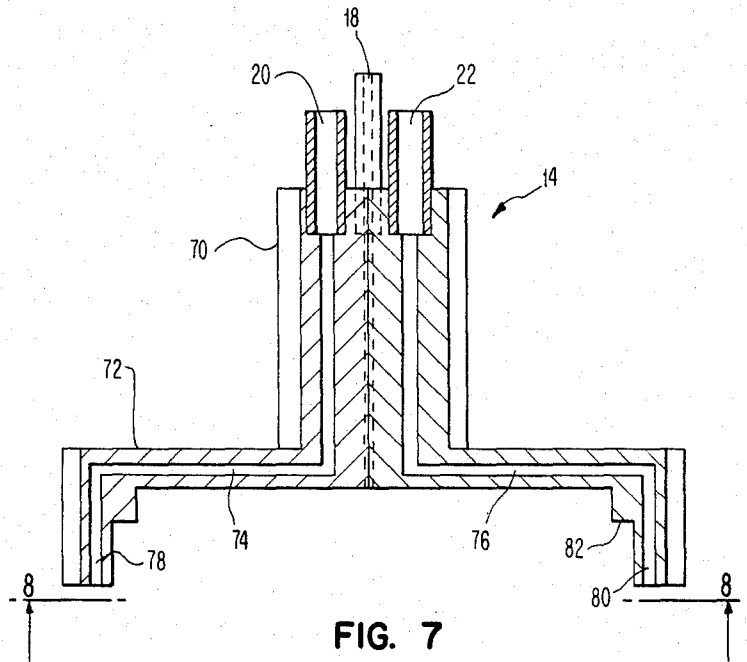


FIG. 7

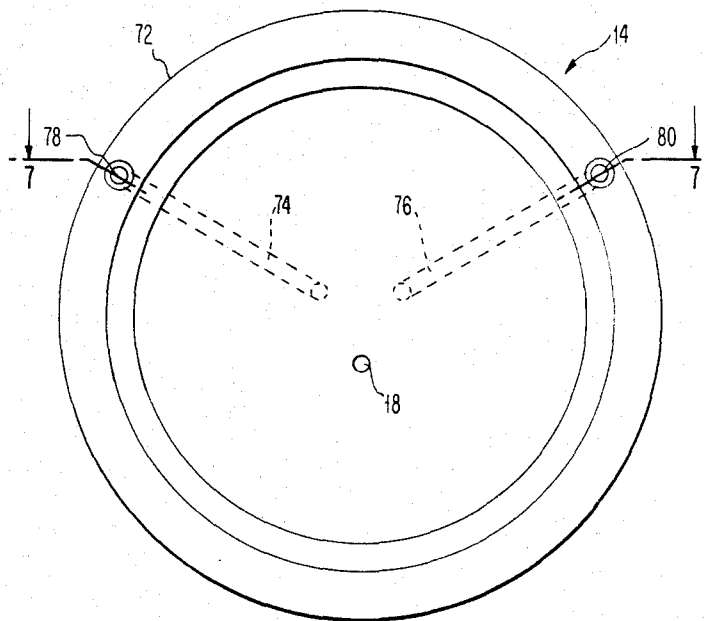


FIG. 8

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