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**Pan et al.**

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(54) **INDUCTIVE PLASMA LOOP ENHANCING  
MAGNETRON SPUTTERING**

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(\*) Notice: Subject to any disclaimer, the term of this  
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This patent is subject to a terminal dis-  
claimer.

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H01L 21/00

(52) **U.S. Cl.** ..... **204/298.06**; 204/298.16;  
204/298.31; 204/298.34; 156/345.35; 156/345.48;  
156/345.49; 118/723 IR

(58) **Field of Search** ..... 204/298.06, 298.07,  
204/298.16, 298.19, 298.31, 298.33, 298.34;  
156/345.35, 345.48, 345.49; 118/723 R,  
723 ME, 723 MR, 723 E, 723 ER, 723 I,  
723 IR, 723 MP

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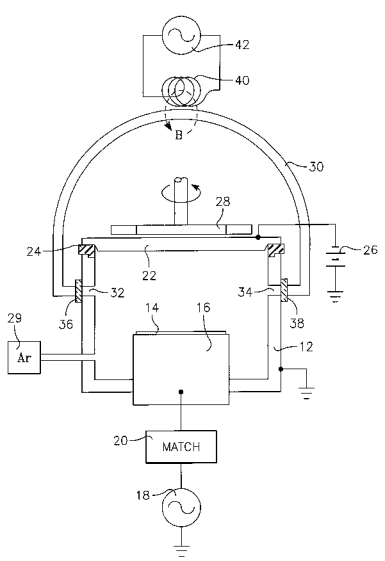
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Mardula LLC

(57) **ABSTRACT**

A plasma reaction chamber, particularly a DC magnetron sputter reactor, in which the plasma density and the ionization fraction of the plasma is increased by a plasma inductive loop passing through the processing space. A tube has its two ends connected to the vacuum chamber on confronting sides of the processing space. An RF coil powered by an RF power supply is positioned adjacent to the tube outside of the chamber and aligned to produce an RF magnetic field around the toroidal circumference of the tube such that an electric field is induced along the tube axis. Thereby, a plasma is generated in the tube in a loop circling through the processing space.

**11 Claims, 4 Drawing Sheets**





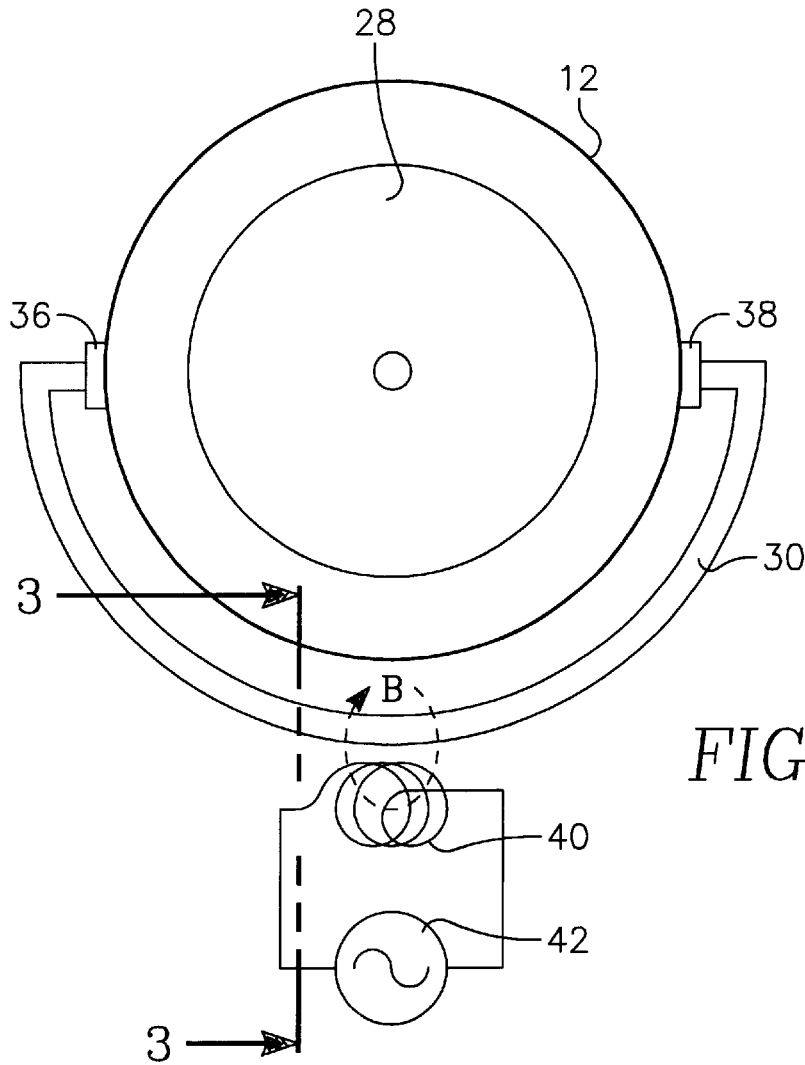


FIG. 2

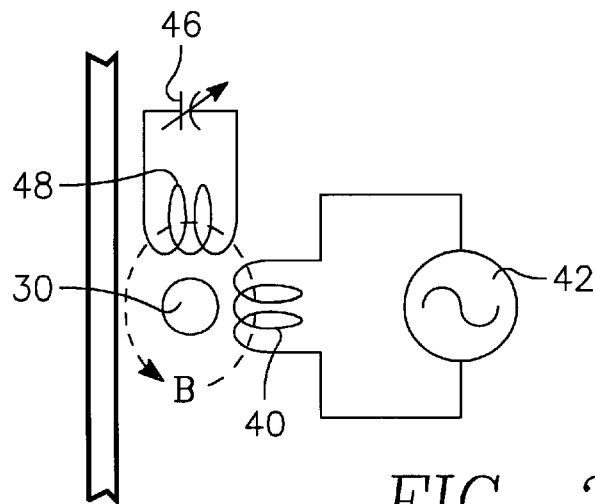
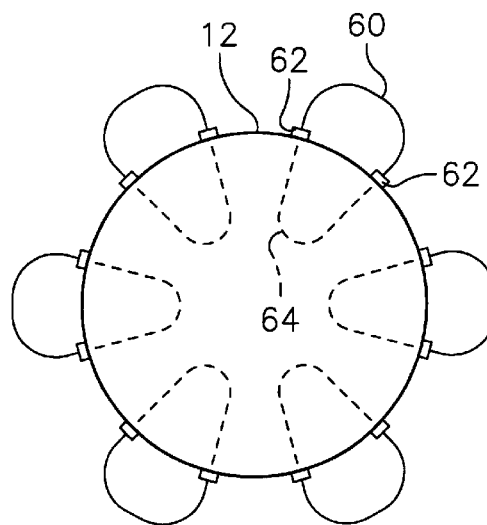
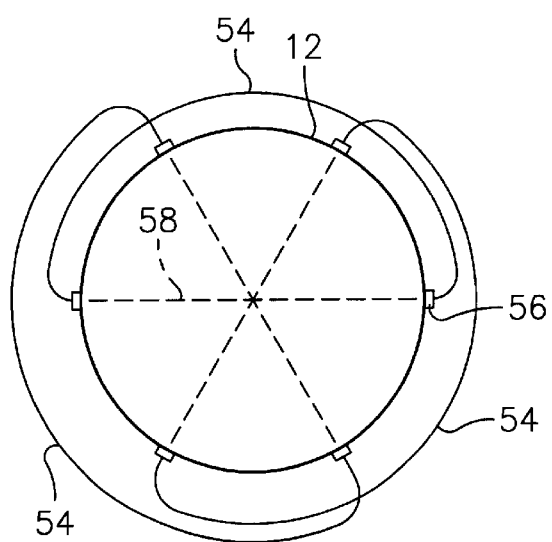
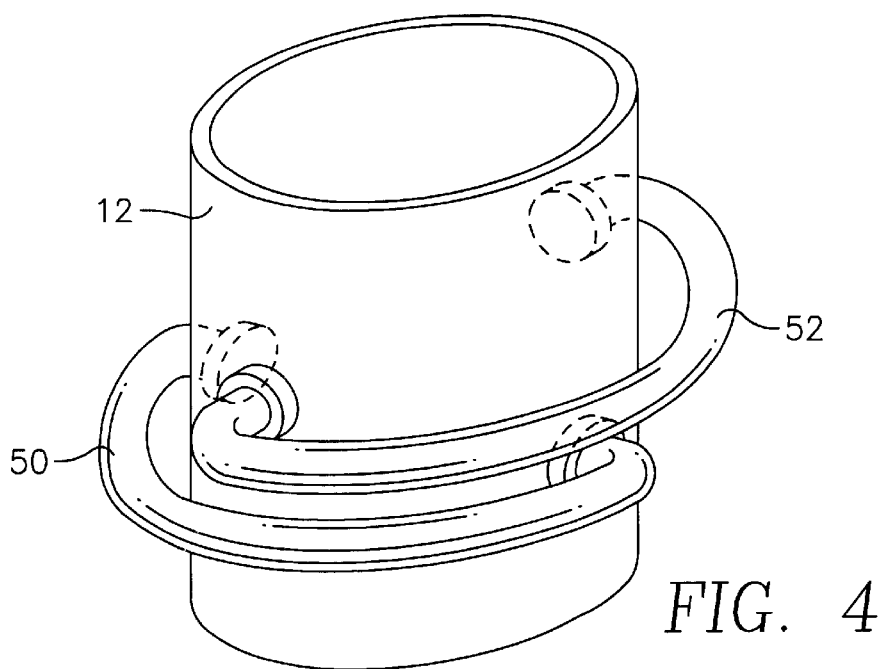


FIG. 3



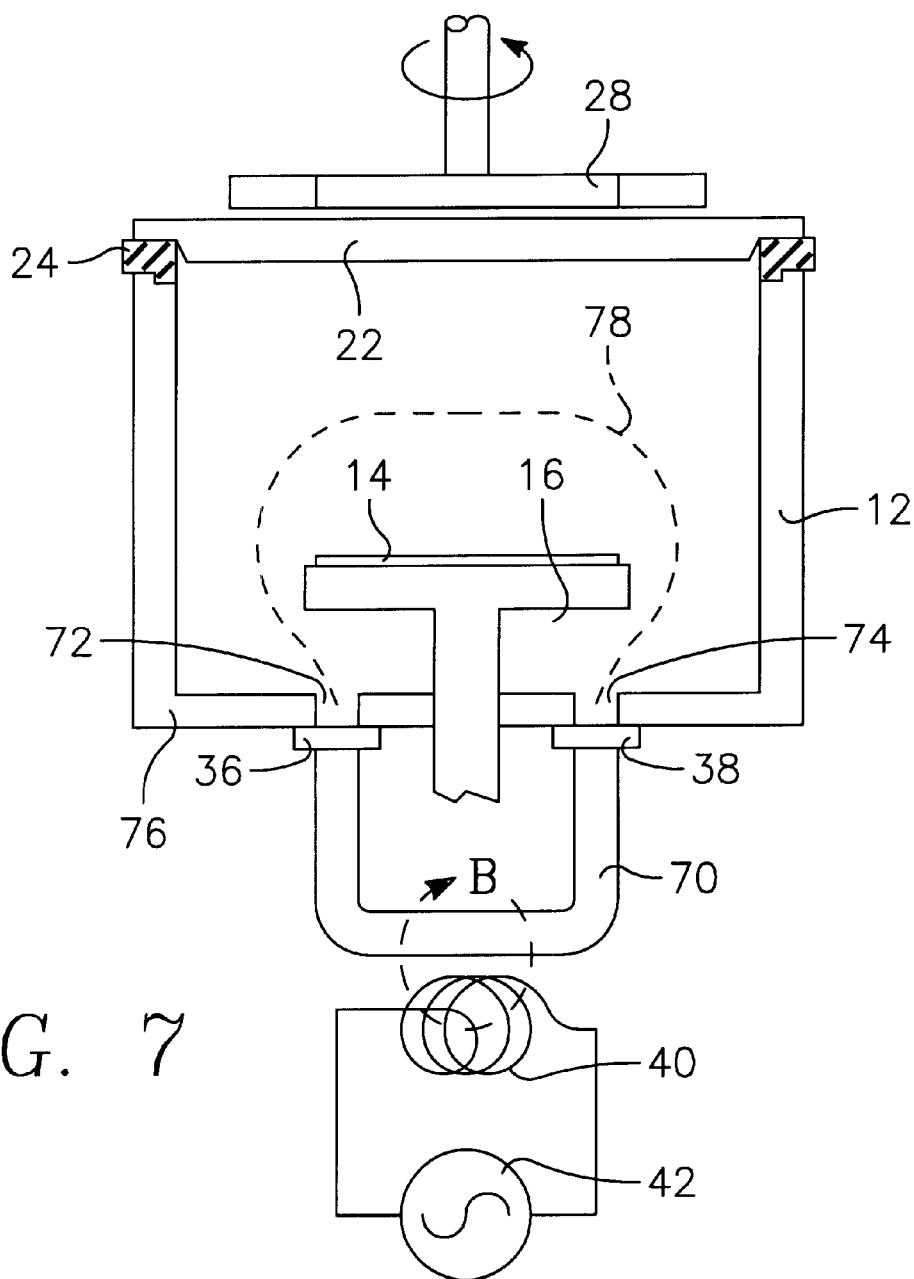


FIG. 7

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