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**Chistyakov**

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(54) **METHODS AND APPARATUS FOR GENERATING HIGH-DENSITY PLASMA**

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(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 748 days.

This patent is subject to a terminal disclaimer.

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**C23C 16/00** (2006.01)

(52) **U.S. Cl.** ..... **204/192.12**; 204/298.08; 204/298.06; 204/298.19; 315/111.21; 315/111.41; 118/723 R; 118/723 E

(58) **Field of Classification Search** ..... 204/192.12, 204/298.08, 298.06, 298.19; 118/723 R, 118/723 E; 315/111.21, 111.41

See application file for complete search history.

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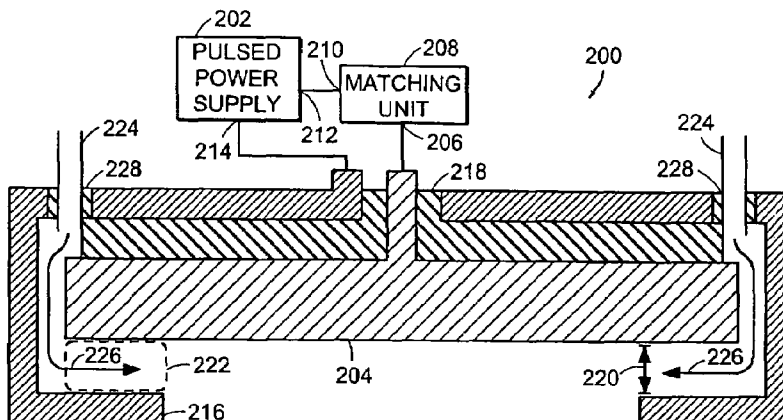
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(57) **ABSTRACT**

Methods and apparatus for generating a strongly-ionized plasma are described. An apparatus for generating a strongly-ionized plasma according to the present invention includes an anode and a cathode that is positioned adjacent to the anode to form a gap there between. An ionization source generates a weakly-ionized plasma proximate to the cathode. A power supply produces an electric field in the gap between the anode and the cathode. The electric field generates excited atoms in the weakly-ionized plasma and generates secondary electrons from the cathode. The secondary electrons ionize the excited atoms, thereby creating the strongly-ionized plasma.

**33 Claims, 13 Drawing Sheets**



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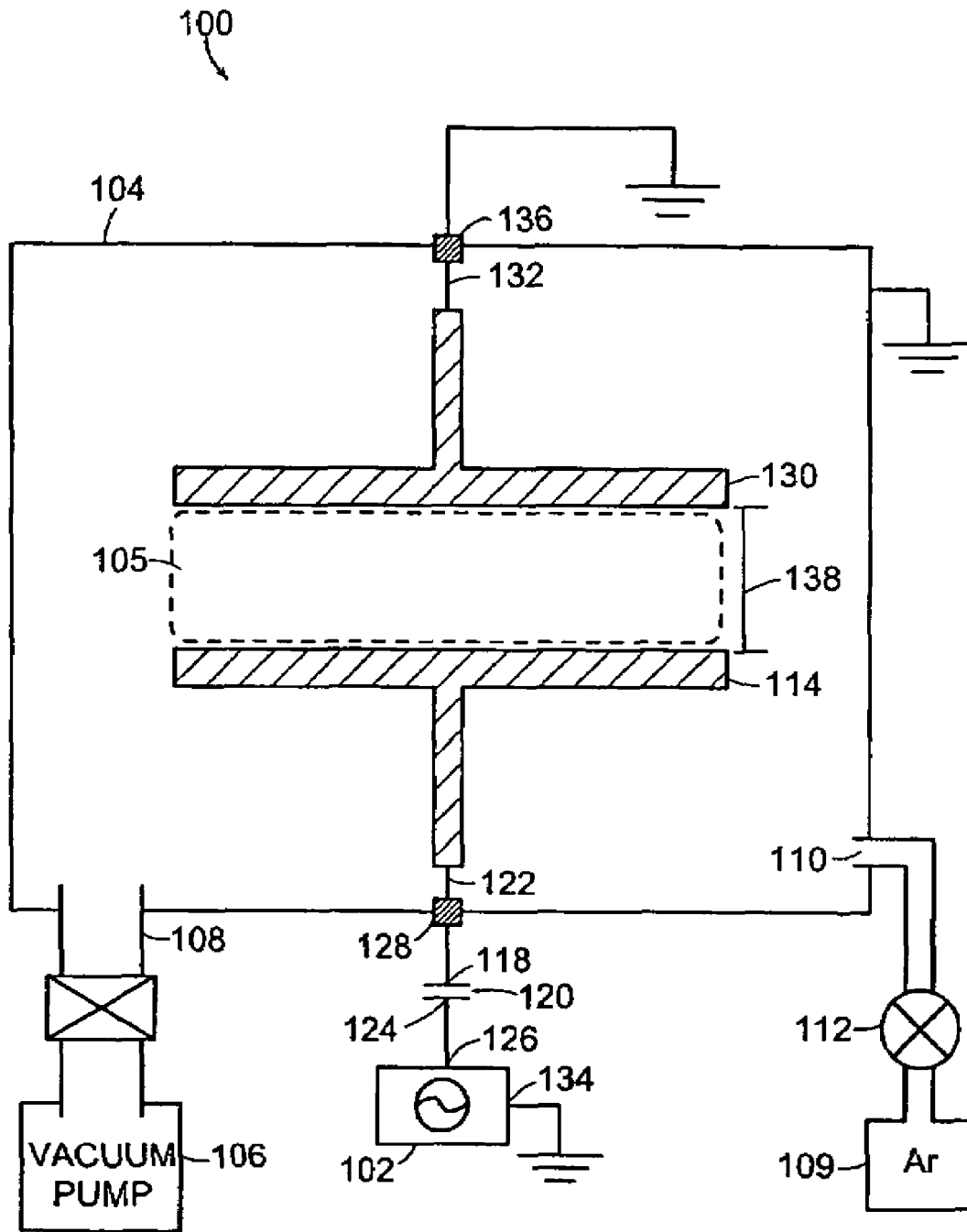


FIG. 1  
PRIOR ART

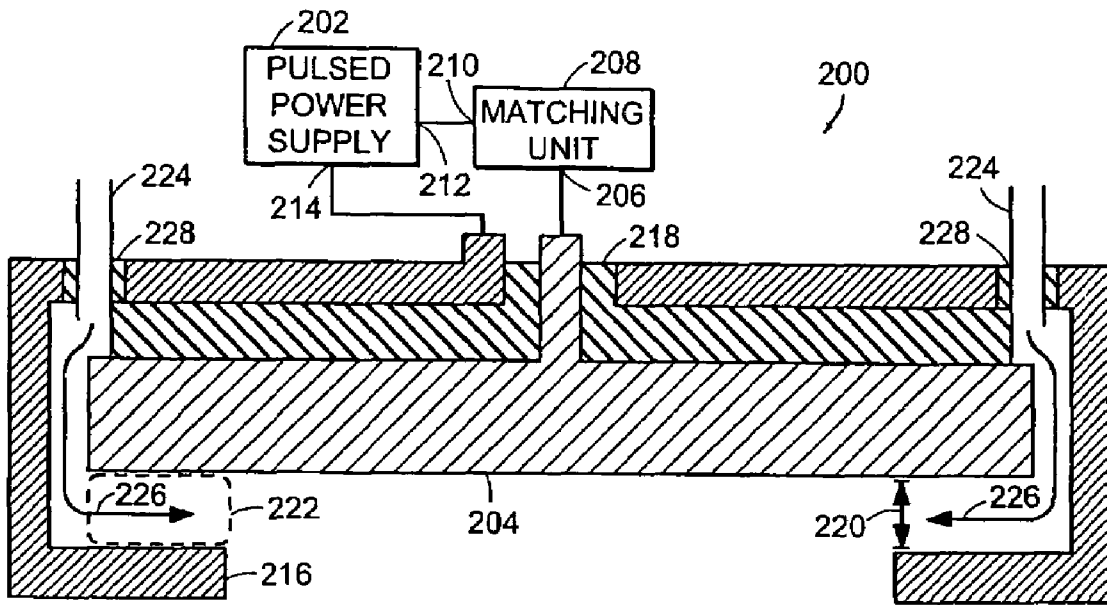


FIG. 2A

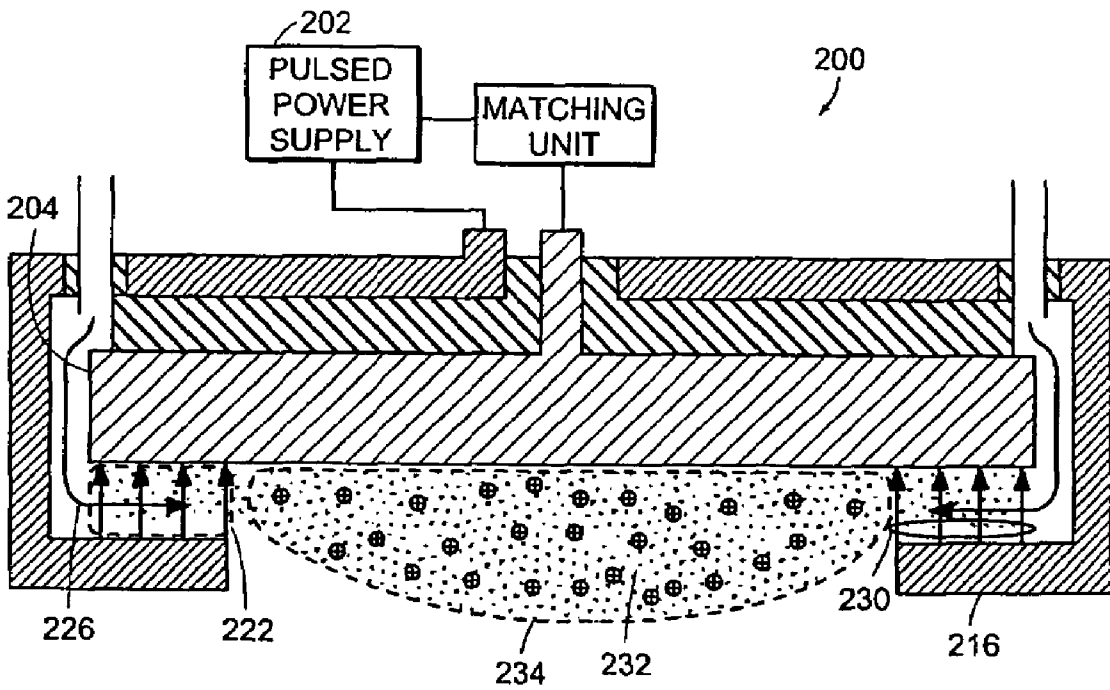


FIG. 2B

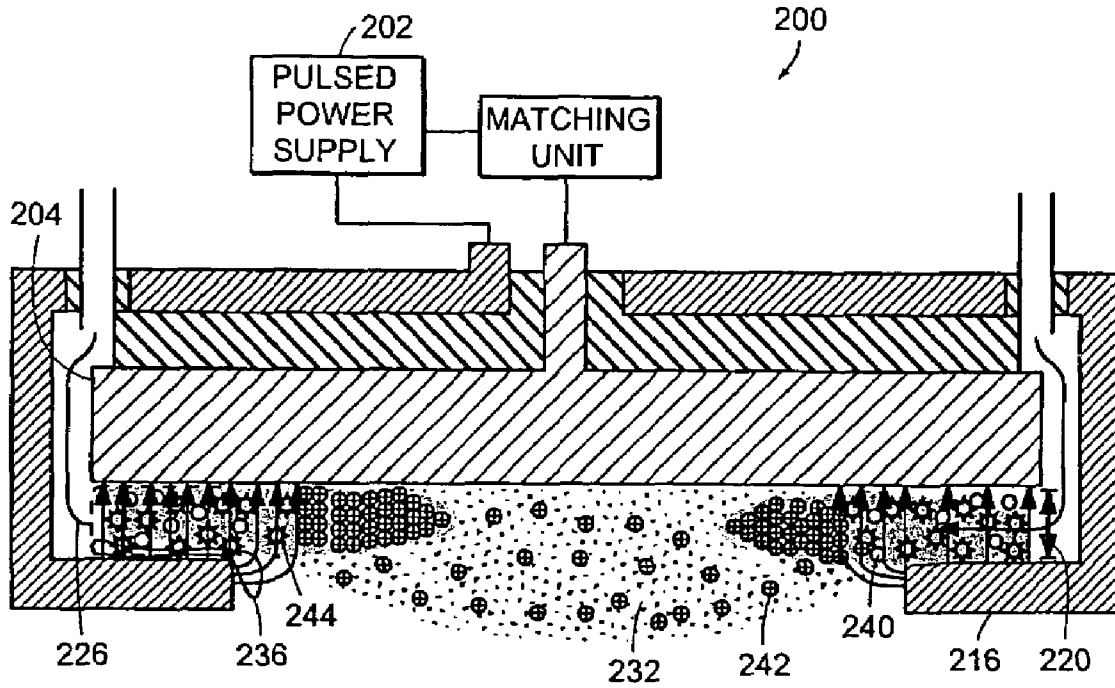


FIG. 2C

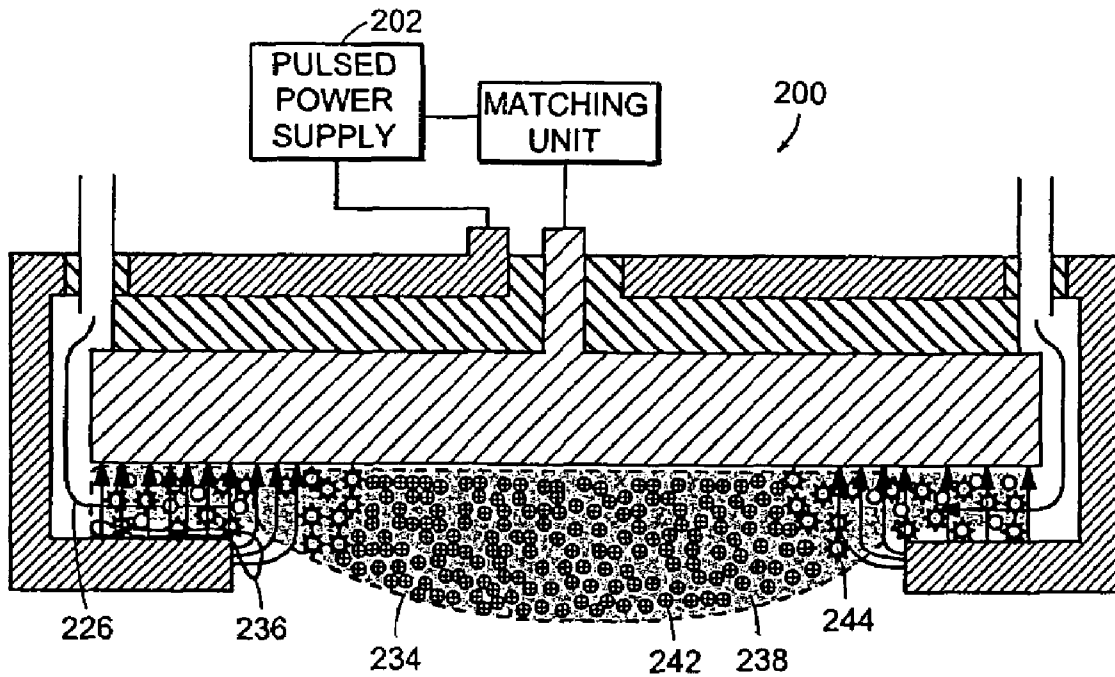


FIG. 2D

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