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United States Patent [19]

Ishikawa et al.

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[54] **IN-SITU SUBSTRATE TEMPERATURE MEASUREMENT SCHEME IN PLASMA REACTOR**

[75] Inventors: **Tetsuya Ishikawa**, Santa Clara; **Brian Lue**, Mountain View, both of Calif.

[73] Assignee: **Applied Materials, Inc.**, Santa Clara, Calif.

[21] Appl. No.: **574,838**

[22] Filed: **Dec. 19, 1995**

[51] **Int. Cl.⁶** **G01K 1/16**

[52] **U.S. Cl.** **374/134**

[58] **Field of Search** 374/120, 121, 374/134

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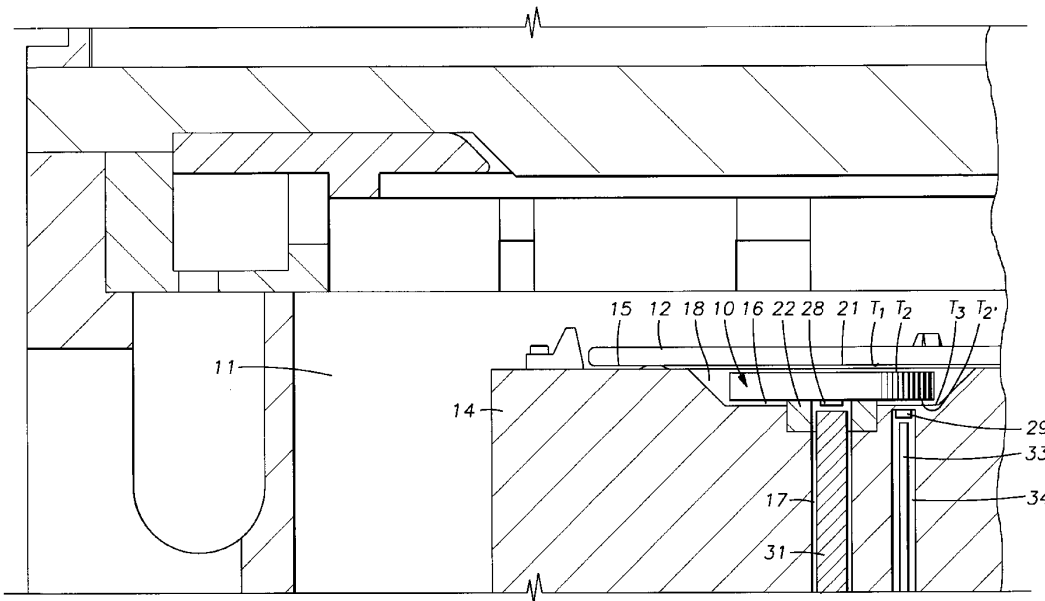
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Primary Examiner—George Dombroske
Assistant Examiner—Paul D. Amrozowicz
Attorney, Agent, or Firm—Patterson & Associates

[57] **ABSTRACT**

A method and apparatus for noncontact temperature measurement of a substrate insitu by measuring the temperature of a substrate support member and an intermediate member located between the substrate and the substrate support member. The intermediate member has a given heat transfer surface area adjacent both the substrate and the substrate support member and high thermal conductivity so that the intermediate member rapidly approaches a steady state surface temperature after the substrate is positioned in the substrate support member. In this arrangement, the temperature of the substrate can be determined either by calibration or application of a heat transfer equation. Various temperature measuring instruments may be used, including a light probe located in the substrate support member normal to the surface of the intermediate member to measure the radiation from a temperature sensitive material deposited on the bottom surface of the intermediate member.

36 Claims, 4 Drawing Sheets



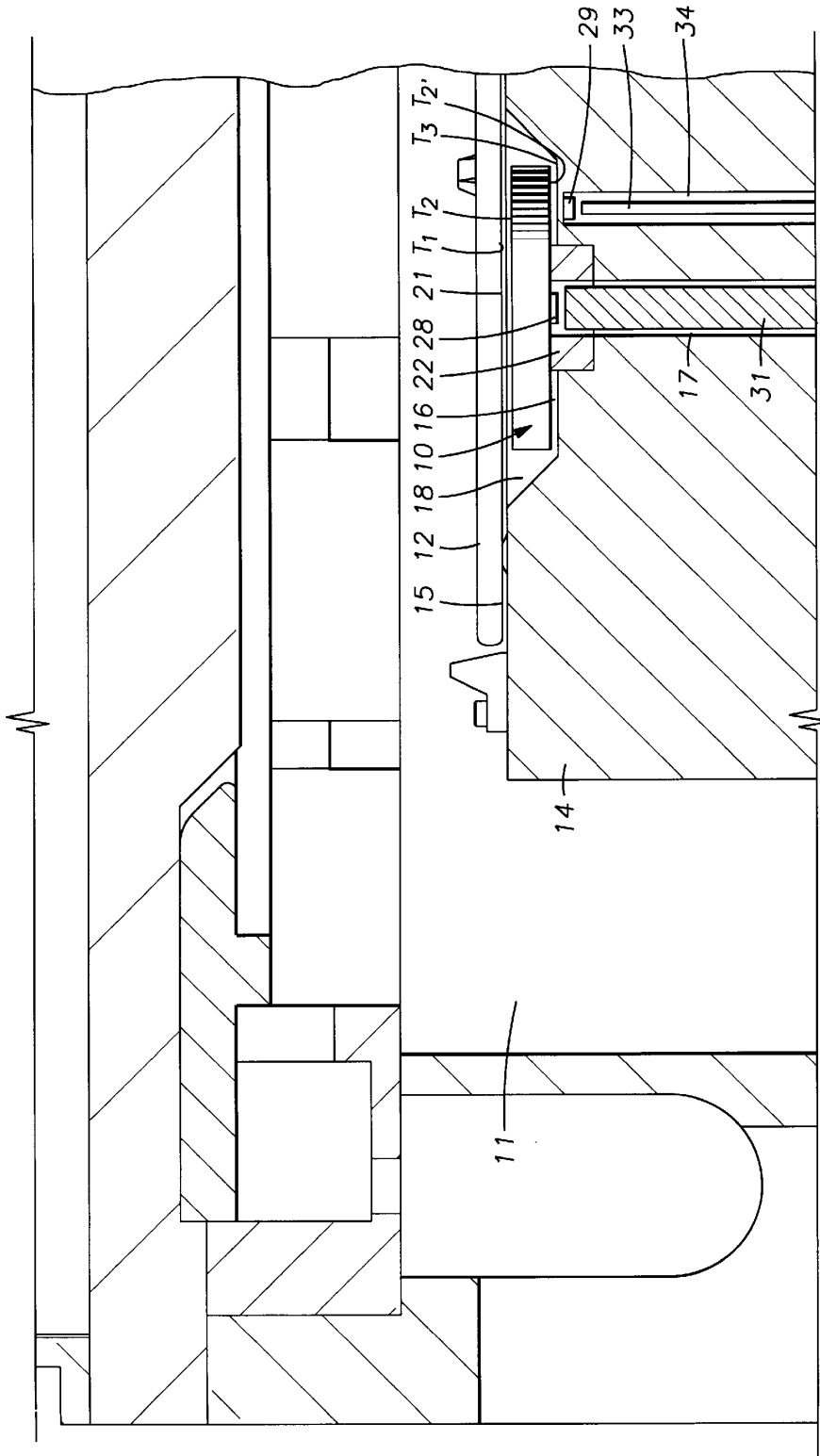


FIG. 1

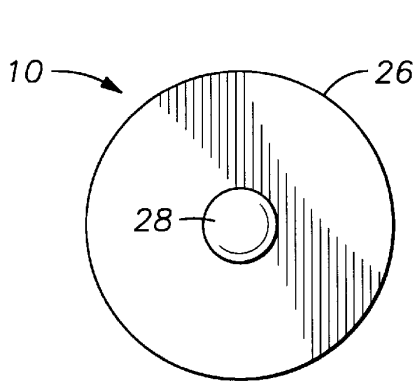
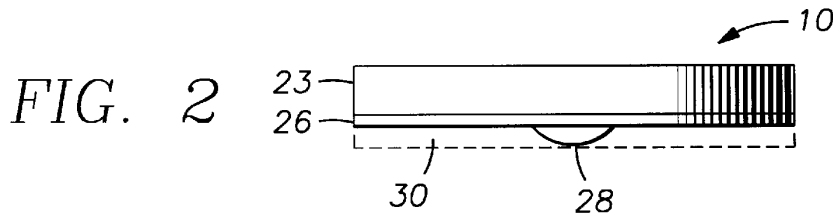


FIG. 3

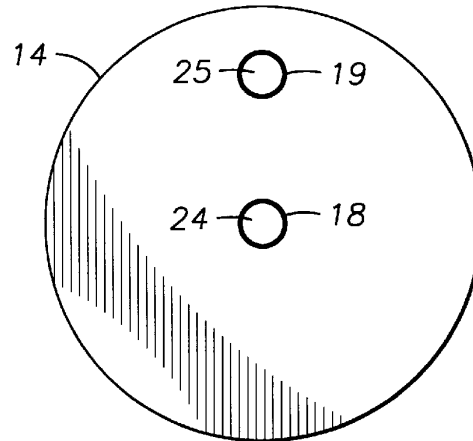


FIG. 4

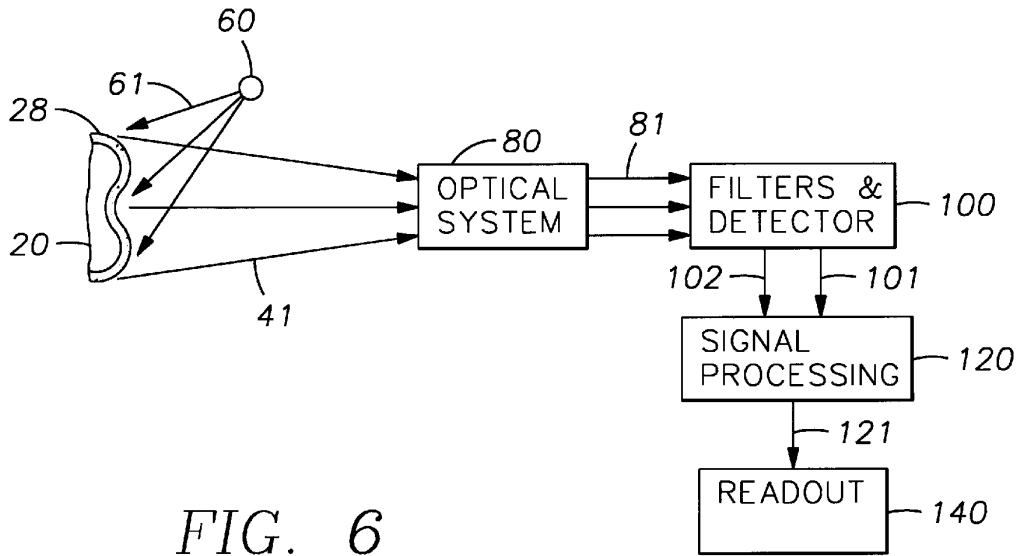


FIG. 6

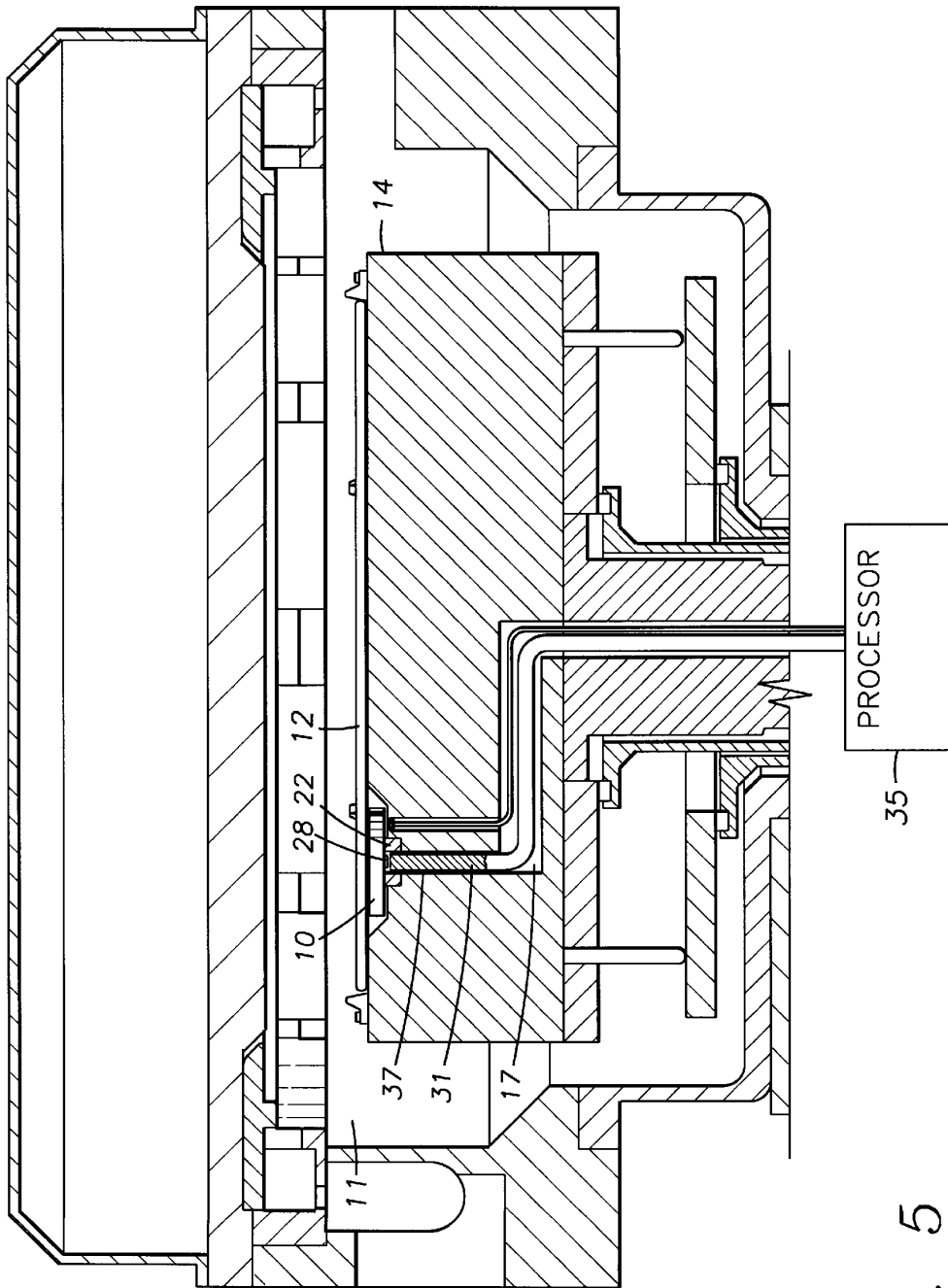


FIG. 5

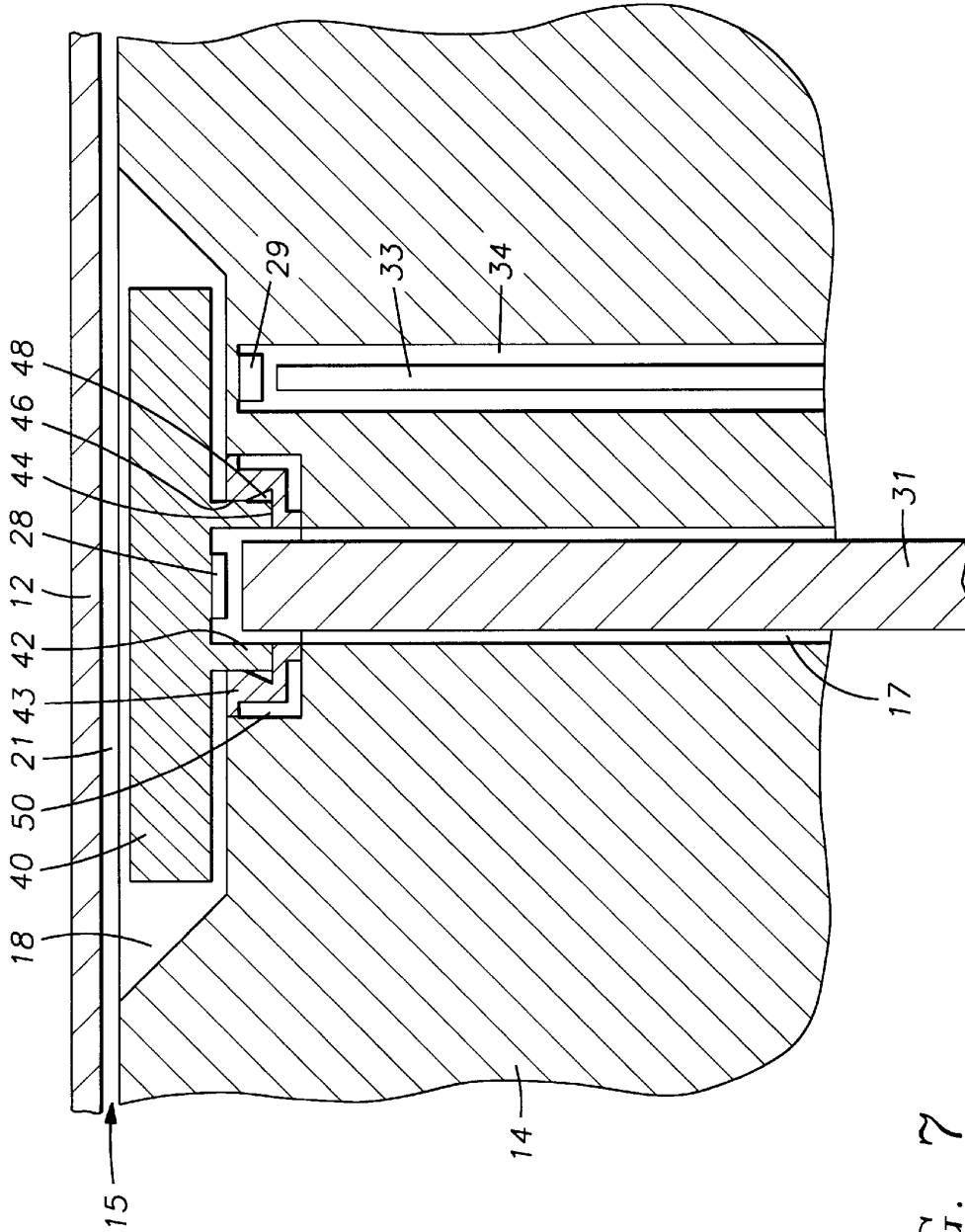


FIG. 7

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