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Hurwitt et al.

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[54] **MAGNETRON SPUTTER COATING METHOD AND APPARATUS WITH ROTATING MAGNET CATHODE**

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[73] Assignee: **Materials Research Corporation, Orangeburg, N.Y.**

[21] Appl. No.: **626,987**

[22] Filed: **Dec. 13, 1990**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 606,701, Oct. 31, 1990, abandoned, which is a continuation-in-part of Ser. No. 570,943, Aug. 22, 1990, which is a continuation-in-part of Ser. No. 339,308, Apr. 17, 1989, Pat. No. 4,957,605.

Primary Examiner—Aaron Weisstuch
Attorney, Agent, or Firm—Wood, Herron & Evans

[57] ABSTRACT

[51] Int. Cl.⁵ **C23C 14/35**
[52] U.S. Cl. **204/192.12; 204/298.2; 204/298.09**
[58] Field of Search **204/192.12, 298.09, 204/298.2**

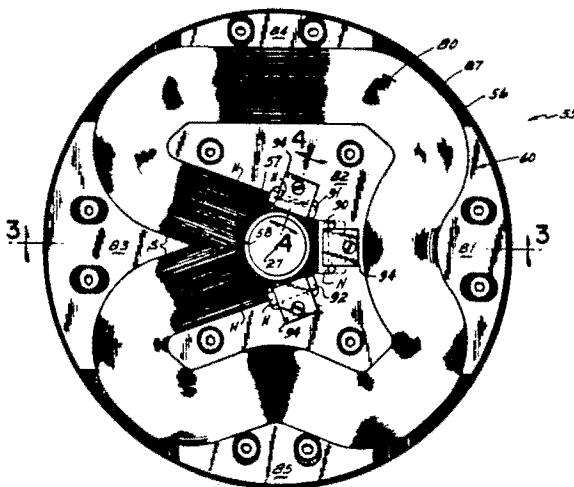
A target of a thickness, which varies across its radius according to the amount of material required to be sputtered, is supported in a nest in a chamber of a sputter coating apparatus. Positioned behind the nest is a rotating magnet carrier having arranged thereon in a closed loop a permanent or electro magnetic strip, but preferably a flexible permanently magnetic material, with portions near the rim of the target and portions near, but not on, the target center about which the magnet rotates. The magnetic loop is transversely polarized with one pole toward the target rim and one toward the target center so that its field will enclose the rim of the target within a magnetic tunnel that traps a plasma over the target. Lumped magnets across the center from the strip support the plasma near the center so as to cause some sputtering at the target center. Other lumped magnets adjacent the strip help sharpen the field so that a desired distribution of sputtering can be achieved. Enclosed in a sealed space behind and in thermal contact with the target nest is the carrier from which the magnets project to facilitate the flow of cooling fluid across the back surface of the nest to cool the target as the carrier rotates.

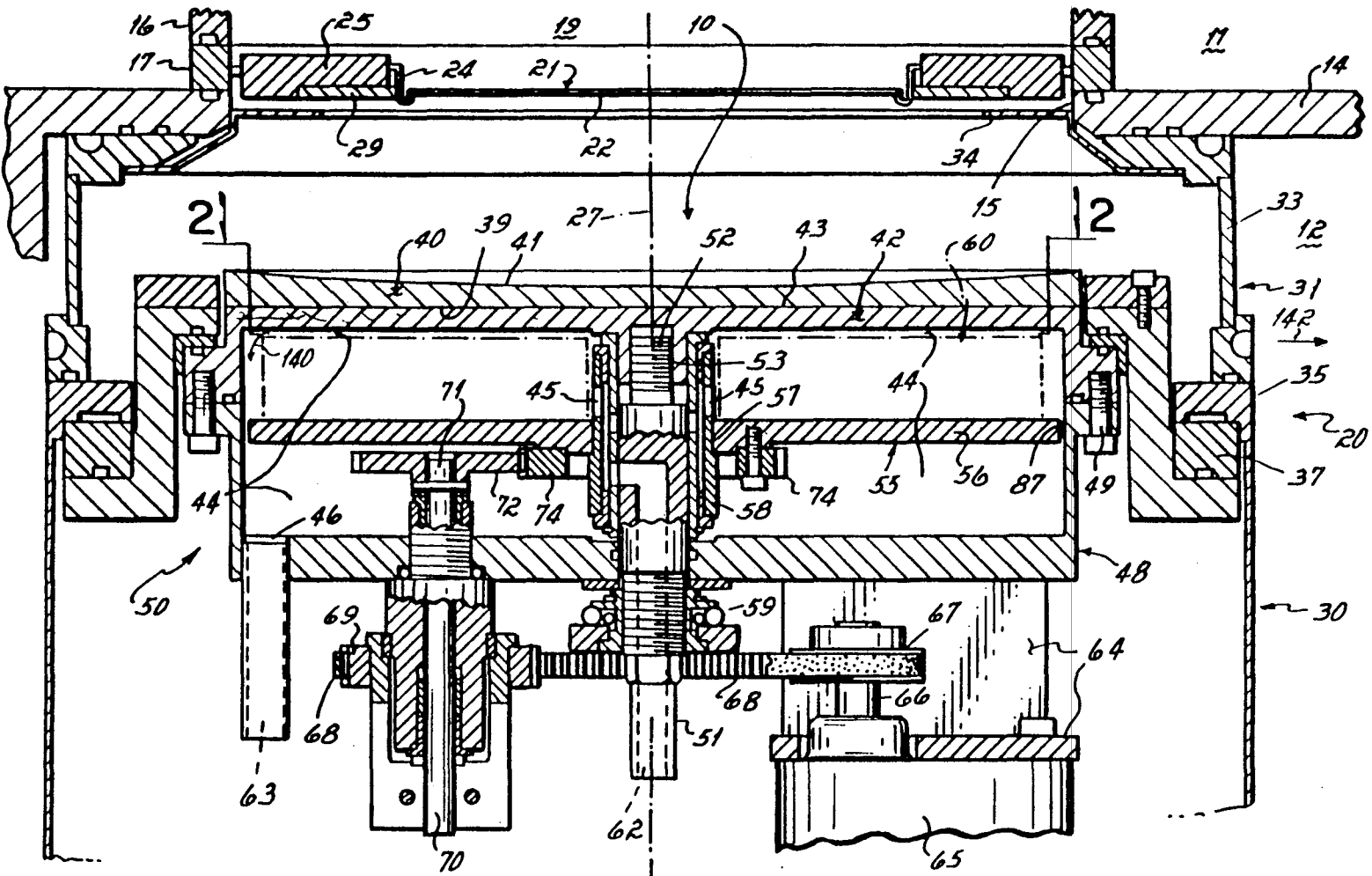
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22 Claims, 5 Drawing Sheets





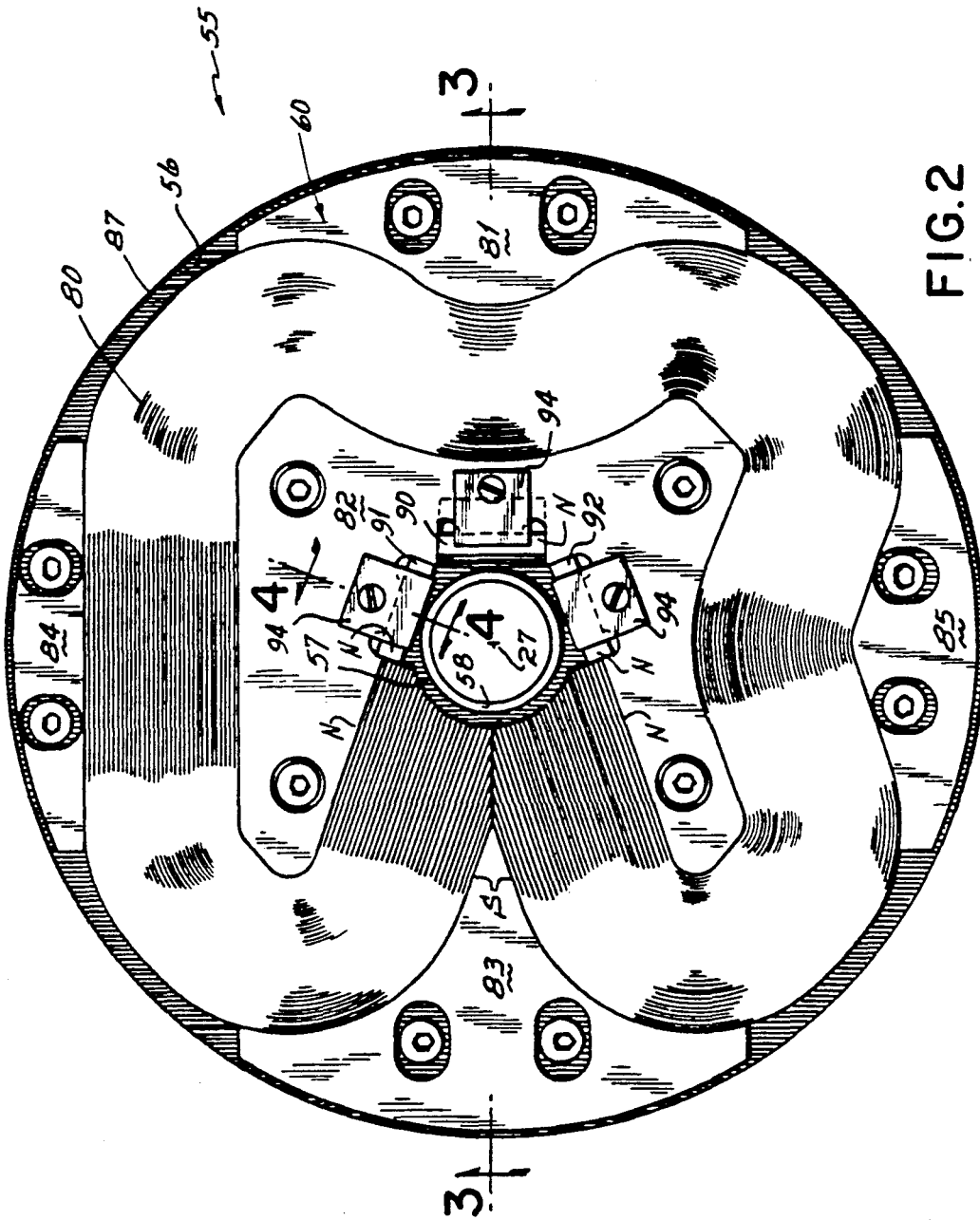


FIG. 2

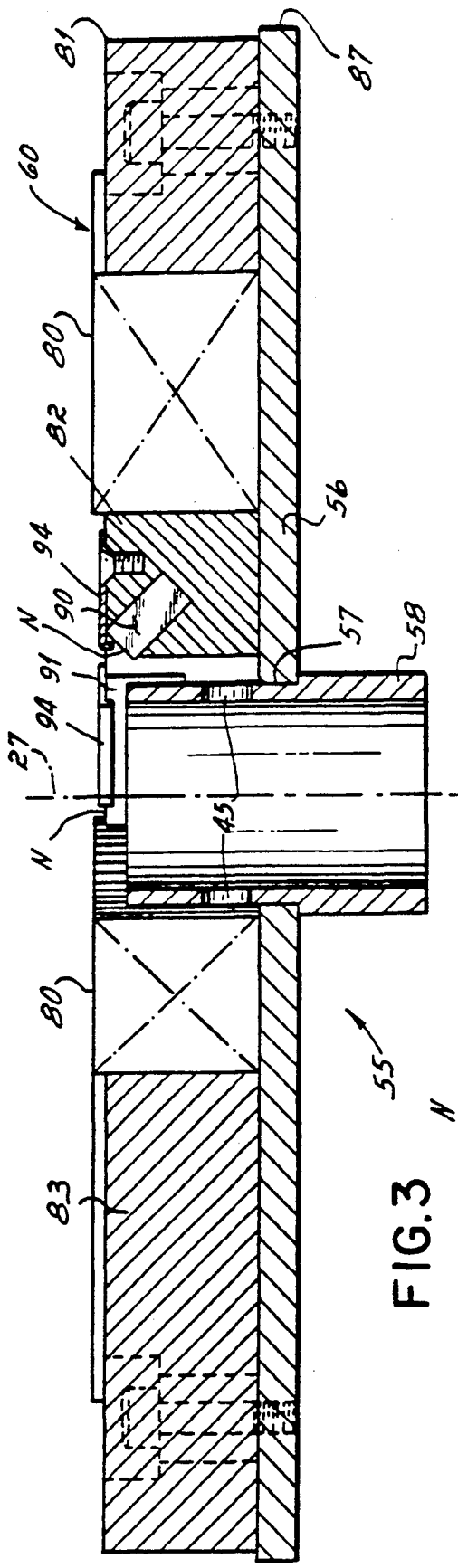


FIG. 3

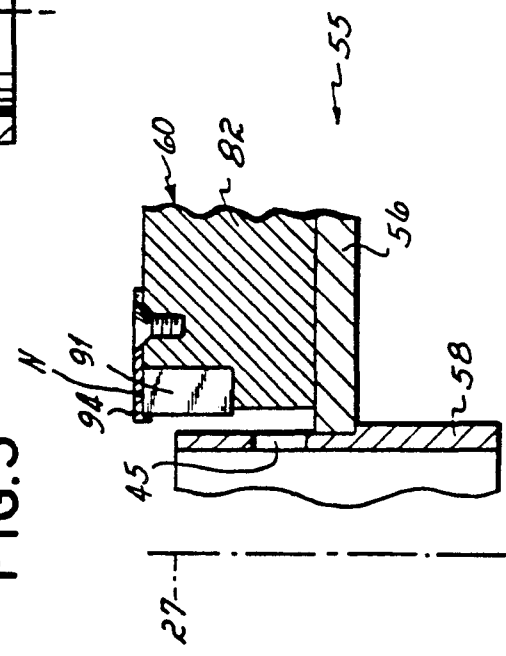


FIG. 4

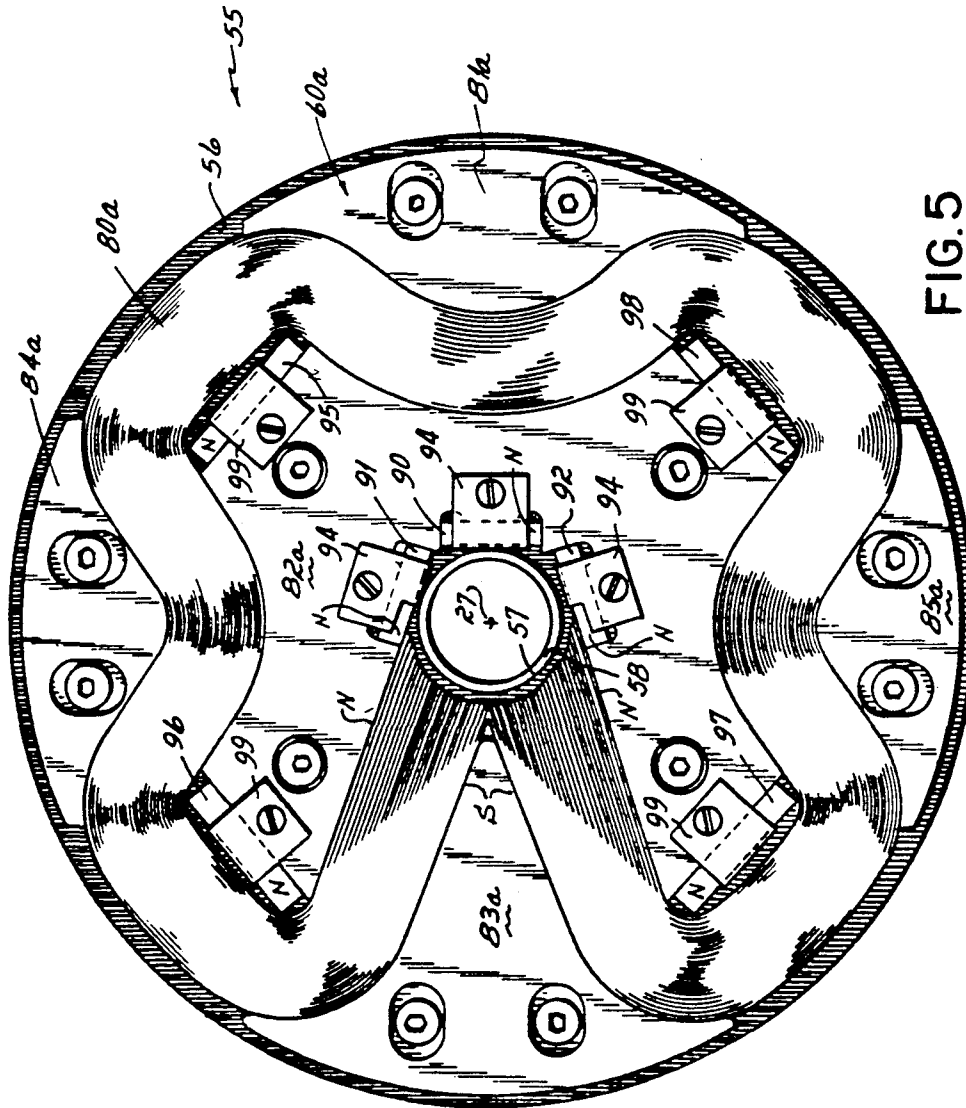


FIG. 5

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