

# EXHIBIT 4

**United States Patent** [19]

[11] **Patent Number:** **6,040,560**

**Fleischhauer et al.**

[45] **Date of Patent:** **Mar. 21, 2000**

[54] **POWER CONTROLLER AND METHOD OF OPERATING AN ELECTRICAL SMOKING SYSTEM**

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[73] Assignee: **Philip Morris Incorporated**, New York, N.Y.

[21] Appl. No.: **08/951,255**

[22] Filed: **Oct. 16, 1997**

**Related U.S. Application Data**

[63] Continuation-in-part of application No. 08/755,044, Oct. 22, 1996, abandoned.

[51] **Int. Cl.<sup>7</sup>** ..... **H05B 1/02**

[52] **U.S. Cl.** ..... **219/494**; 219/483; 219/501; 219/497; 219/492; 128/202.21; 131/329

[58] **Field of Search** ..... 219/494, 497, 219/499, 501, 505, 483, 485, 486, 492; 131/194, 270, 271, 329, 273; 128/202.21, 202.27

[56] **References Cited**

**U.S. PATENT DOCUMENTS**

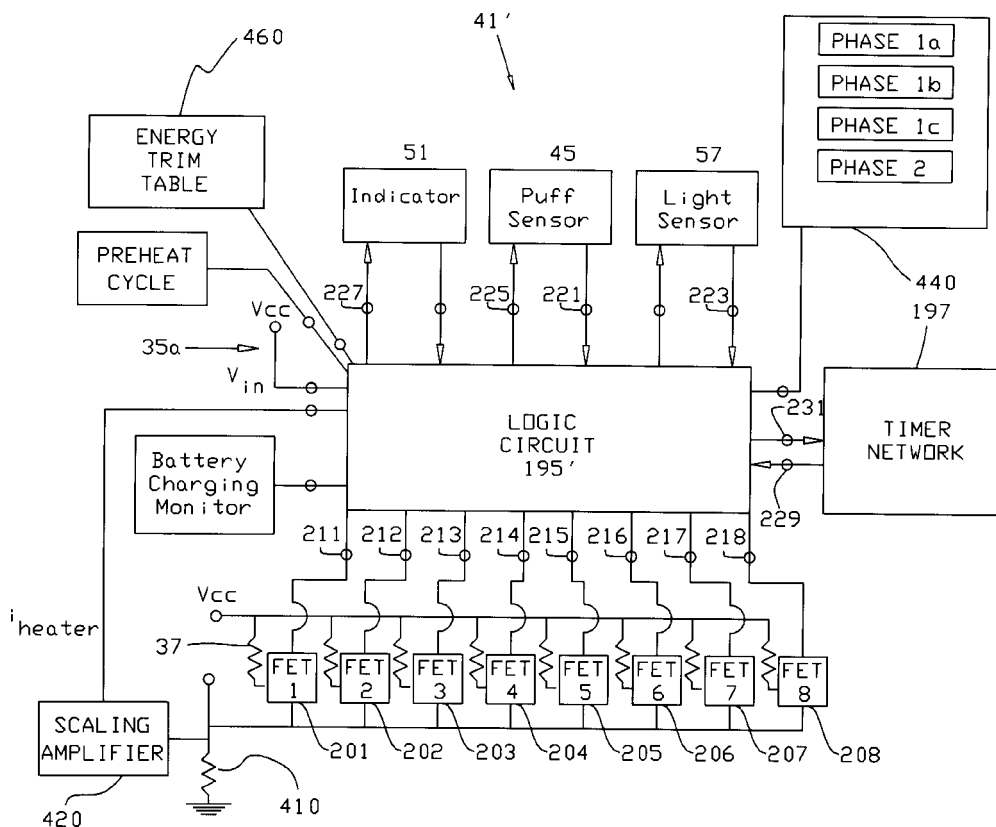
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[57] **ABSTRACT**

A novel controller in an electrical smoking system and method, wherein the method includes the steps of: establishing a preferred thermal pathway to be executed with each heater activation responsively to a puff on an electrically heated cigarette; configuring a power cycle in accordance with the desired thermal pathway; dividing the power cycle into at least first and second phases each having a respective, predetermined time period and total energy input for each phase; and adjusting a respective duty cycle (or other power-adjusting factor) in each phase of the power cycle responsively to a voltage reading of the power source such that the established, respective total energy input of each phase is achieved during the time period of each power cycle.

**82 Claims, 17 Drawing Sheets**



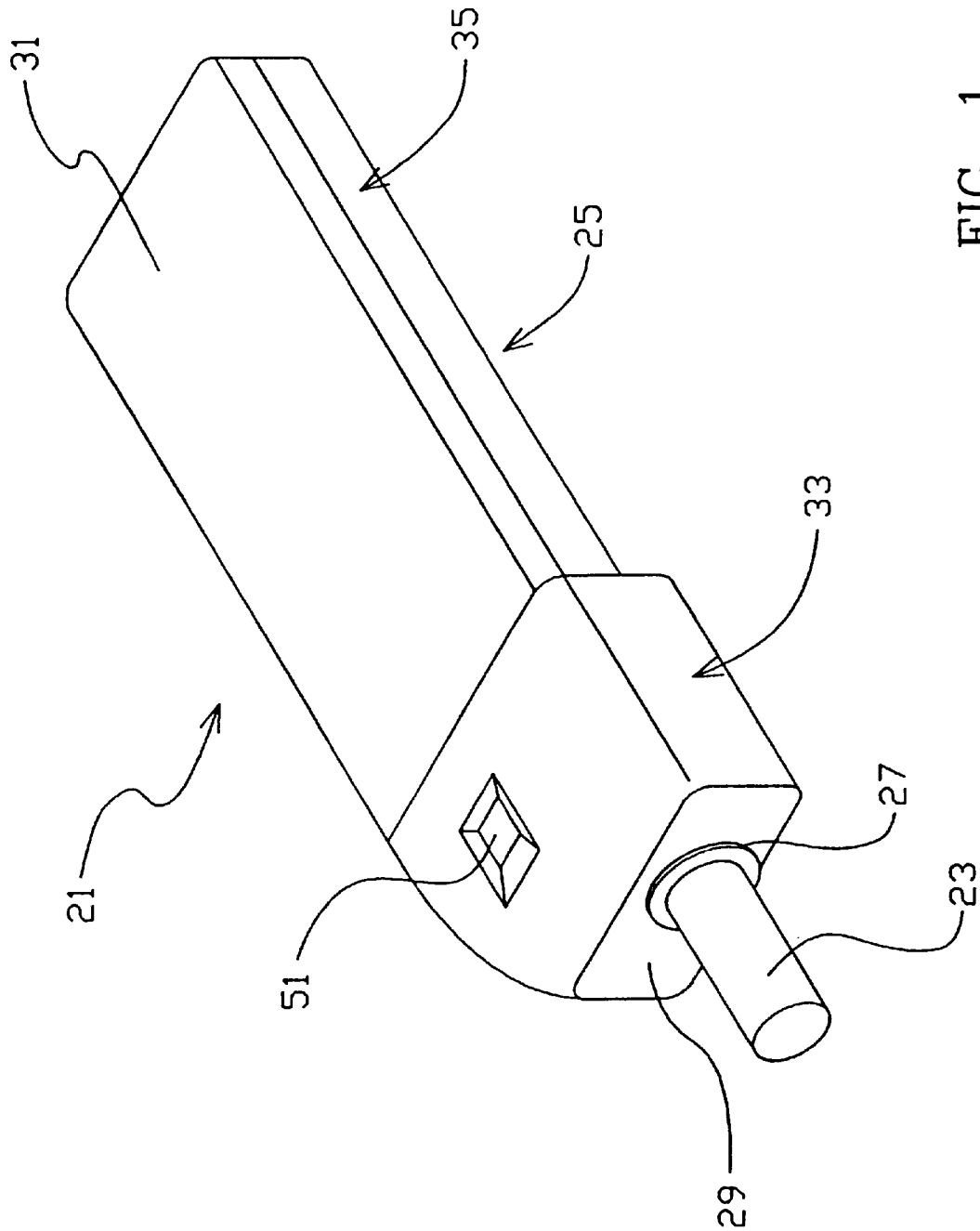


FIG. 1

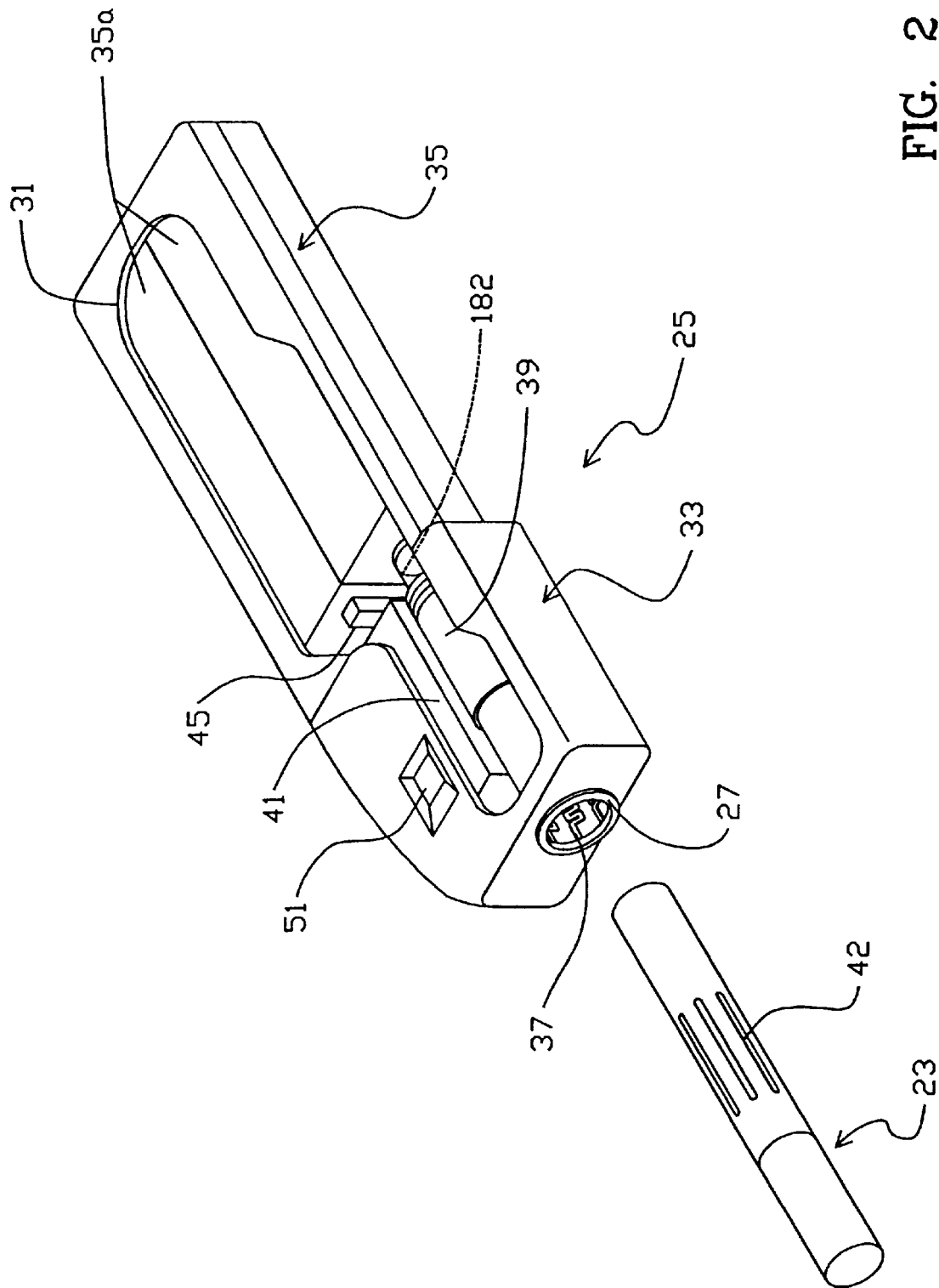


FIG. 2

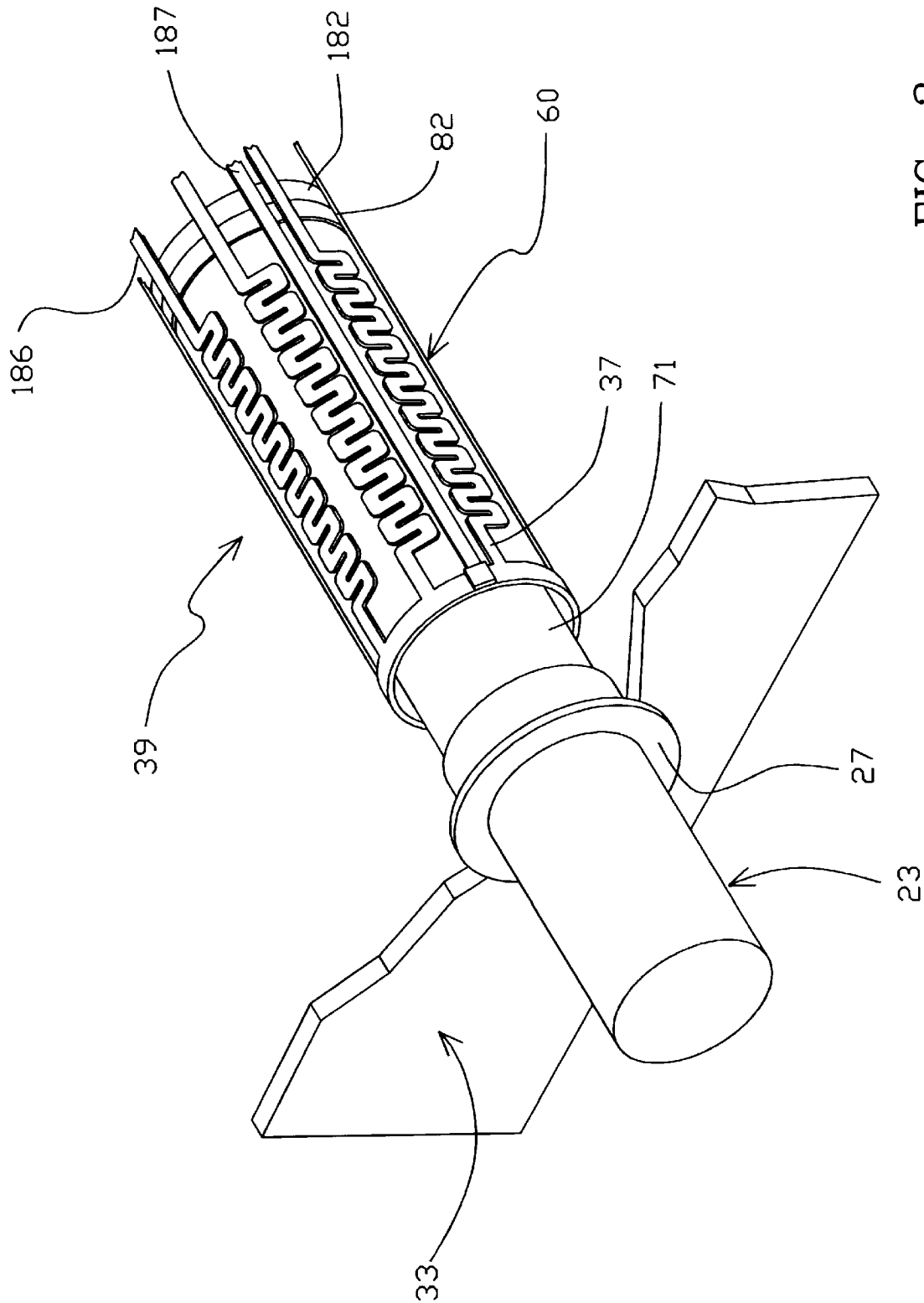


FIG. 3

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