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United States Patent [19]

DeMuro

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[45] Date of Patent: Apr. 9, 1996

[54] **METHOD AND APPARATUS FOR DETERMINING EXTERNAL POWER SUPPLY TYPE**

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[73] Assignee: **Motorola, Inc.**, Schaumburg, Ill.

[21] Appl. No.: **149,686**

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[51] **Int. Cl.**[6] **H01M 10/46**

[52] **U.S. Cl.** **320/23**; 320/39; 320/56; 363/143

[58] **Field of Search** 320/2, 15, 22, 320/23, 24, 39, 40, 56; 363/142, 143

[56] **References Cited**

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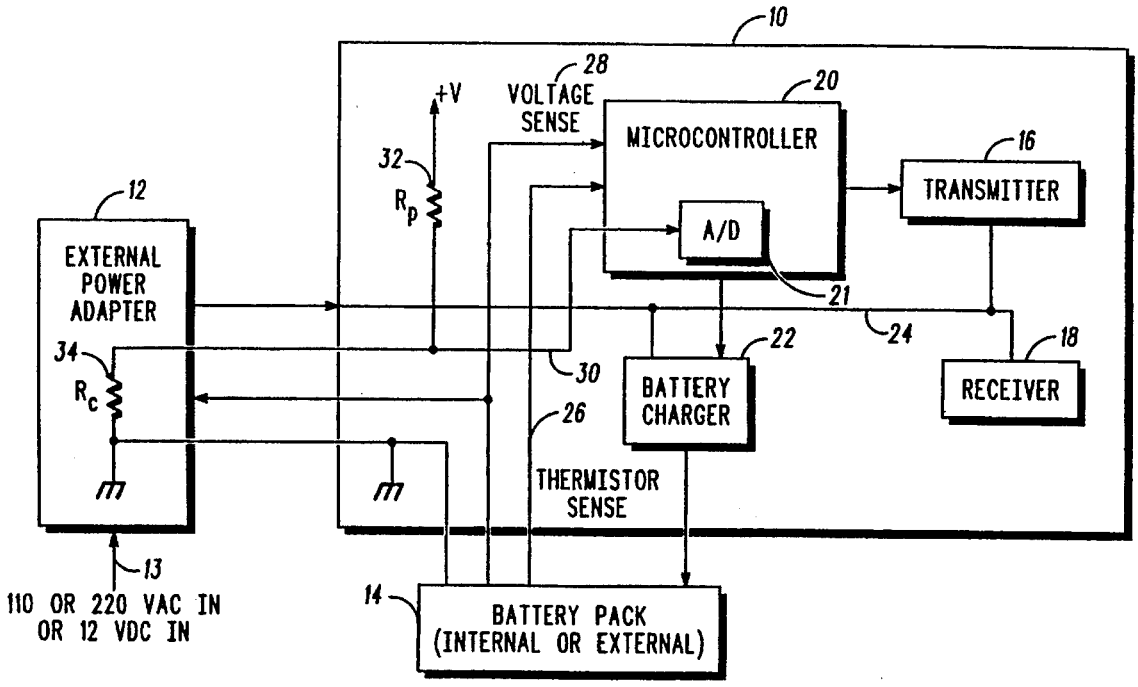
Assistant Examiner—Patrick Law

Attorney, Agent, or Firm—John J. King

[57] **ABSTRACT**

In summary, the present invention provides a method and apparatus for determining an external power supply type and modifying the charging of the internal battery (**14**) based upon the external power supply type and battery information. The device has an external power adapter (**12**) used to provide power to the device (**10**), as well as charging current for the battery which is regulated by the internal battery charger. A microcontroller (**20**) in the device (**10**) regulates the charging current to the battery (**14**). The microcontroller (**20**) preferably contains an A/D converter (**21**) which is connected to a pull-up resistor (**32**) internal to the device, and to a pull-down resistor (**34**) in the external power adapter (**12**). The voltage generated by the resistor divider network including the pull-up resistor (**32**) and the pull-down resistor (**34**) in the external power adapter is used to identify the external power adapter type. By changing the value of the pull-down resistor (**34**) in the external power supply to identify the external power supply, the microcontroller (**20**) in the apparatus may determine the optimum charging profile to use for the battery based upon the charger type and other information relating to the battery.

20 Claims, 4 Drawing Sheets



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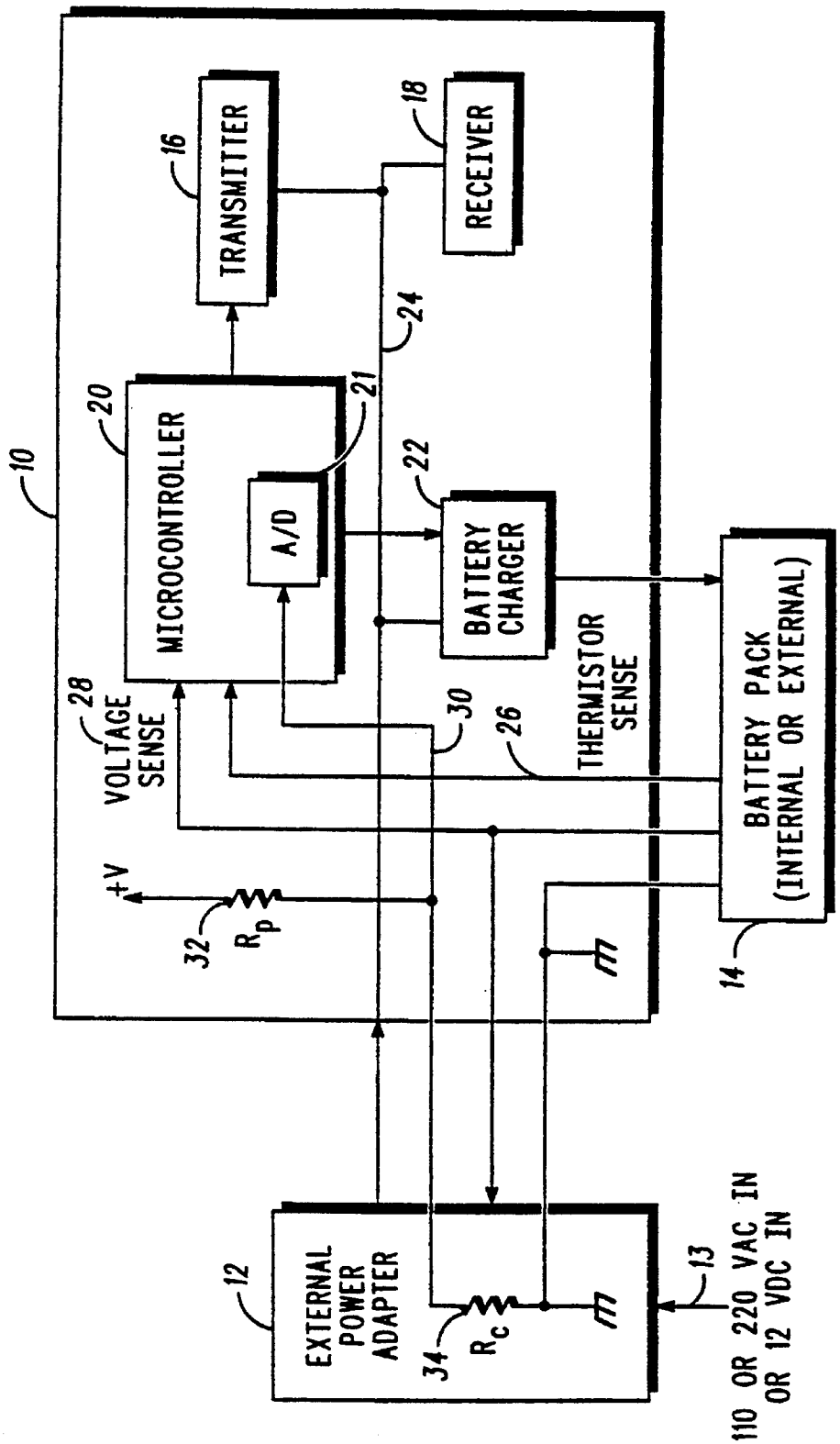

FIG. 1

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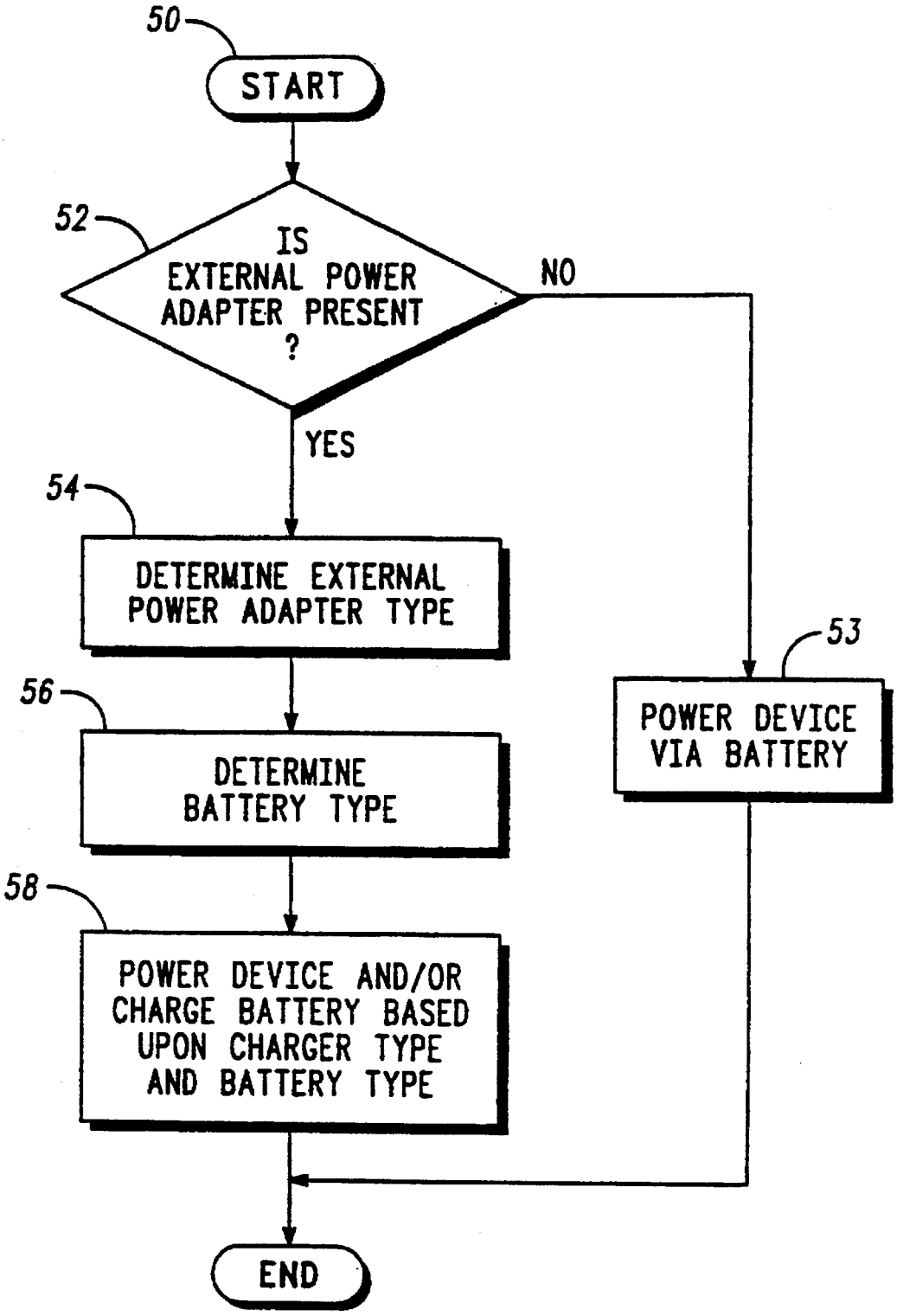

FIG. 2

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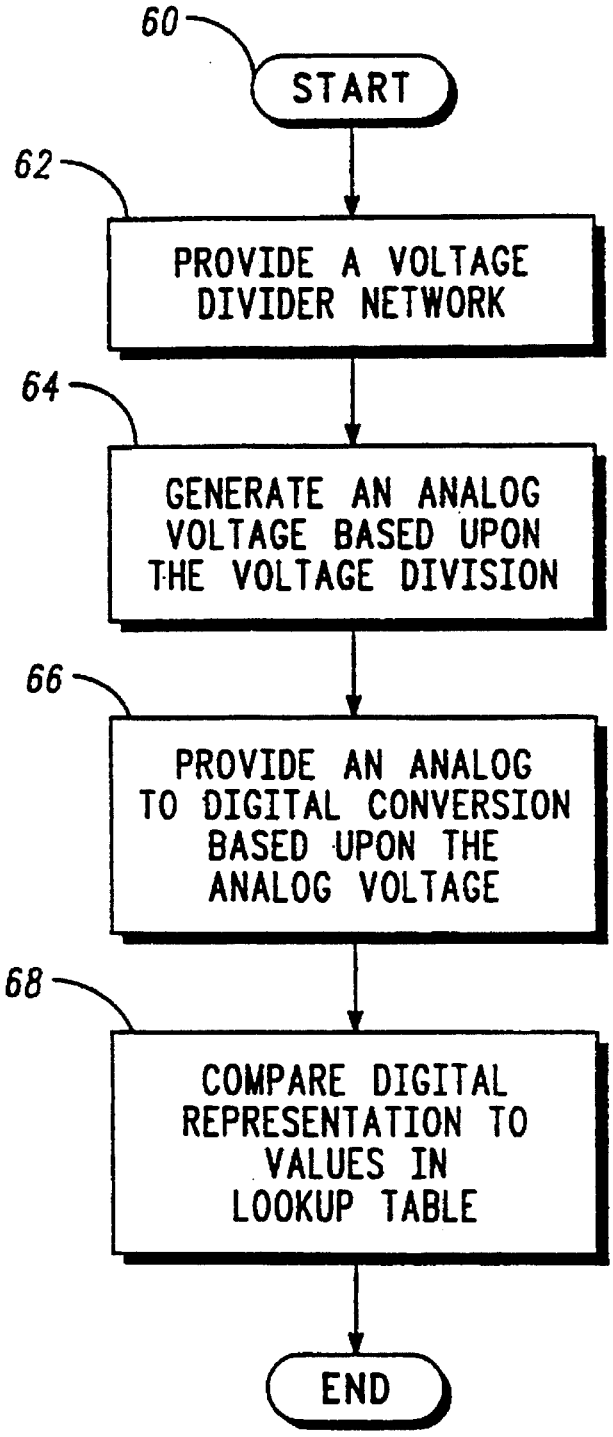

FIG. 3

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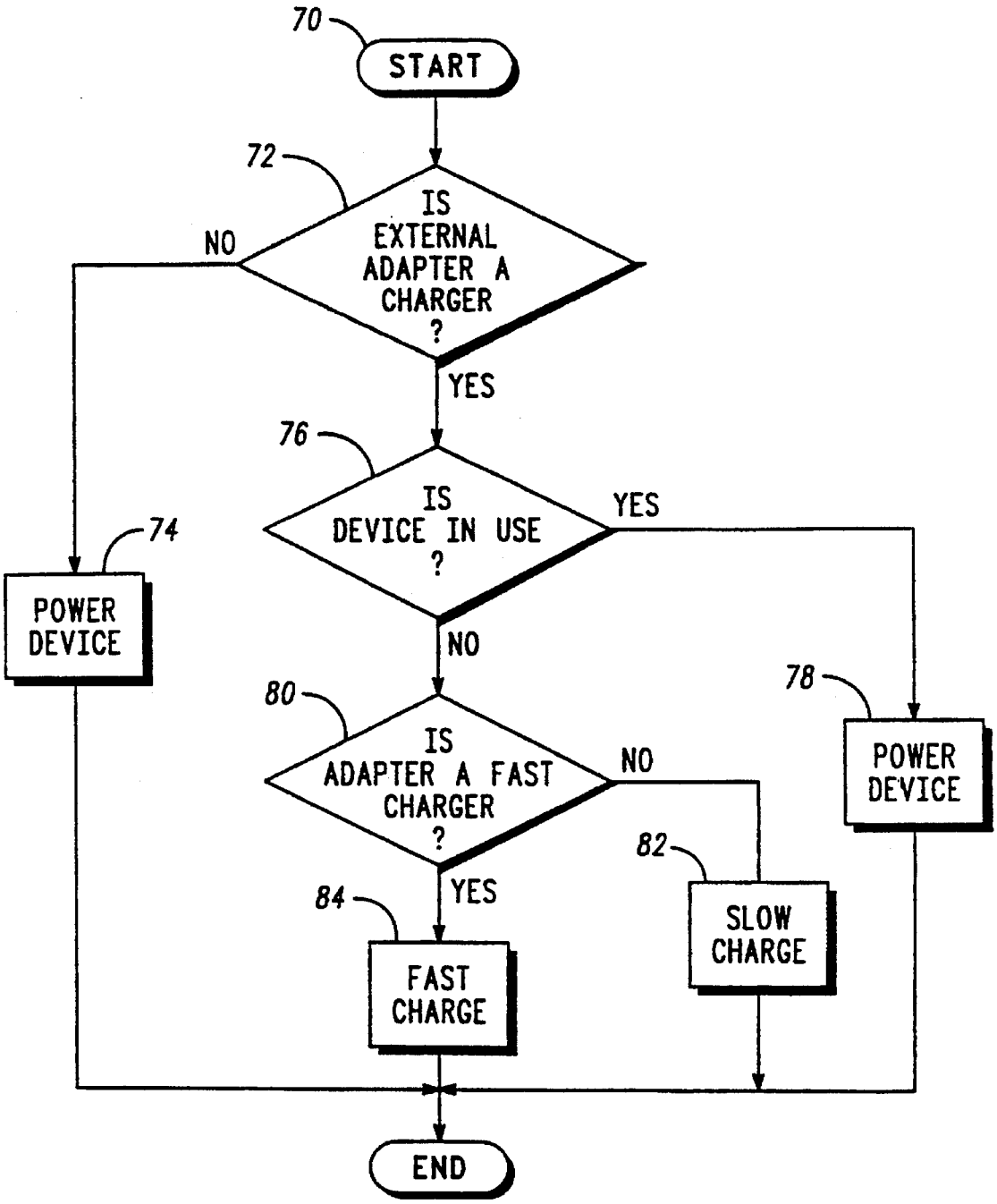

FIG. 4

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