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# United States Patent [19]

McCoy et al.

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[45] Date of Patent: **Sep. 30, 1997**

[54] **DIAGNOSTIC SYSTEM FOR A CAPACITOR DISCHARGE IGNITION SYSTEM**

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[75] Inventors: **Steven R. McCoy**, Washington; **Horst Scheel**, Peoria, both of Ill.

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[73] Assignee: **Caterpillar Inc.**, Peoria, Ill.

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[21] Appl. No.: **946,491**

*Attorney, Agent, or Firm*—Kirk A. Vander Leest; R. Carl Wilbur

[22] PCT Filed: **May 27, 1992**

[86] PCT No.: **PCT/US92/04515**

### [57] ABSTRACT

§ 371 Date: **Nov. 9, 1992**

An apparatus is provided for monitoring ignition in individual cylinders of a multi-cylinder engine of the type having an ignition system which includes a separate transformer for each cylinder. Each transformer has primary and secondary coils. The secondary coil is connected in series with a spark gap in an associated one of the cylinders. The ignition system further includes selector switches for receiving cylinder select signals and responsively connecting respective transformer primary coils. The current flows through the primary coil resulting in a voltage potential across an associated spark gap which normally increases to a magnitude sufficient to cause a spark across the spark gap. A first circuit receives the cylinder select signals, senses time delay between the reception of a cylinder select signal and sparking in a respective cylinder and responsively produces a delay signal indicative of the sensed time delay. A diagnostics controller receives the delay signal, compares the delay signal to a plurality of preselected thresholds and responsively produces a status signal indicating the status of ignition in a respective cylinder.

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[51] Int. Cl.<sup>6</sup> ..... **F02P 5/145; F02P 17/00**

[52] U.S. Cl. .... **324/393; 123/605; 324/388; 324/391**

[58] Field of Search ..... **324/380, 388, 324/391, 393, 399, 402; 73/116, 117.3; 123/605**

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**15 Claims, 10 Drawing Sheets**

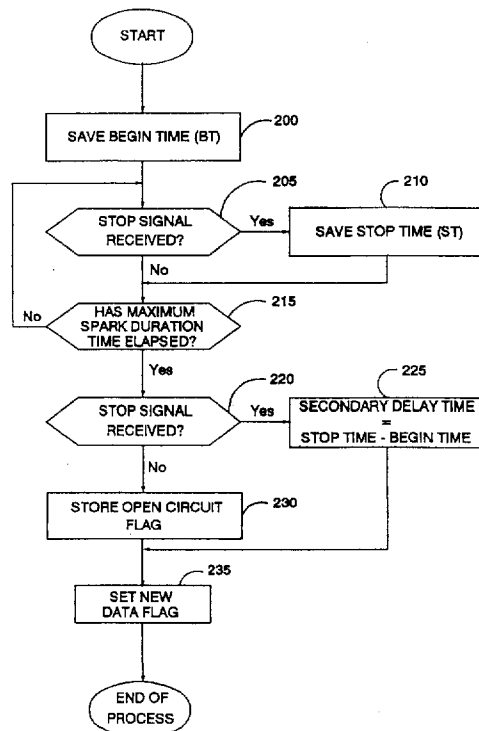




Fig. 2

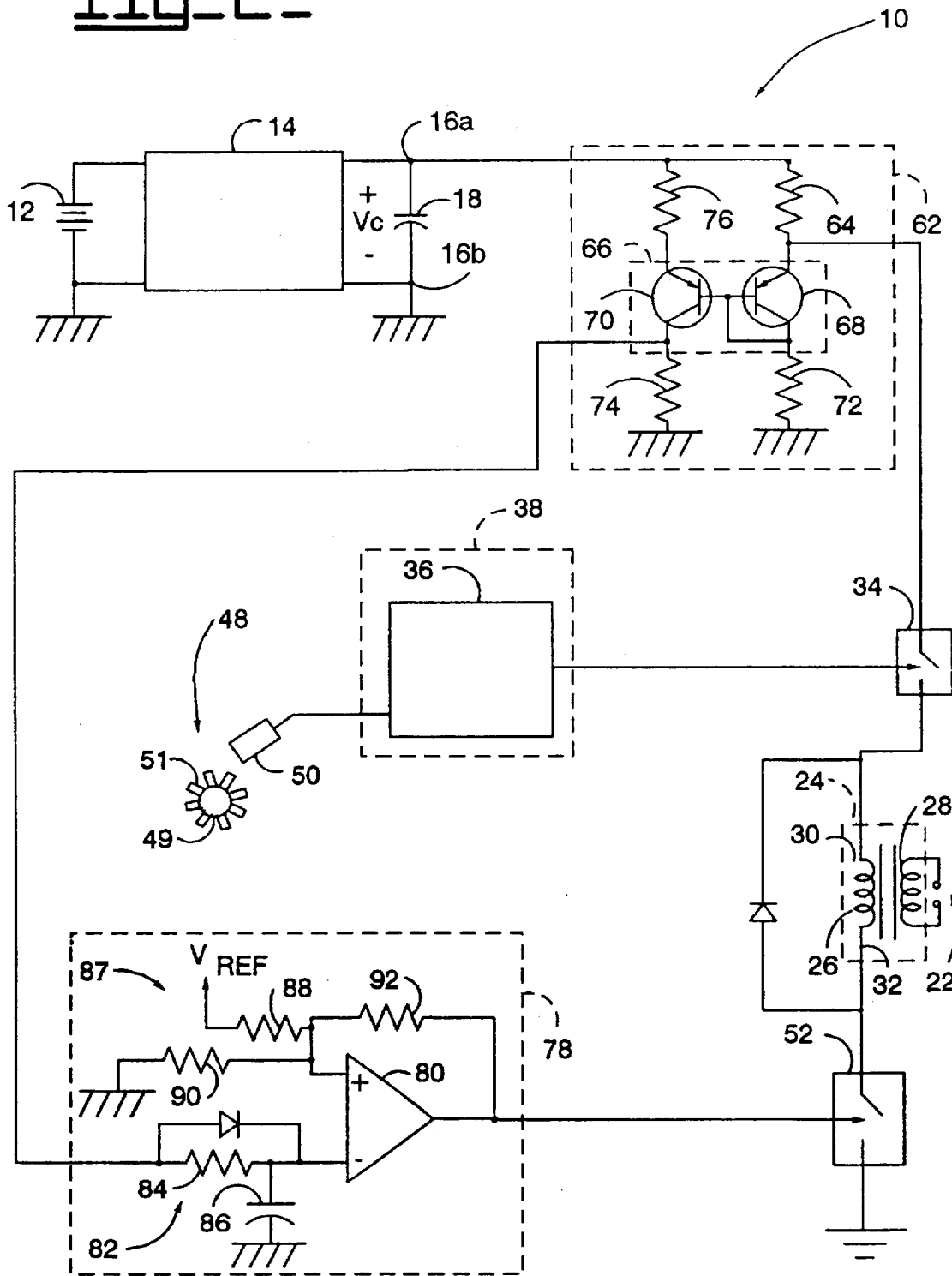




Fig. 4.

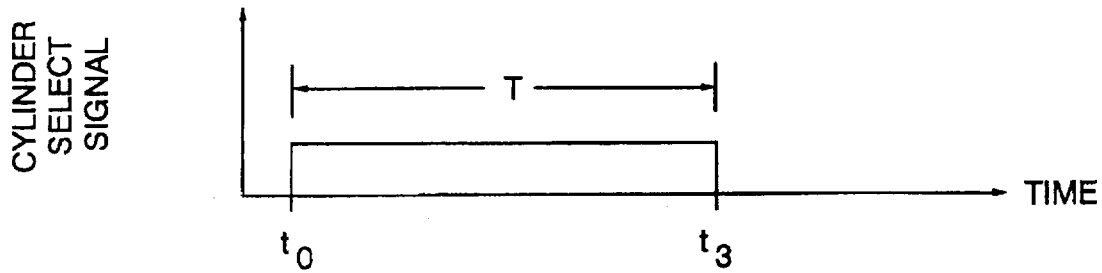


Fig. 5.

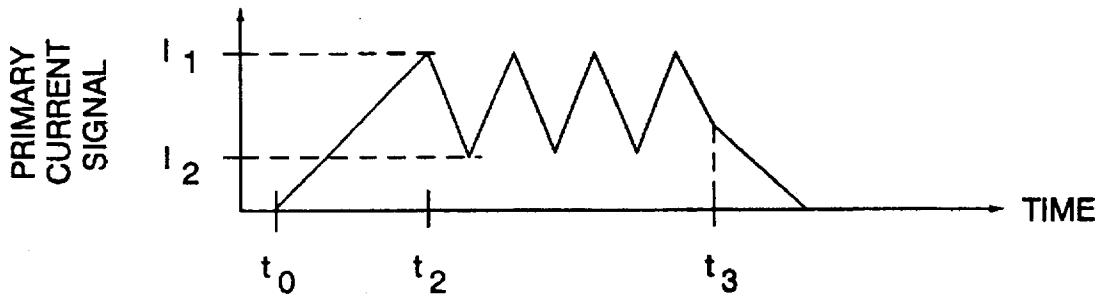
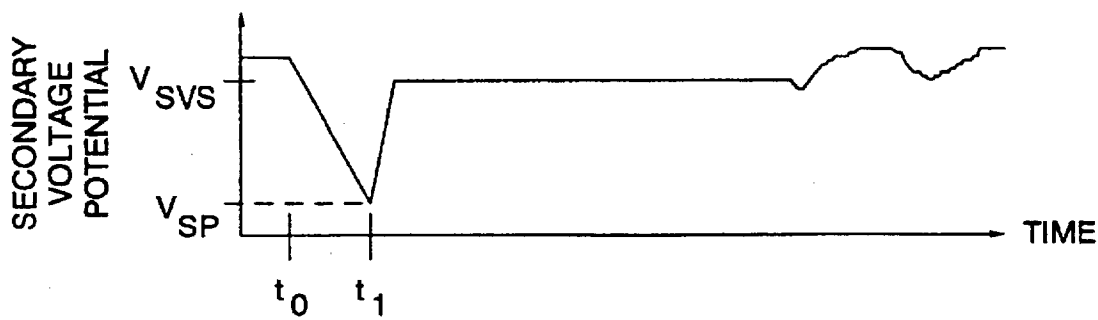


Fig. 6.



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