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(54) **HYBRID VEHICLES**

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This patent is subject to a terminal disclaimer.

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(58) **Field of Classification Search** 180/65.2, 180/65.3, 65.4, 65.8, 165; 477/2, 3; 701/54
See application file for complete search history.

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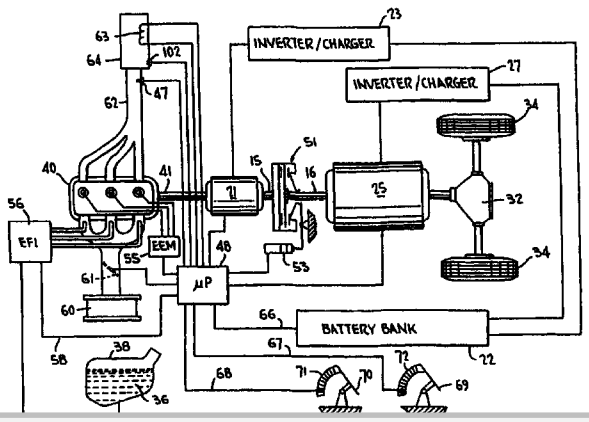
(57) **ABSTRACT**

A hybrid vehicle comprises an internal combustion engine, a traction motor, a starter motor, and a battery bank, all controlled by a microprocessor in accordance with the vehicle's instantaneous torque demands so that the engine is run only under conditions of high efficiency, typically only when the load is at least equal to 30% of the engine's maximum torque output. In some embodiments, a turbocharger may be provided, activated only when the load exceeds the engine's maximum torque output for an extended period; a two-speed transmission may further be provided, to further broaden the vehicle's load range. A hybrid brake system provides regenerative braking, with mechanical braking available in the event the battery bank is fully charged, in emergencies, or at rest; a control mechanism is provided to control the brake system to provide linear brake feel under varying circumstances.

306 Claims, 17 Drawing Sheets



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