

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FORD MOTOR COMPANY

Petitioner,

v.

PAICE LLC & ABELL FOUNDATION, INC.

Patent Owner.

U.S. Patent No. 7,104,347 to Severinsky et al.

IPR Case No.: IPR2014-00884

**DECLARATION OF DR. GREGORY W. DAVIS IN SUPPORT
OF *INTER PARTES* REVIEW UNDER 35 U.S.C. § 311 *ET SEQ.*
AND 37 C.F.R. § 42.100 *ET SEQ.* (CLAIMS 1, 7, 10, 21, 23, 24 OF
U.S. PATENT NO. 7,104,347)**

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... [1.0] A hybrid vehicle, comprising:	67

...	[1.1] an internal combustion engine controllably coupled to road wheels of said vehicle;.....	68
...	[1.2] a first electric motor connected to said engine and [sic] operable to start the engine responsive to a control signal;	72
...	[1.3] a second electric motor connected to road wheels of said vehicle, and operable as a motor, to apply torque to said wheels to propel said vehicle, and as a generator, for accepting torque from at least said wheels for generating current	74
...	[1.4] a battery, for providing current to said motors and accepting charging current from at least said second motor; and	87
...	[1.5] a controller for controlling the flow of electrical and mechanical power between said engine, first and second motors, and wheels,	90
...	[1.6] wherein said controller starts and operates said engine when torque require to be produced by said engine to propel the vehicle and/or to drive either one or both said electric motor(s) to charge said battery is at least equal to a setpoint (SP) above which said engine torque is efficiently produced, and	94
...	[1.7] wherein the torque produced by said engine when operated at said setpoint (SP) is substantially less than the maximum torque output (MTO) of said engine.....	108
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...	[7.0] The vehicle of claim 1, wherein said vehicle is operated in a plurality of operating modes responsive to the value for the road load (RL) and said setpoint SP, both expressed as percentages of the maximum torque output of the engine when normally-aspirated (MTO), and said operating modes include:.....	113

...	[7.1] a low-load mode I, wherein said vehicle is propelled by torque provided by said second electric motor in response to energy supplied from said battery, while $RL < SP$,	126
...	[7.2] a highway cruising mode IV, wherein said vehicle is propelled by torque provided by said internal combustion engine, while $SP < RL < MTO$, and	128
...	[7.3] an acceleration mode V, wherein said vehicle is propelled by torque provided by said internal combustion engine and by torque provided by either or both electric motor(s) in response to energy supplied from said battery, while $RL > MTO$	130
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...	[23.2] a battery, and	151
...	[23.3] one or more electric motors being capable of providing output torque responsive to supplied current, and of generating electrical current responsive to applied torque,	153
...	[23.4] said engine being controllably connected to wheels of said vehicle for applying propulsive torque thereto and to said at least one motor for applying torque thereto,	156

...	[23.5] determining the instantaneous torque RL required to propel said vehicle responsive to an operator command;.....	161
...	[23.6] monitoring the state of charge of said battery;.....	168
...	[23.7] employing said at least one electric motor to propel said vehicle when the torque RL required to do so is less than said lower level SP;	172
...	[23.8] employing said engine to propel said vehicle when the torque RL required to do so is between said lower level SP and MTO;.....	176
...	[23.9] employing both said at least one electric motor and said engine to propel said vehicle when the torque RL required to do so is more than MTO; and.....	180
...	[23.10] employing said engine to propel said vehicle when the torque RL required to do so is less than said lower level SP and using the torque between RL and SP to drive said at least one electric motor to charge said battery when the state of charge of said battery indicates the desirability of doing so; and.....	186
...	[23.11] wherein the torque produced by said engine when operated at said setpoint (SP) is substantially less than the maximum torque output (MTO) of said engine.....	190
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