

CLAIM INDEX – U.S. PATENT NO. 10,542,648

1. A system for a hybrid electric vehicle, comprising:
 - an energy storage system;
 - a first traction motor coupled to the energy storage system;
 - a second traction motor coupled to the energy storage system;
 - a transmission device coupled to the first traction motor, the transmission device comprising an arrangement of planetary gears;
 - a gear assembly coupled between the second traction motor and the transmission device such that the output of the second traction motor bypasses the transmission device;
 - an internal combustion engine coupled to the transmission device via a path that does not include the first traction motor and second traction motor; and
 - a control system configured to selectively:
 - operate the first traction motor and second traction motor to drive the vehicle through the transmission device and gear assembly, respectively;
 - operate the first traction motor as a generator to generate electrical power while operating the second traction motor to drive the vehicle through the gear assembly; and
 - operate the second traction motor as a generator to generate electrical power.
2. The system of claim 1, further comprising a DC/DC converter coupled to the energy storage device.
3. The system of claim 2, further comprising a second energy storage system coupled to the DC/DC converter.
4. The system of claim 1, wherein the energy storage system comprises a battery.
5. The system of claim 1, further comprising a wheel/axle assembly coupled to the gear assembly.

6. The system of claim 1, further comprising:

a first inverter coupled between the energy storage device and first traction motor; and

a second inverter coupled between the energy storage device and second traction motor.

7. The system of claim 1, wherein the electrical power generated by the first traction motor is provided to the second traction motor.

8. The system of claim 1, wherein the electrical power generated by the second traction motor is provided to the energy storage system.

9. A vehicle propulsion system, comprising:

an energy storage system;

a first traction drive system coupled to the energy storage system, the first traction drive system comprising a first inverter coupled to a first AC motor;

a second traction drive system coupled to the energy storage system, the second traction drive system comprising a second inverter coupled to a second AC motor;

a transmission device coupled to the first traction drive system, the transmission device comprising an arrangement of planetary gears;

a gear assembly coupled between the second traction drive system and the transmission device such that the output of the second traction motor bypasses the transmission device;

an internal combustion engine coupled to the transmission device via a path that does not include the first AC motor and second AC motor; and

a control system configured to selectively:

operate the first traction drive system and second traction drive system to drive the vehicle through the transmission device and gear assembly, respectively;

operate the first traction drive system to generate electric power while operating the second traction drive system to drive the vehicle through the gear assembly; and

operate the second traction drive system to generate electric power.

10. The system of claim 9, further comprising a DC/DC converter coupled to the energy storage device.

11. The system of claim 10, further comprising a second energy storage system coupled to the DC/DC converter.

12. The system of claim 9, wherein the energy storage system comprises a battery.

13. The system of claim 9, further comprising a wheel/axle assembly coupled to the gear assembly.

14. The system of claim 9, wherein the electrical power generated by the first traction drive system is provided to the second traction drive system.

15. The system of claim 9, wherein the electrical power generated by the second traction drive system is provided to the energy storage system.

16. A hybrid electric vehicle propulsion system, comprising:

an energy storage system;

a first electric motor coupled to the energy storage system;

a second electric motor coupled to the energy storage system;

a transmission device coupled to the first electric motor, the transmission device comprising an arrangement of planetary gears;

a gear assembly coupled between the second electric motor and the transmission device such that the output of the second electric motor bypasses the transmission device;

an internal combustion engine coupled to the transmission device; and

a control system configured to selectively:

operate the first electric motor and second electric motor to drive the vehicle through the transmission device and gear assembly, respectively;

operate the first electric motor as a generator to generate electrical power while operating the second electric motor to drive the vehicle through the gear assembly; and

operate the second electric motor as a generator to generate electrical power.

17. The system of claim 16, further comprising a DC/DC converter coupled to the energy storage device.

18. The system of claim 16, further comprising a wheel/axle assembly coupled to the gear assembly.

19. The system of claim 16, wherein the electrical power generated by the first electric motor is provided to the second electric motor.

20. The system of claim 16, wherein the electrical power generated by the second electric motor is provided to the energy storage system.