WHAT IS CLAIMED IS:

1. An apparatus, comprising:

an alternator that is drivable by an engine for producing a first AC electric current;

a rectifier in electrical communication with the alternator for producing a DC electric current;

an inverter in electrical communication with the rectifier for producing a second AC electric current; the second AC electric current having an acceptable frequency and/or voltage, and the inverter in electrical communication with one or more electric loads responsive to the second AC electric current; and

an energy storage device that is able to electrically couple to the alternator, rectifier, and/or inverter.

2. The apparatus of claim 1, wherein the alternator is one of a plurality of alternators and the rectifier is one of a plurality of rectifiers, and each alternator of the plurality of alternators has a corresponding one of the plurality of rectifiers in electrical communication therewith, and each alternator is operable to supply a constant voltage to the corresponding rectifier in response to a variable speed input of an engine coupled thereto.

3. The apparatus of claim 2, wherein each of the plurality of alternators is separately controllable such that differing power inputs to each of the alternators results in the same voltage output.

4. The apparatus of claim 1, wherein the energy storage device is electrically coupled to the rectifier, and the energy storage device comprises a DC-DC converter and a battery.

5. The apparatus of claim 1, wherein the energy storage device is electrically coupled to the alternator.

6. The apparatus of claim 1, wherein the energy storage device is electrically coupled to the inverter.

7. The apparatus of claim 1, further comprising a controller that is operable to control an engine speed and/or power output of the engine, a switch operable to couple the energy storage device to a load, and/or the alternator operable to produce a voltage and/or the current that is independent of the engine speed and/or power output.

8. The apparatus of claim 7, wherein the alternator is one of a plurality of alternators, and wherein the apparatus further comprises a plurality of variable speed engines, each of which is coupled to a corresponding one of the alternators.

9. The apparatus of claim 8, further comprising a constant-speed engine for supplying rotational forces to a generator system, and the generator system is operable to produce AC electrical energy.

10. The apparatus of claim 9, further comprising a DC bus and a first switch, the DC bus carrying the DC electric current from the rectifier or a DC current from another source, and the first switch interposed between the DC bus and first electrical loads, the first switch having a first state for energizing the first electrical loads from the DC bus and a second state for energizing the first electrical loads from the generator system.

11. The apparatus of claim 10, further comprising an additional energy storage device, and the additional energy storage device is coupled to the generator system such that the first switch is interposed between the additional energy storage device and the first loads.

12. The apparatus of claim 8, wherein the controller responds to a command for low motive power by stopping or reducing the engine speed of only one of the variable speed engines of the plurality.

13. The apparatus of claim 8, wherein one of the variable speed engines provides a non-zero, but different, amount of power, via a corresponding alternator, to a propulsion motor relative to another of the variable speed engines.

14. The apparatus of claim 8, wherein the controller controls the energy storage device to charge from only one of the alternators during use.

15. The apparatus of claim 1, wherein the one or more electric loads comprise propeller motors, thrust motors, and hotel loads; and the energy storage device is chargeable from an off-board source.

16. A system comprising the apparatus of claim 1, and further comprising a controller, wherein the apparatus provides propulsion force and is responsive to the controller and operable to generate electricity for onboard loads of a marine vessel or an off-highway vehicle.

17. The system of claim 16, further comprising a constant-speed engine for supplying electrical energy to hotel loads.

18. The system of claim 16, wherein the controller is operable to differentially control a speed of a plurality of engines in response to a signal that corresponds to one or more of vehicle speed, emission levels, fuel consumption, or equipment life.

19. An apparatus, comprising:

a plurality of alternators each driven by a respective variable speed engine for producing a respective first AC electric signal;

a plurality of rectifiers each in electrical communication with a respective one of the alternators for producing a respective DC electric signal;

a DC bus connected to an output of at least one of the rectifiers;

an inverter in electrical communication with the DC bus for producing a second AC electric signal;

a first electric load in electrical communication with the inverter and responsive to the second AC electric signal; and

an energy storage system coupled to the DC bus for controllably receiving electrical power from the DC bus and providing electrical power to the DC bus.

20. The apparatus of claim 19, further comprising:

a constant speed engine;

a generator system coupled to an output of the constant speed engine for producing a third AC electric signal; and

at least one switch electrically connected to the inverter and to the generator system for selectively providing the second and third AC electric signals, respectively, to a second electric load.

21. An apparatus, comprising:

an alternator driven by a variable speed engine for producing a first AC electric signal;

a rectifier in electrical communication with the alternator for producing a DC electric signal;

a DC bus connected to an output of the rectifier;

an inverter in electrical communication with the DC bus for producing a second AC electric signal;

a first electric load in electrical communication with the inverter and responsive to the second AC electric signal;

an energy storage system coupled to the DC bus for controllably receiving electrical power from the DC bus and providing electrical power to the DC bus;

a generator system coupled to an output of a constant speed engine for producing a third AC electric signal; and

at least one switch electrically connected to the inverter and to the generator system for selectively providing the second and third AC electric signals, respectively, to a second electric load.

Claims

1. An apparatus, comprising:

plural alternators that are drivable by plural engines for producing AC electric currents;

a rectifier in electrical communication with at least one of the alternators for producing a DC electric current;

an inverter in electrical communication with the rectifier for producing a second AC electric current; the second AC electric current having at least one of a designated an acceptable frequency or a designated voltage, and the inverter in electrical communication with one or more electric loads responsive to the second AC electric current;

an energy storage device that is able to electrically couple to at least one of the alternators, the rectifier, or the inverter;

wherein one of the alternators comprises a generator system drivable by a constant-speed engine to produce one of the AC electric currents, the constant-speed engine being one of the plural engines; and

the alternators being operable to produce at least one of voltages or the currents that are independent of one or more of the engine speeds or the power outputs.

2. The apparatus of claim 1, wherein the rectifier is one of a plurality of rectifiers, and each alternator has a corresponding one of the plurality of rectifiers in electrical communication therewith, and each alternator is operable to supply a constant voltage to the corresponding rectifier in response to a variable speed input of the engine coupled thereto, the alternators being operable to supply the constant voltage by at least one of modifying a field current of the engines coupled with the alternators or modifying one or more of a current or voltage supplied to exciters of the alternators.

3. The apparatus of claim 2, wherein each of the alternators is separately controllable such that differing power inputs to each of the alternators results in the same voltage output.

4. The apparatus of claim 1, wherein the energy storage device is electrically coupled to the rectifier, and the energy storage device comprises a DC-DC converter and a battery.

5. The apparatus of claim 1, wherein the energy storage device is electrically coupled to at least one of the alternators.

6. The apparatus of claim 1, wherein the energy storage device is electrically coupled to the inverter.

7. The apparatus of claim 1, further comprising a DC bus and a switch, the DC bus carrying the DC electric current from the rectifier or a DC current from another source, and the switch interposed between the DC bus and electrical loads, the switch having a state for energizing the electrical loads from the DC bus and a second state for energizing the electrical loads from the generator system.

8. The apparatus of claim 7, further comprising an additional energy storage device, and the additional energy storage device is coupled to the generator system such that the switch is interposed between the additional energy storage device and the loads.

9. The apparatus of claim 1, wherein the controller responds to a command for low motive power by stopping or reducing the engine speed of only one variable speed engine of the engines.

10. The apparatus of claim 1, wherein one of the engines is a variable speed engine that provides a non-zero, but different, amount of power, via a corresponding one of the alternators, to a propulsion motor relative to another of the engines that is a variable speed engine.

11. The apparatus of claim 1, wherein the controller controls the energy storage device to charge from only one of the alternators during use.

12. The apparatus of claim 1, wherein the one or more electric loads comprise propeller motors, thrust motors, and other non-motor loads; and the energy storage device is chargeable from an off-board source.

13. A system comprising the apparatus of claim 1, wherein the apparatus provides propulsion force and is responsive to the controller and operable to generate electricity for onboard loads of a marine vessel or an off-highway vehicle that travels on routes other than public streets or highways.

14. The system of claim 13, further comprising a constant-speed engine for supplying electrical energy to non-motor loads.

15. The system of claim 13, wherein the controller is operable to differentially control a speed of the engines in response to a signal that corresponds to one or more of vehicle speed, emission levels, consumption, or equipment life.

16. The apparatus of claim 1, further comprising one or more of:
a controller that is operable to control at least one of engine speeds of the engines or power outputs of the engines, or
a switch operable to couple the energy storage device to a load.

17. An apparatus, comprising:
a plurality of alternators each driven by a respective variable speed engine for producing a respective first AC electric signal;
a plurality of rectifiers each in electrical communication with a respective one of the alternators for producing a respective DC electric signal;
a DC bus connected to an output of at least one of the rectifiers;

an inverter in electrical communication with the DC bus for producing a second AC electric signal;

a electric load in electrical communication with the inverter and responsive to the second AC electric signal;

an energy storage system coupled to the DC bus for controllably receiving electrical power from the DC bus and providing electrical power to the DC bus

a constant speed engine;

a generator system coupled to an output of the constant speed engine for producing a third AC electric signal; and

at least one switch electrically connected to the inverter and to the generator system for selectively providing the second and third AC electric signals, respectively, to a second electric load.

18. An apparatus, comprising:

an alternator driven by a variable speed engine for producing a AC electric signal;

a rectifier in electrical communication with the alternator for producing a DC electric signal;

a DC bus connected to an output of the rectifier;

an inverter in electrical communication with the DC bus for producing a second AC electric signal;

a electric load in electrical communication with the inverter and responsive to the second AC electric signal;

an energy storage system coupled to the DC bus for controllably receiving electrical power from the DC bus and providing electrical power to the DC bus;

a generator system coupled to an output of a constant speed engine for producing a third AC electric signal; and

at least one switch electrically connected to the inverter and to the generator system for selectively providing the second and third AC electric signals, respectively, to a second electric load.