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(54) **GEAR DRIVEN ENERGY TRANSFER SYSTEM**

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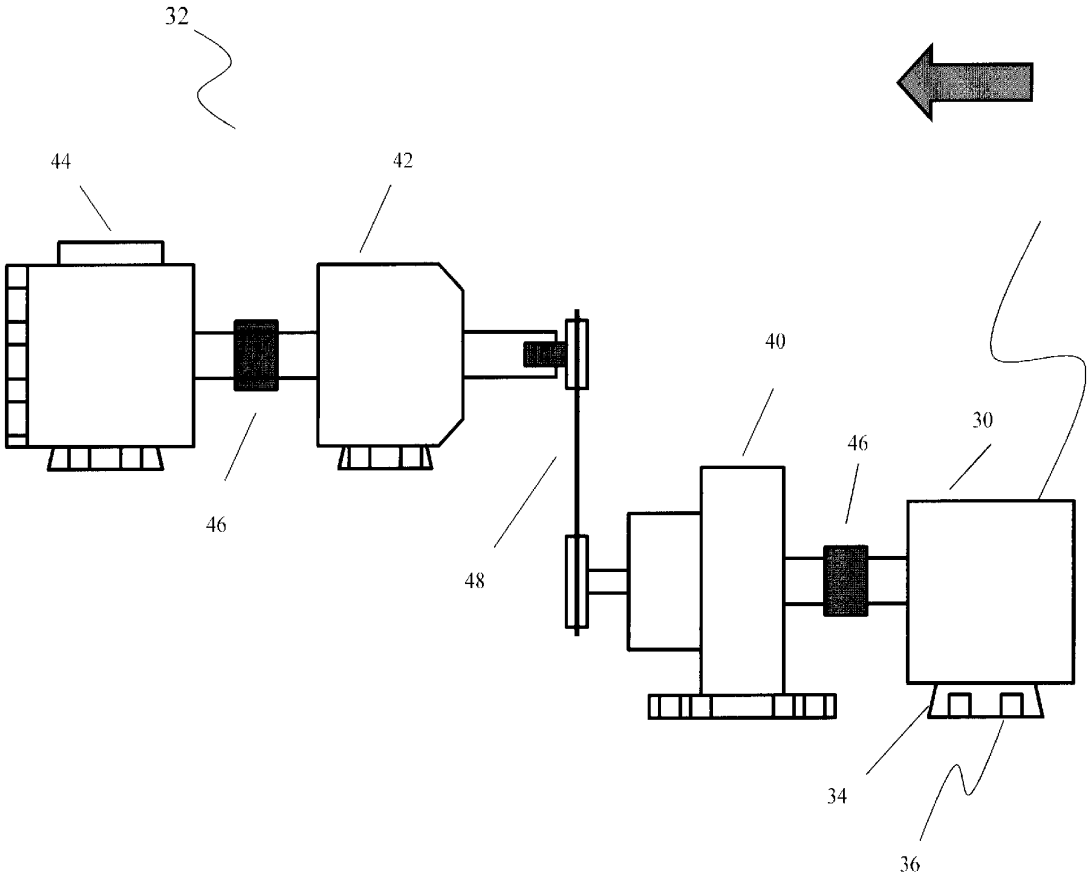
(57) **ABSTRACT**

A gear driven energy transfer system having a pair of power conversion systems, wherein each system includes an electric drive motor, a gear box, a transmission and a generator to allow for the powering of a plurality of devices connected to the system.



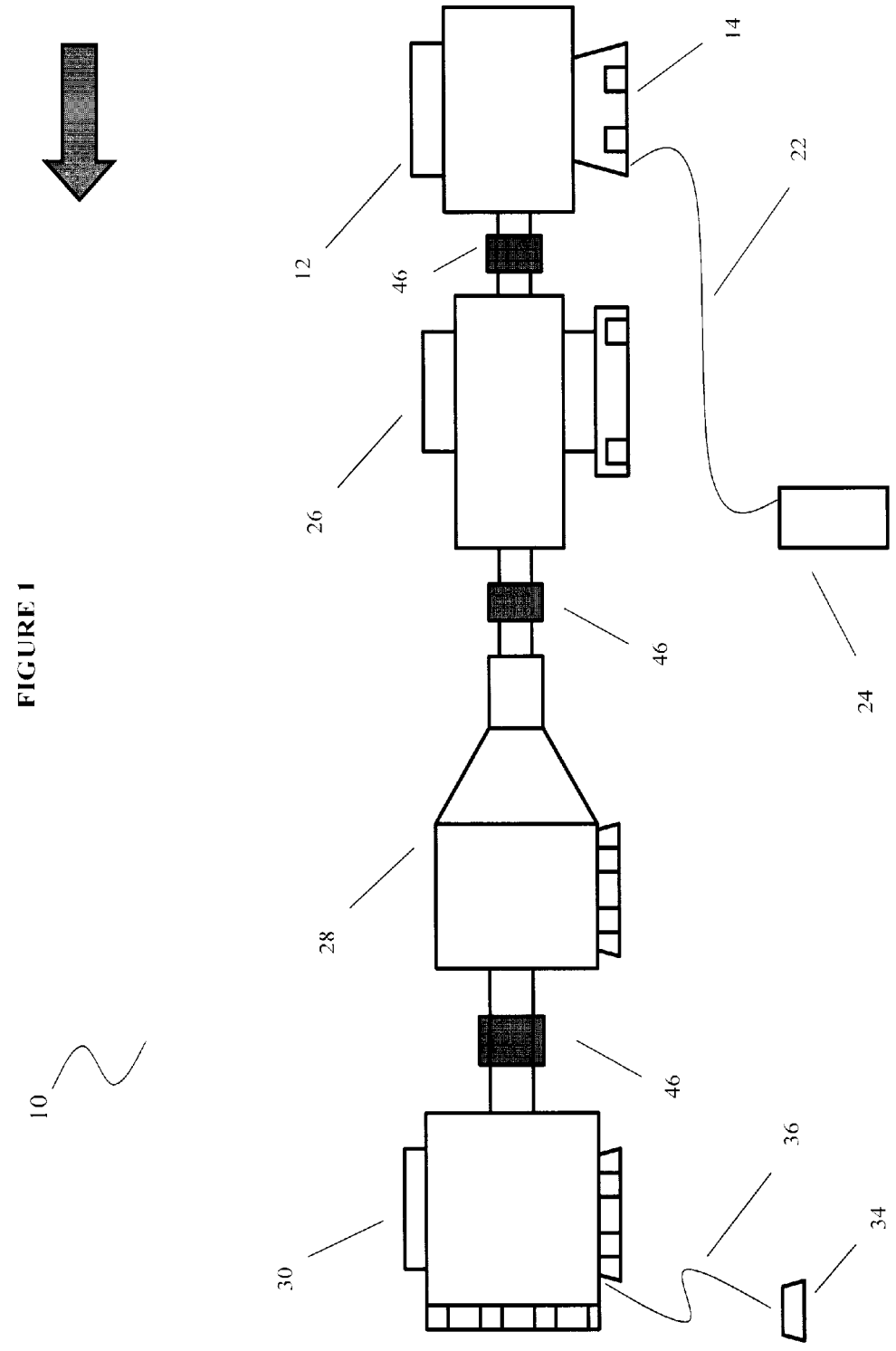


FIGURE 1

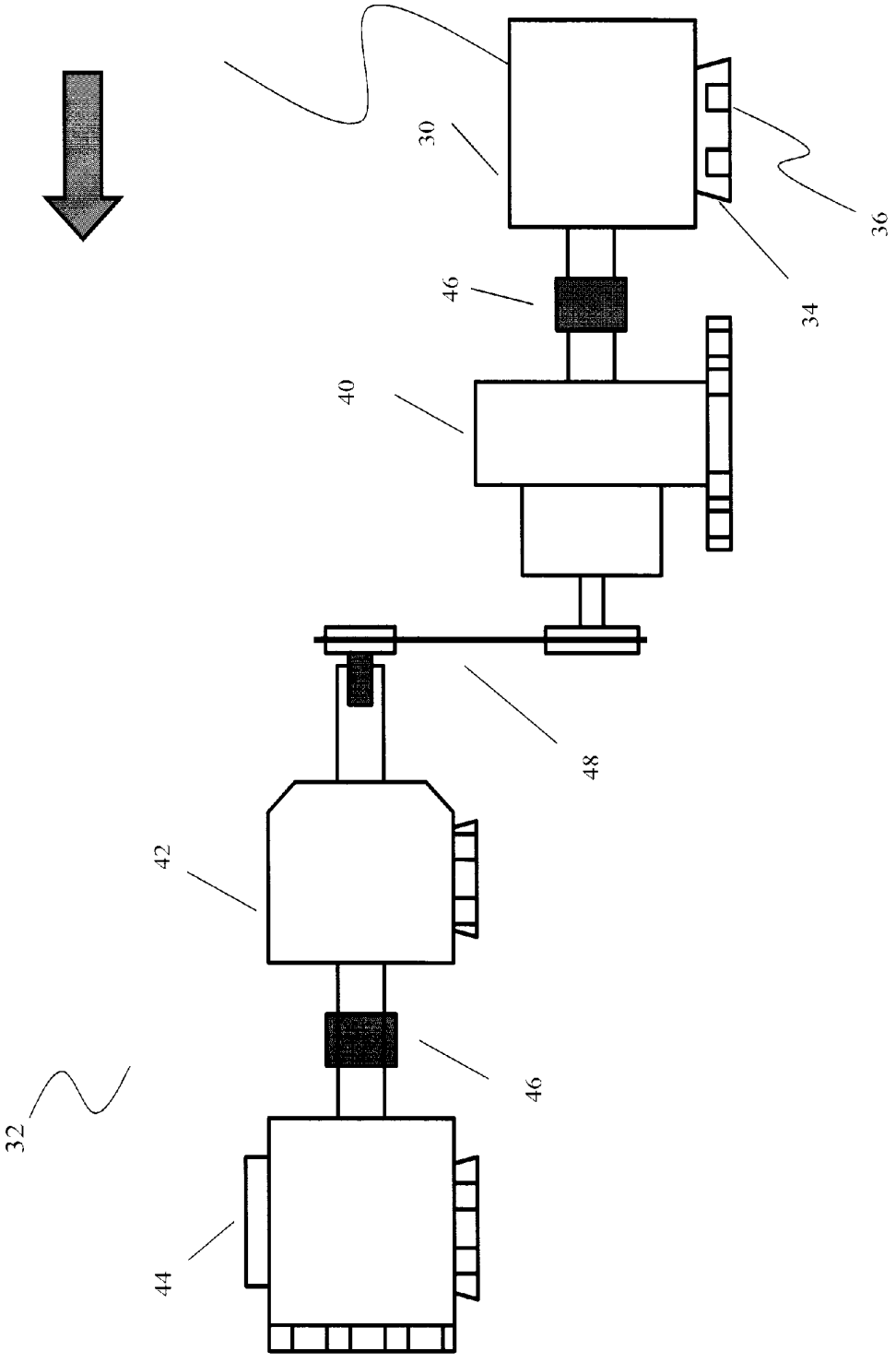


FIGURE 2

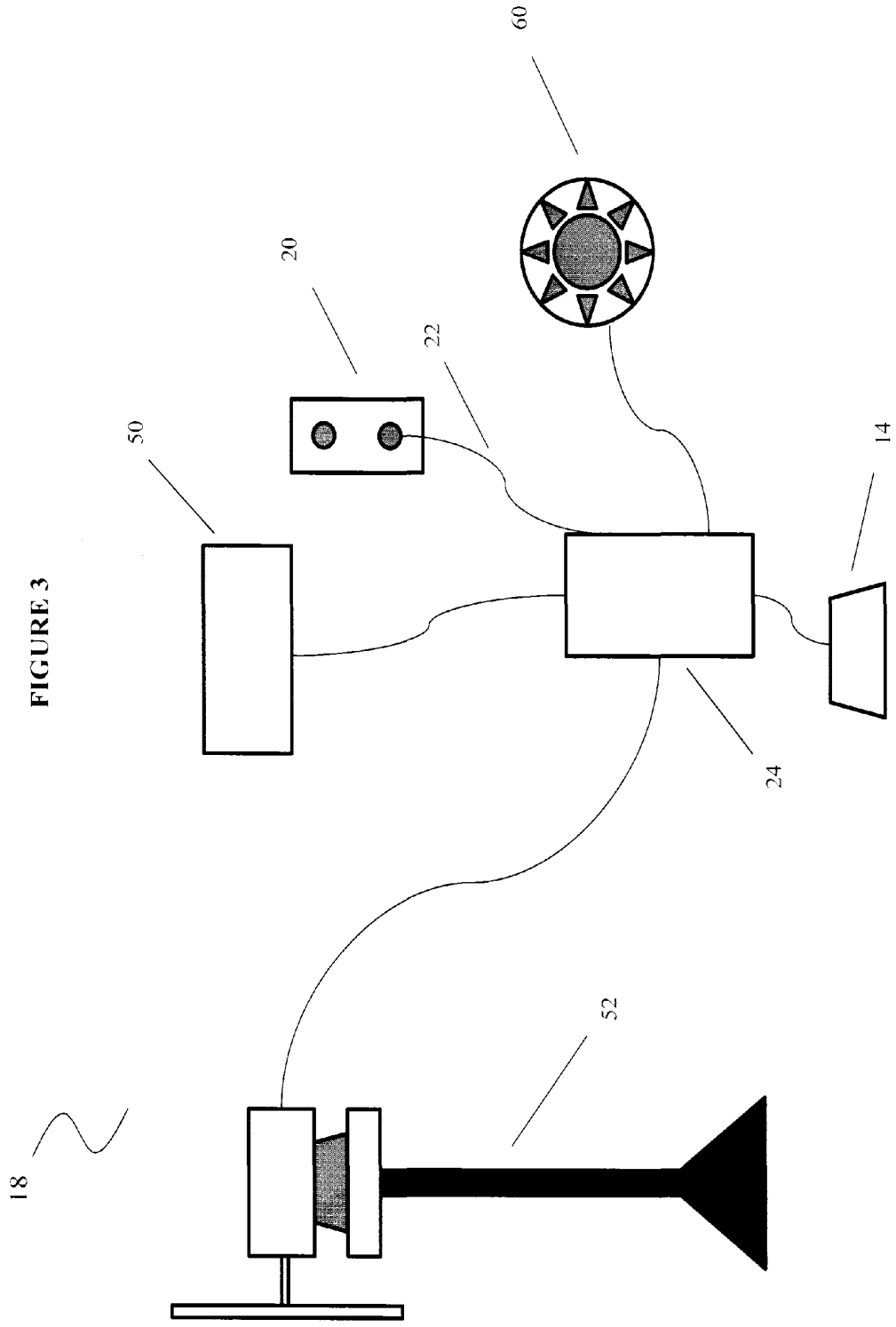


FIGURE 3

GEAR DRIVEN ENERGY TRANSFER SYSTEM

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to the transfer of energy, and more particularly to a gear driven energy transfer system that employs a pair of power conversion systems for the transfer of energy through the variation of gear ratios in each system.

[0003] 2. Description of the Prior Art

[0004] Energy is the ability to do work or to organize or change matter. Furthermore, energy can be transferred from one location to another, for example, as in the sun's energy travels through space to Earth. The two ways that energy can be transferred are through doing work and by heat transfer.

[0005] Energy is subject to a strict global conservation law; that is, whenever one measures (or calculates) the total energy of a system of particles whose interactions do not depend explicitly on time, it is found that the total energy of the system always remains constant.

[0006] A familiar example is mechanical work. In simple cases this is written as the following equation:

$$\Delta E=W \tag{1}$$

[0007] If there are no other energy-transfer processes involved. Here E is the amount of energy transferred, and W represents the work done on the system. More generally, the energy transfer can be split into two categories:

$$\Delta E=W+Q \tag{2}$$

Where Q represents the heat flow into the system.

[0008] The transfer of energy can take various forms; familiar examples include work, heat flow, and advection, as discussed below. Since energy is strictly conserved and is also locally conserved (wherever it can be defined), it is important to remember that by the definition of energy the transfer of energy between the "system" and adjacent regions is work.

SUMMARY OF THE INVENTION

[0009] It is therefore a primary objective of the invention to provide a gear driven energy transfer system, wherein the system allows for the powering of a plurality of devices connected to the energy transfer system through a variation of gear ratios within the system.

[0010] To this end, the present invention provides a gear driven energy transfer system including a pair of power conversion systems, wherein each power conversion system possesses an electric drive motor coupled to a gear box, a transmission which is coupled to the gear box and a generator, whereby the generator of the first power conversion system allows for the operation of the electric drive motor in the second power conversion system by the transfer of energy generated from the first power conversion system, thus enabling a plurality of devices connected to the instant invention to operate.

[0011] These and other objects of the present invention will no doubt became obvious to those of ordinary skill in the art after reading the following detailed description of the preferred embodiment, which is illustrated in the various figures and drawings.

[0012] There has thus been outlined, rather broadly, the more important features of the gear driven energy transfer system in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are additional features of the invention that will be described hereinafter and which will form the subject matter of the claims appended hereto.

[0013] In this respect, before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting.

[0014] These together with other objects of the invention, along with the various features of novelty, which characterize the invention, are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and the specific objects attained by its uses, reference should be made to the accompanying drawings and descriptive matter in which there are illustrated preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] FIG. **1** is a block diagram of the instant invention illustrating a first power conversion system;

[0016] FIG. **2** is a block diagram of the instant invention illustrating a second power conversion system, wherein the second system is disposed to work in conjunction with the first system;

[0017] FIG. **3** is a diagrammatic perspective view of a plurality of energy sources disposed to operate the first power conversion system via an electric drive motor.

DETAILED DESCRIPTION OF THE SEVERAL EMBODIMENTS

[0018] In the following detailed description of the several embodiments, a Gear Driven Energy Transfer System **10** is employed for the transfer of energy through a pair of power conversion systems utilizing a variety of gear trains comprising ratios designed to initially increase and subsequently decrease torque to allow for the powering of a plurality of devices connected to the system **10**.

[0019] FIG. **1** illustrates the Energy Transfer System **10**, wherein the system **10** includes a first power conversion system **12** having an electric drive motor **14** that is disposed to receive power from a plurality of energy sources **18** (see FIG. **3**) to allow for the operation of the first conversion system **12**. In one preferred embodiment, the electric drive motor **14** of the first conversion system **12** is a two-horsepower, one-phase two hundred forty volt electric drive motor that is capable of producing eight amps of electricity.

[0020] In one preferred embodiment, the electric drive motor **14** of the first power conversion system **12** operates with an input of one thousand eight hundred revolutions per minute based on the power supply from the plurality of energy sources **18** described below. In alternate embodiments, the input of the electric drive motor **14** may vary depending on the specific operational needs and uses of the instant invention. The first conversion system **12** further comprises a gear box **26**, wherein the gear box **26** is in commu-

nication with the electric drive motor **14** via a mechanical coupling **46**. In one embodiment the mechanical coupling **46** is a lovejoy coupling, however other functionally equivalent couplings may be utilized as contemplated by those known in the art. In this embodiment, there is a twenty-six to one gear ratio between the shaft input from the electric drive motor **14** and the shaft output from the gear box **26**, wherein the change in the gear ratio leads to an increase in torque as there is a step down in the revolutions per minute from approximately one thousand eight hundred rpm's in the electric drive motor **14** to approximately sixty to one hundred rpm's in the gear box **26**. Moreover, with the reduction in the speed of the shaft output between the electric drive motor **14** and the gear box **26**, there is preferably an increase in torque from approximately ninety foot/pounds seen in the electric drive motor **14** to approximately two hundred seventy foot/pounds seen in the gear box **26**.

[0021] The first power conversion system **12** of the instant invention further comprises a transmission **28**, wherein the transmission is in communication with the gear box **26** via the mechanical coupling **46**. The transmission **28** is disposed to increase the speed of the shaft **16** by a twelve to one gear ratio between the gear box **26** and the transmission **28**, wherein there is a step up in the revolutions per minute from between sixty to one hundred rpm's in the gear box **26** to approximately one thousand two hundred rpm's in the transmission **28**. The increase in revolutions per minute from the gear box **26** to the transmission **28**, allows for the transmission **28** to power up a first generator **30**, wherein the first generator **30** is in communication with the transmission **28** via the mechanical coupling **46**. Furthermore, in one embodiment, the gear box **26** and the transmission **28** are disposed to absorb the friction created by the generator **30** during initial start-up of the system **10** to prevent fuses or breakers from blowing or tripping respectively, within the system **10**.

[0022] FIG. **2** illustrates a second power conversion system **32**, wherein the second conversion system **32** works in conjunction with the first conversion system **12** to transfer energy to a plurality of devices connected to the instant invention **10**. In one preferred embodiment, the second power conversion system **32** further comprises a second electric driver motor **34**, wherein the first generator **30** is in electrical communication with the second electric drive motor **34**. In one embodiment, the second electric drive motor **34** is a ten horsepower, three phase four hundred eighty volt drive motor that is capable of producing twenty amps of electricity. In alternate embodiments, the second electric drive motor **34** is a thirty-six volt, one phase direct current ("DC") motor; in another alternate embodiment, the second electric drive motor **34** is a seventy-two volt, one phase DC motor. The first generator **34** further comprises a solid state starter **36**, wherein the solid state starter is disposed to reduce current from the motor upon starting; in the preferred embodiment, the solid state starter **36** is employed when the second electric drive motor **34** possesses above seven-and-a-half horsepower.

[0023] In one preferred embodiment, the second electric drive motor **34** of the second power conversion system **32** operates with an input of one thousand two hundred revolutions per minute based on the power supply from the first generator **30** as described above. It should be readily apparent to those skilled in the art that the actual rpm's and energy production numbers stated hereinabove represent the preferred embodiment of the instant invention, and substitutions with respect to the energy sources and/or electric drive motors will be consistent with those elements known in the art and according to the operational parameters of the instant invention. Furthermore, in alternate embodiments, the input of the second electric drive motor **34** may vary depending on the specific operational needs and uses of the instant invention. The second generator system further comprises a second gear box **40**, wherein the second gear box **40** is in communication with the second electric drive motor **34** via the mechanical coupling **46**. In this embodiment, there is a four to one gear ratio between the shaft input of the second electric drive motor **34** and the shaft output of the second gear box **40**, wherein the change in the gear ratio leads to an increase in torque as there is a step down in the revolutions per minute from approximately one thousand two hundred rpm's in the second electric drive motor **34** to approximately three hundred rpm's in the second gear box **40**. Moreover, with the reduction in speed between the second electric drive motor **34** and the second gear box **40**, there is preferably an increase in torque from approximately ninety foot/pounds seen in the second electric drive motor **34** to approximately two hundred seventy foot/pounds of torque in the second gear box **40**.

[0024] The second power conversion system **32** of the instant invention further comprises a second transmission **42**, wherein the second transmission **42** is in communication with the second gear box **40** via a connecting belt **48**. The second transmission **42** is disposed to increase the speed of the connecting belt by a four to one gear ratio between the input of the second gear box **40** and the output of the second transmission **42**, wherein there is a step up in the revolutions per minute from three hundred rpm's from the second gear box **40** to approximately one thousand two hundred rpm's in the second transmission **42**. The increase in revolutions per minute from the second gear box **40** to the second transmission **42**, allows for the second transmission **42** to power up a second generator **44**, for use in a building or residential home, wherein the second generator **44** is in communication with the second transmission **42** via the mechanical coupling **46**.

[0025] FIG. **3** illustrates the plurality of energy sources **18** disposed to operate the electric drive motor **14** of the first conversion system **12**. In one embodiment of the instant invention, the plurality of energy sources **18** is disposed to be electrical communication with a control panel **24**, wherein the control panel is in electrical communication with the electric drive motor **14** of the first power conversion system **12**. In one embodiment of the instant invention, the electric drive motor **14** receives the necessary input of energy from a city power supply **20** by connecting a power cord **22** as known in the art between the city power supply **20** and the control panel **24**.

[0026] In alternate embodiments, the city power supply may comprise a one hundred twenty volt/two hundred forty volt outlet, whereby in order to power up the electric drive motor **14** at six amps, requires two hundred forty volts, as compared to power up the electric drive motor **14** at twelve amps, requires one hundred twenty volts. In another alternate embodiment, the instant invention **10** may employ the use of solar power via a plurality of solar panels **50** to power the electric drive motor **14**. In yet another alternate embodiment, the instant invention **10** may employ the use of wind power via a plurality of wind turbines **52** to power the electric drive motor **14**, wherein the wind turbines may be located on the roof of a building, or other feasible locations as contemplated by those known in the art.

[0027] In yet another alternate embodiment, the instant invention may employ the use of battery power **54** as a system back-up in the event that insufficient power is provided by either wind or solar alone, or in combination. In one preferred embodiment, the instant invention will utilize either wind or solar power as a primary power source for powering the electric motor **14** of the first conversion system **12**. The use of battery power **54** by the instant invention functions primarily

as a back-up power source, and depending on the type and number of batteries employed, may supply power for up to seventy-two hours to the electric drive motor **14**. Furthermore, in one preferred embodiment, the control panel **24** as known in the art is provided to regulate the type and amount of each power source that will be utilized to power the electric drive motor at a specific time and day. For example, through a series of relays and sensors, as known in the art of backup power generators the control panel **24** is configured to activate either the city power supply or battery power upon a reading of inadequate power, or a power surge for the electric drive motor **14** by the control panel **24**.

[0028] Now that the invention has been set forth, an explanation of the use of the instant invention will be put forth, along with further discussion of the advantages of the instant invention.

Examples

[0029] One embodiment of the instant invention features a three horsepower electric drive motor possessing an input of one thousand seven hundred fifty revolutions per minute; the gear ratio from the input of the electric drive motor to the output of the gear box is twenty nine to one, thereby generating an output of sixty revolutions per minute in the gear box. The initial torque see in the electric drive motor is approximately fifteen foot/pounds, and considering the gear ratio provides an increase in torque seen in the gear box of four hundred thirty five foot/pounds; a subsequent increase in the shaft output been the gear box and transmission of sixty-and-a-half to one provides a decreased torque of sixty five foot/pounds in the transmission. As a result of the speed increase and reduction in torque, this provides enough power to run a ten thousand watt generator at nine hundred revolutions per minute.

[0030] Some alternate embodiments and various examples of the present invention comprise the following parameters:

1) The driver gear possesses a speed of sixty-eight revolutions per minute (rpm's); a gear ratio between the driver gear and second drive gear of 1.6=108.8 RPM Second Gear Speed.

Gear Teeth=Drive Gear 72 Teeth÷45 Teeth=1.6 Gear Ratio

45 Teeth×1.6 GR.=72 Teeth of Drive Gear.

72 Teeth÷into 1.6 Ratio S.G.D.=45 Teeth.

2) 108.8 RPM÷2.3 G Ratio=47 RPM D.G

[0031]

45 Teeth×2.3R=103.5 Teeth D.E

or

45 Teeth Second Drive×2.4R=108 Teeth D.G

or

45 Teeth Second Drive×2.5R=112.5 Teeth D.G.

3a) Twenty kilowatt generator possessing a speed of one thousand two hundred revolutions per minute having a torque of one hundred twenty five foot/pounds requires a forty-two horsepower engine.

3b) Twenty kilowatt generator possessing a speed of three hundred revolutions per minute having a torque of one hundred twenty five foot/pounds requires a seven-and-a-half horsepower engine, when the system utilizes a six to one gear ratio reduction.

4) Twenty kilowatt generator possessing a speed of one thousand two hundred revolutions per minute possessing a voltage of four thousand one hundred sixty at five amps produces twenty thousand eight hundred watts. Therefore, he higher the voltage the lower the amps required and the less these power it takes to run the generator.

5) Twenty kilowatt generator at twenty thousand volts possessing a speed of one thousand two hundred revolutions per minute with one amp creates twenty thousand watts of power. If you place the twenty thousand watts in a transformer and step down the voltage to four hundred eighty, you will obtain twenty-five amps of electricity in the second generator.

6) Fifty kilowatt generator at twenty thousand volts possessing a speed of either three hundred or six hundred revolutions per minute with two and a half amps would produce fifty thousand watts of power and require a one horsepower electric drive motor if there is a gear reduction reducing the speed to six hundred revolutions per minute.

[0032] In summary, the invention describes a gear driven energy transfer system. The invention is characterized by a pair of generator systems, wherein each generator system includes an electric drive motor, a gear box, a transmission and a generator. Each generator system utilizes a variation in gear ratios to reduce the speed of the shaft while simultaneously increasing the torque in each system, thereby allowing for the transfer of energy from the first generator system to the electric drive motor in the second generator system for use in powering a plurality of devices connected to the energy transfer system.

[0033] The instant invention is not intended to be restricted to the details of the above described embodiments. It is understood that the embodiments described herein are merely illustrative of the instant invention. Variations in the applications and implementation of the gear driven energy transfer system may be contemplated by one of ordinary skill in the art without limiting the intended scope of the instant invention disclosed herein and as defined by the following claims.

What is claimed is:

1. An energy transfer system comprising:

a first power conversion system, wherein the first conversion system further comprises:

an electric drive motor;

a gear box, wherein the gear box is in communication with the electric drive motor;

a transmission, wherein the transmission is in communication with the gear box;

a first generator, wherein the first generator is in communication with the transmission;

a second power conversion system, wherein the second conversion system is disposed to be in electric communication with the first power conversion system and further comprises:

a second electric drive motor;

a second gear box, wherein the second gear box is in communication with the second electric drive motor;

a second transmission, wherein the second transmission is coupled to the second gear box;

a second generator, wherein the second generator is coupled to the second transmission; and

a plurality of energy sources, wherein the plurality of power sources is disposed to operate the electric drive motor of the first power conversion system.

2. The energy transfer system of claim **1**, wherein the electric drive motor is a two-horsepower, one-phase two hundred forty volt capable of producing eight amps of electricity.

3. The energy transfer system of claim **1**, wherein the electric drive operates with an input of one thousand eight hundred revolutions per minute from the plurality of energy sources.

4. The energy transfer system of claim **1**, wherein the mechanical coupling is a lovejoy coupling.

5. The energy transfer system of claim **1**, wherein there is a twenty-six to one gear ratio between the shaft input from the electric drive motor and the shaft output from the gear box.

6. The energy transfer system of claim **5**, wherein the gear ratio between the shaft input of the electric drive motor and the shaft output of the gear box results in an increase in torque.

7. The energy transfer system of claim **1**, wherein there is a step down in the revolutions per minute from one thousand eight in the electric drive motor to a range of sixty to one hundred in the gear box.

8. The energy transfer system of claim **1**, wherein there is an increase in torque from ninety foot/pounds in the electric drive motor to two hundred seventy foot/pounds in the gear box.

9. The energy transfer system of claim **1**, wherein there is a twelve to one gear ratio between the shaft input of the gear box and the shaft output of the transmission.

10. The energy transfer system of claim **9**, wherein there is a step up in the revolutions per minute from one hundred in the gear box to one thousand two hundred in the transmission.

11. The energy transfer system of claim **1**, wherein the plurality of energy sources are selected from the group consisting of wind power, solar power, water power, battery power and city power.

12. The energy transfer system of claim **1**, wherein the second electric drive motor is a ten-horsepower, three-phase four hundred eighty volt capable of producing twenty amps of electricity.

13. The energy transfer system of claim **1**, wherein the first generator further comprises a solid state starter disposed to reduce current from the electric drive motor upon operation.

14. The energy transfer system of claim **1**, wherein the second electric drive motor operates with an input of one thousand two hundred revolutions per minute from the output of the first generator.

15. The energy transfer system of claim **1**, wherein there is a four to one gear ratio between the shaft input from the second electric drive motor and the shaft output from the second gear box.

16. The energy transfer system of claim **15**, wherein the gear ratio between the shaft input of the electric drive motor and the shaft output of the gear box results in an increase in torque.

17. The energy transfer system of claim **1**, wherein there is a step down in the revolutions per minute from one thousand two in the second electric drive motor to a range of three hundred in the second gear box.

18. The energy transfer system of claim **1**, wherein there is a step up in the revolutions per minute from three hundred in the second gear box to one thousand two hundred in the second transmission.

19. The energy transfer of claim **1**, further comprising a control panel, wherein the control panel is disposed to be in electrical communication with the plurality of energy sources.

20. A method for the prevention of power surges during a system start-up, the steps consisting of:

utilizing at least two transmission mechanisms; and

utilizing at least two reduction gear boxes, wherein a first reduction gear box is in communication with a first transmission, and a second gear box is in communication with a second gear box.

* * * * *