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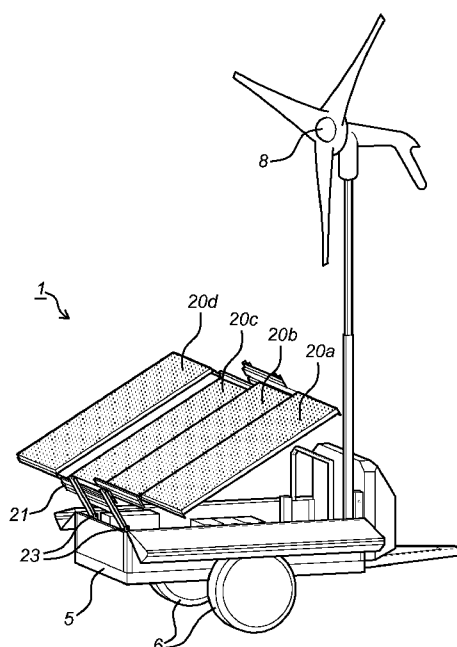


Fig. 6

(57) Abstract: The current invention concerns a mobile system which can be a motorized vehicle or which can be towed by a motorized vehicle such as a car or truck, for generating and providing electricity; said mobile system comprising a mobile platform; said mobile system also comprising collecting systems, a converting unit and storage means attached to said mobile platform, whereby said collecting systems comprise at least one of the following systems: solar energy extraction means, wind energy extraction means, a fossil fuel generator; said converting unit capable of transforming direct current received at its DC connection poles to alternating current at its AC connection poles; said storage means comprising one or more batteries; said collecting systems connected to said converting unit; and said energy storage means connected to said converting unit, whereby said collecting systems also comprise at least one dynamo system connected to said mobile platform by transmission means and to said DC connection poles of said converting unit via an electrical circuit; said dynamo system capable of producing a direct current from the kinetic energy of the mobile platform and providing said direct current to said DC connection poles of said converting unit via said electrical circuit.

MOBILE ECOLOGICAL ELECTRICAL POWER SYSTEM WITH DYNAMO

TECHNICAL FIELD

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The invention pertains to the technical field of electrical power sources, and more particularly, to a mobile ecological electrical power system whereby electricity is generated by transforming wind energy, photovoltaic energy, fossil-fuel energy, kinetic energy, or any combination thereof into electrical and/or electrochemical energy.

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BACKGROUND

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Electrical equipment is omnipresent in today's society. Therefore, electricity-storing and electricity-providing means become more important every day. In a society which has the means to build and maintain an electrical power grid, electricity can be delivered in every household in a very cost-effective way. However, in many cases there is a need for electricity to power electrical equipment at remote or less-developed areas where no connection to an electrical power grid is provided. At such places, one can use batteries or fossil-fuel generators to provide electrical power. However, batteries run out of power if they are not recharged and with the depletion of fossil fuels it has become costly to generate electrical energy via the burning of fossil fuel and this latter solution is not environmental-friendly due to e.g. the large CO₂ production. Therefore, there remains a need in the art for improved systems for generating and/or providing electrical power at remote locations which are ecologically justified.

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Up to this day, the three main renewable energy sources remain wind energy, hydro-energy and solar energy. Electricity can be typically produced from wind energy by means of e.g. a wind mill or similar, from hydro-energy by means of e.g. a water mill or similar and from solar energy by means of photovoltaic cells. Since a remote location may not always have flowing water nearby, but will always be subject to sunshine or wind at least part of the time, it seems logical that a mobile ecological system for providing electricity at remote locations will comprise means for generating electrical energy from wind energy and/or from solar energy. Such a system is disclosed in patent application US 2010/0207452. This patent application discloses a mobile electrical energy providing system comprising solar panels which can be folded,

rotated and moved up and down automatically (motor-driven, computer-steered), a wind mill which can be rotated and moved up and down automatically, a fossil fuel generator, and batteries. The batteries are energy-providing means which produce electricity from stored chemical energy. It seems that in US 2010/0207452, the batteries can only be recharged by the electricity produced by the solar panels, and not by the other means. Many of the disclosed systems can work together in an array. The system can be connected bidirectionally to the power grid, i.e. the system can extract electrical energy from the power grid and transfer it to the user, but can also transfer surplus electricity produced from the wind and solar energy to the power grid. However, disadvantageously, it seems that the batteries cannot be recharged by the electricity produced from wind energy, from the fossil fuel or from any other means. Obviously, this can lead to problems when there has been no sunshine at all, and the wind blows intermittently. During a wind-less period, the batteries can become depleted after which electricity can only be generated by the fossil-fuel generator. If the fossil fuel is depleted, the system can only provide electricity during windy periods, but has no way of providing electricity during windless periods. If the batteries could be recharged by electricity produced from wind energy, windless periods could be bridged, i.e. electrical power could be provided for during windless periods, by the energy stored in the batteries during windy periods. Furthermore, when the mobile system as disclosed in US 2010/0207452 has been e.g. indoors and/or unused for a while, it is possible that the batteries are depleted already before the system is put to use. This can happen, e.g. when the system has been in the garage for a while without being connected to the power grid, and when the solar panels have not been deployed for a while, hereby drastically reducing the electrical power storing and/or providing capacities of the batteries. When the system is then moved out of the garage and is transported to a remote area without sunshine or at night, the electricity supply depends totally on wind energy and fossil fuel, i.e. when all fossil fuels are burnt and there is no wind, one does not have battery power because the batteries were depleted already.

The present invention aims to improve on the system of US 2010/0207452 by providing a mobile system which can provide electricity and which comprises batteries that can be recharged using wind energy, solar energy, energy stored in fossil fuel, kinetic energy or a combination thereof. Thereby, the present system comprises

- one or more batteries;
- at least one means of extracting electricity from one of the following energy sources: solar energy, wind energy, energy stored in fossil fuels;

- a dynamo system which is connected to one or more wheels or axes of the mobile system and which can produce electricity from the kinetic energy of the mobile system when it is being towed by e.g. a car or truck.

Furthermore, the system is designed such that the batteries can be recharged by the electricity produced from any of the energy sources for which the system has extraction means, e.g. if the system has photovoltaic cells, a wind mill and a dynamo system, the batteries can be recharged by the electricity produced from solar energy, wind energy and kinetic energy of the mobile system. It is clear that with such a system, the batteries are at least partially charged when the mobile system arrives at its remote location, and that the batteries can be recharged using wind energy, in contrast with e.g. the prior art system of US 2010/0207452.

The invention thereto aims to provide a simple, robust, cheap and ecological mobile electrical power system. Hereby, electrical energy can be produced from wind energy solar energy, energy stored in fossil fuels and/or kinetic energy. This electrical energy can be stored in the batteries and can be simultaneously and/or subsequently delivered to the user in the form of AC or DC electricity. Therefore, when more electricity is needed than can be provided for from solar energy or wind energy at a certain time, the batteries can provide the extra energy needed. As soon as there is any surplus energy, the batteries can be automatically recharged.

SUMMARY OF THE INVENTION

The present invention provides a mobile system which can be a motorized vehicle or which can be towed by a motorized vehicle such as a car or truck, for generating and providing electricity; said mobile system comprising a mobile platform; said mobile system also comprising collecting systems, a converting unit and storage means attached to said mobile platform,

whereby said collecting systems comprise at least one of the following systems

- solar energy extraction means capable of producing electricity from solar energy;
- wind energy extraction means capable of producing electricity from wind energy;
- a fossil fuel generator capable of producing electricity from the burning of fossil fuel; and

whereby the converting unit is capable of transforming direct current received at its DC connection poles to alternating current at its AC connection poles;

whereby said storage means comprise one or more batteries;

whereby said collecting systems and said energy storage means are connected to each other and to said DC connection poles of said converting unit,

or whereby said collecting systems are connected to said converting unit, and whereby said energy storage means are connected to said converting unit,

characterized in that

5 said collecting systems also comprise at least one dynamo system connected to said mobile platform by transmission means; said dynamo system connected to said energy storage means and to said DC connection poles of said converting unit via an electrical circuit; whereby said dynamo system is capable of producing a direct current from the kinetic energy of the mobile platform and providing said direct current to said energy storage means and to said DC connection poles of said converting unit via said
10 electrical circuit.

DESCRIPTION OF FIGURES

15 **Figures 1 and 2** show an embodiment of a mobile ecological power system where all components are in a position suitable for transport and the covering means are closed.

Figure 3 shows a mobile system in a state suitable for extracting wind energy and solar energy.
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Figure 4 shows a mobile system in a state suitable for wind and solar energy extraction.

Figure 5 shows a top view of the embodiment of the mobile system which is also
25 shown in Figs. 3 and 4.

Figure 6 shows the mobile system in a state suitable for wind and solar energy extraction.

30 **Figure 7** shows a mobile platform on wheels with covering means.

Figure 8 specifically shows the solar panels attached to a frame with sets of telescopically connected sliding bars or rails.

35 **Figures 9 to 10** show an embodiment of a dynamo system with transmission means.

Figures 11 to 13 show another embodiment of a dynamo system with transmission means.

Figure 14 shows how the different components of the mobile system can be electrically connected in an embodiment.

Figure 15 shows how the different components of the mobile system can be electrically connected in another embodiment as compared to fig. 14.

10 DETAILED DESCRIPTION OF THE INVENTION

The present invention concerns a mobile system which can provide electricity and which comprises batteries that can be recharged using wind energy, solar energy, energy stored in fossil fuel, kinetic energy or a combination thereof. Thereby, the present system comprises

- one or more batteries;
- at least one means of extracting electricity from one of the following energy sources: solar energy, wind energy, energy stored in fossil fuels;
- a dynamo system which is connected to one or more wheels or axes of the mobile system and which can produce electricity from the kinetic energy of the mobile system when it is being towed by e.g. a car or truck.

Furthermore, the system is designed such that the batteries can be recharged by the electricity produced from any of the energy sources for which the system has extraction means, e.g. if the system has photovoltaic cells, a wind mill and a dynamo system, the batteries can be recharged by the electricity produced from solar energy, wind energy and kinetic energy of the mobile system.

Such a mobile system is useful when electricity needs to be provided at remote locations. In a preferred embodiment, the system is a trailer or caravan which can be towed by a motorized vehicle, hereby charging the batteries along the way due to the dynamo system, or it can be a motorized vehicle such as a motor home.

Unless otherwise defined, all terms used in disclosing the invention, including technical and scientific terms, have the meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. By means of further guidance, term definitions are included to better appreciate the teaching of the present invention.

As used herein, the following terms have the following meanings:

"A", "an", and "the" as used herein refers to both singular and plural referents unless the context clearly dictates otherwise. By way of example, "a compartment" refers to one or more than one compartment.

"About" as used herein referring to a measurable value such as a parameter, an amount, a temporal duration, and the like, is meant to encompass variations of +/- 20% or less, preferably +/-10% or less, more preferably +/-5% or less, even more preferably +/-1% or less, and still more preferably +/-0.1% or less of and from the specified value, in so far such variations are appropriate to perform in the disclosed invention. However, it is to be understood that the value to which the modifier "about" refers is itself also specifically disclosed.

"Comprise," "comprising," and "comprises" and "comprised of" as used herein are synonymous with "include", "including", "includes" or "contain", "containing", "contains" and are inclusive or open-ended terms that specifies the presence of what follows e.g. component and do not exclude or preclude the presence of additional, non-recited components, features, element, members, steps, known in the art or disclosed therein.

The recitation of numerical ranges by endpoints includes all numbers and fractions subsumed within that range, as well as the recited endpoints.

The expression "% by weight" (weight percent), here and throughout the description unless otherwise defined, refers to the relative weight of the respective component based on the overall weight of the formulation.

In a first aspect, the invention provides a mobile system which can be a motorized vehicle or which can be towed by a motorized vehicle such as a car or truck, for generating and providing electricity; said mobile system comprising a mobile platform; said mobile system also comprising collecting systems, a converting unit and storage means attached to said mobile platform,

whereby said collecting systems comprise at least one of the following systems

- solar energy extraction means capable of producing electricity from solar energy;
- wind energy extraction means capable of producing electricity from wind energy;

- a fossil fuel generator capable of producing electricity from the burning of fossil fuel; and

whereby the converting unit is capable of transforming direct current received at its DC connection poles to alternating current at its AC connection poles;

- 5 whereby said storage means comprise one or more batteries;

whereby said collecting systems and said energy storage means are connected to each other and to said DC connection poles of said converting unit,

characterized in that

- 10 said collecting systems also comprise at least one dynamo system connected to said mobile platform by transmission means; said dynamo system connected to said energy storage means and to said DC connection poles of said converting unit via an electrical circuit; whereby said dynamo system is capable of producing a direct current from the kinetic energy of the mobile platform and providing said direct current to said energy storage means and to said DC connection poles of said converting unit via said
- 15 electrical circuit.

The presence of a dynamo system in the present invention ensures that the batteries are at least partly charged when the mobile system arrives at its remote location. Thereby, it is necessary that the electricity which is eventually produced by the dynamo system is of DC type such that it can recharge the system's batteries.

- 20 The term "dynamo system" as used here above refers to a system which is capable of producing a direct current from kinetic energy either directly or through the mediation of a transmission system. Thereby the kinetic energy is transmitted into rotational kinetic energy of the rotor of the dynamo by the transmission system.

- 25 Basically, a dynamo uses rotating coils of wire and magnetic fields to convert mechanical rotation into a pulsing direct electric current through Faraday's law of induction. A dynamo machine consists of a stationary structure, called the stator, which provides a constant magnetic field, and a set of rotating windings called the armature which turn within that field. The motion of the wire within the magnetic field causes the field to push on the electrons in the metal, creating an electric current in
- 30 the wire. On small machines the constant magnetic field may be provided by one or more permanent magnets; larger machines have the constant magnetic field provided by one or more electromagnets, which are usually called field coils. Traditionally, a commutator was needed to produce direct current. When a loop of wire rotates in a magnetic field, the potential induced in it reverses with each half turn, generating an
- 35 alternating current. However, in the early days of electric experimentation, alternating

current generally had no known use. The few uses for electricity, such as electroplating, used direct current provided by messy liquid batteries. Dynamos were invented as a replacement for batteries. The commutator is essentially a rotary switch. It consists of a set of contacts mounted on the machine's shaft, combined with
5 graphite-block stationary contacts, called "brushes", because the earliest such fixed contacts were metal brushes. The commutator reverses the connection of the windings to the external circuit when the potential reverses, so instead of alternating current, a pulsing direct current is produced. However, in the present context, the term "dynamo system" can refer to any system which produces a direct electrical current from kinetic
10 energy. In particular, a combination of an alternator and a rectifier may also be considered as a dynamo system.

Obviously, it is possible to combine more than one of the presented collecting systems. Also, the mobile system may comprise more than one solar energy extraction means capable of producing electricity from solar energy, more than one
15 wind energy extraction means capable of producing electricity from wind energy and more than one fossil fuel generator capable of producing electricity from the burning of fossil fuel.

The present invention has the further advantage of being relatively silent compared to prior art power generators, especially fossil fuel generators, and can thus be used in
20 situations where too much noise is undesired, e.g. in military operations, for not disturbing the natural habitat of animals during observations or simply when camping. Furthermore, the present invention can be manufactured from easily obtainable components, which are also easily replaced when broken. The components may further be recycled from e.g. cars, trucks, ships, or other electromechanical devices,
25 thereby contributing to a better environment and a smaller manufacturing cost.

In a preferred embodiment, the total weight of the mobile system is smaller than or equal to 750kg, hereby meeting the European weight restriction on the trailer which may be trailed by a driver in possession of a European driving license B.

In a preferred embodiment the present invention concerns a mobile system whereby
30 said mobile platform comprises one or more axes with one or more wheels for transporting the mobile system; whereby said at least one dynamo system is connected to said one or more axes and/or said one or more wheels of said mobile platform via said transmission means; and whereby said transmission means are capable of transferring the rotational kinetic energy of said one or more axes and/or

said one or more wheels to said dynamo system. It should be clear to a person skilled in the art that rotational kinetic energy is much easier to be transferred into electrical energy than e.g. translational kinetic energy. Furthermore, in preferred embodiments, the mobile platform itself comprises a set of wheels on one or more axis onto which a platform is attached. In such embodiments, it is straightforward to transmit the rotational energy of an axis or wheel of the mobile platform to e.g. the rotation of the rotor of the dynamo. In a more preferred embodiment, an axis of the mobile platform can be used as the axis to which an electromagnetic component is attached which is used as a rotor in a dynamo system. However, in other embodiments, the rotational energy of an axis or a wheel can be transferred by adapted transmission means comprising e.g. gears, chains, bands, etc. In a particularly preferred embodiment, said transmission means comprise a band or chain spanned around at least one of said axes and/or wheels, said band or chain also spanned around the axis of said at least one dynamo system, thereby capable of transferring rotational kinetic energy of said at least one axis and/or wheel to rotational kinetic energy of said axis of said dynamo system. In an even more preferred embodiment, the transmission means also comprise special components for guiding the band or chain.

In another preferred embodiment, at least one dynamo system of the present invention comprises transmission means which comprise a transmission wheel attached to the axis of said at least one dynamo system, said transmission wheel being into contact with said at least one wheel of said mobile platform, whereby said transmission wheel is capable of transferring rotational kinetic energy of said at least one wheel of said mobile platform to rotational kinetic energy of said axis of said dynamo system through friction. In a more preferred embodiment, said transmission wheel is pressed against said wheel of said mobile platform by gravity, by a mechanical force such as a spring, or by a combination thereof, whereby said at least one dynamo system is hingeably attached to said mobile platform.

In a preferred embodiment at least one dynamo system comprises a permanent magnet.

In a preferred embodiment, at least one dynamo system comprises an electromagnet capable of producing a magnetic field when provided with an electrical current. In a more preferred embodiment, this electrical current is produced by the batteries of the storage means of the mobile system and provided via an electrical circuit.

In a preferred embodiment, the dynamo system comprises an alternator commonly used in the automotive industry. In another preferred embodiment, the dynamo system comprises a previously used alternator, e.g. recycled from a car, truck, boat, etc. The advantages of using an alternator as used in automotive industry or a previously used alternator are multiple: such alternators are readily available, they are easily adapted to be used or reused in the present invention, recycling contributes to a better environment and reduces manufacturing costs.

In a preferred embodiment, the present invention concerns a mobile system whereby said one or more batteries of said storage means are connected to said DC connection poles of said converting unit by an electrical circuit, whereby said one or more batteries can be connected in serial, in parallel, or any combination thereof. As such the batteries of the storage means can act as storage means. Any electricity which is not consumed but is delivered by the energy collecting systems to the DC connection poles is used to recharge the batteries. In case more electricity is asked for by a user than can be delivered by the energy collection systems at that time, the batteries will deliver DC electricity to the converting unit via the DC connection poles. As such, the batteries serve as an electricity consumption buffer or reserve, able to provide electricity to the converting unit even when there is no wind, no sun, no fossil fuel and the mobile platform is not moving. In a more preferred embodiment, the storage means comprise batteries such as 12V car batteries, truck batteries, ship batteries or any other kind of rechargeable batteries. These batteries can be connected with each other and the DC connection poles of the converting unit such that the voltage across the DC connection poles is around any multiple of 12V, more specifically around 12V, 24V, 36V, 48V or higher.

In a preferred embodiment, the present invention concerns a mobile system whereby said solar energy extraction means comprise one or more solar panels connected to a solar power controller;

whereby said solar power controller is connected to said DC connection poles of said converting unit via an electrical circuit, said solar power controller capable of producing a direct current from the electrical current produced in said solar panels, and said solar power controller capable of providing said direct current to said DC connection poles of said converting unit via said electrical circuit;

whereby said solar panels are slidably or hingeably attached to said mobile platform and whereby said solar panels can be in a folded position, suitable for when the mobile

system is being transported, and in an unfolded position, suitable for collecting as much solar energy as possible.

A solar panel (or photovoltaic module or photovoltaic panel) is a packaged
5 interconnected assembly of solar cells, also known as photovoltaic cells. The solar panel can be used as a component of a larger photovoltaic system to generate and supply electricity in commercial and residential applications. More than one solar panel can be connected in serial and/or parallel in order to provide the desired amount of current at a desired voltage. Since the electricity produced in the photovoltaic cells
10 and solar panels does not necessarily come at the desired DC voltage, a solar power controller can be used to transform the produced electricity to the desired DC voltage. The thusly transformed electricity is delivered to the DC connection poles of the converting unit.

15 Attaching the solar panels to the mobile platform can be done by constructing one or more frames, preferably of a light and strong material such as e.g. aluminium, wood, zinc, etc., and by fixing the solar panels on these frames. The frames can then be slidable or hingably connected to each other and/or to the mobile platform. In a preferred embodiment, a frame is slidably connected to another frame by means of a
20 set of telescopically connected beams or sliding bars, and the latter frame is hingeably attached to the mobile platform in such a way that the plane of the solar panels attached to these frames can be fixed in a position perpendicular or nearly perpendicular to the direction of the sun, thereby optimizing the solar energy arriving at the panels. When the solar panels are thusly deployed, they are in an unfolded
25 position. When there is no need for deploying the solar panels, the hingeable and/or slidable connection between the solar panels and/or the mobile platform allow an operator to fold them into an essentially compact position which is suitable for transport. It should be clear to a person skilled in the art that many possible systems for deploying and undeploying the solar panels are possible.

30 In a preferred embodiment, the present invention concerns a mobile system whereby said wind energy extraction means comprise a wind generator which is removably connected to said DC connection poles of said converting unit via an electrical circuit, which is capable of producing a direct current from wind energy and which is capable
35 of providing said direct current to said DC connection poles of said converting unit via said electrical circuit;

said wind energy extraction means also comprising a wind generator support system comprising one or more rigid arms which are hingeably or slideably, e.g. telescopically, connected to each other and/or said mobile platform;

whereby said wind energy extraction means can be in a folded position suitable for
5 when the mobile system is being transported, and in an unfolded position, suitable for collecting as much wind energy as possible;

whereby in said folded position, said wind generator is disconnected from said wind generator support system and said rigid arms of said wind generator support system are in an essentially horizontal and compact position; and

10 whereby in said unfolded position, said rigid arms of said wind generator support system are in an essentially vertical and extended position, and said wind generator is rotatably attached near or at the top of said wind generator support system.

A wind generator is a device that generates electrical power from wind energy. Wind
15 generators have traditionally been wind turbines, i.e. a propeller attached to an electric generator attached to appropriate electronics to attach it to the electrical grid or to charge batteries. In the present invention the appropriate electronics needed to transform the electricity produced by e.g. the alternator in the wind turbine, to a direct current at the desired voltage, i.e. at or near the operating voltage across the
20 DC connection poles of the converting unit, are assumed to be comprised in the wind generator. The electrical wiring of the electrical circuitry connecting the wind energy extraction means to the DC connection poles may be comprised in the wind generator support system. Hereby, the rigid arms may be hollow and open at or near the top and bottom and the thusly obtained open cavity can be used to harbor the electrical
25 wiring. In a preferred embodiment, the wind generator can be disconnected from the wind supporting means, preferably in a simple way, and can be stowed on the mobile platform for easier transport, e.g. by placing it on a short support fixed on the mobile platform. In a preferred embodiment, the wind generator support means comprise a set of telescopically connected rigid arms which can be slid into each other in a
30 compact position and because one arm is hingeably attached to the mobile platform, can be placed in an essentially horizontal position on the platform. In this way, the wind energy extraction means are in a position suitable for transport. For placing the wind energy extraction means in a position suitable for producing electricity from wind energy, the wind generator may be attached at or near the end of one rigid arm of the
35 set of telescopically connected rigid arms which can be slid out of each other whereby one arm is hingeably connected to the mobile platform such that the whole set of arms can be placed in an essentially upright position. In this unfolded or

extended, essentially vertical position, the wind energy extraction means are in a position suitable for producing electricity from wind energy. In a more preferred embodiment, the wind generator can be attached to the wind generator support system in a rotatable manner, which allows the wind generator to rotate such that its direction is optimal or nearly optimal for extracting wind energy. In many embodiments, this optimal direction is such that the plane of the blades of the wind generator is perpendicular to the wind direction.

In a preferred embodiment, the present invention concerns a mobile system whereby said fossil fuel generator is connected to said DC connection poles of said converting unit via an electrical circuit, whereby said fossil fuel generator is capable of producing a direct current from the burning of fossil fuel, and whereby said fossil fuel generator is capable of providing said direct current to said DC connection poles of said converting unit via said electrical circuit. It should be clear to the skilled person from the nature of the present invention that the fossil fuel generator should only produce electricity when there is no wind, no sun, the batteries are depleted and the mobile platform is not moving, in order to arrive to an ecological power system. The fossil fuel generator in present invention can be seen as a backup solution for producing electricity when all other collecting systems cannot and the energy storage means are depleted.

In another preferred embodiment, the mobile system of the present invention comprises a fossil fuel generator which is capable of producing AC electricity from the burning of fossil fuel and which comprises at least one power socket, said fossil fuel generator thereby capable of providing AC electricity independently from other electrical components and circuitry of said mobile system. Such a fossil fuel generator can be used as a classic independent power-providing system, i.e. it can be used independently from the other electrical components or circuitry of the present invention. Furthermore, the fossil fuel generator may even be easily attached to and removable from the mobile platform of the present invention. This has the clear advantage that when other electrical components or circuitry such as a converting unit or distribution board, are damaged, the user still has the backup possibility of fossil fuel electricity generation.

In still another preferred embodiment, the fossil fuel generator is connected to said AC connection poles of said converting unit via an electrical circuit, whereby said fossil fuel generator is capable of producing an alternating current from the burning of fossil

fuel, and whereby said fossil fuel generator is capable of providing said alternating current to said AC connection poles of said converting unit via said electrical circuit. Such a setup may be preferred over connecting the fossil fuel generator to the DC connection poles, since it would not lead to a recharging of the batteries, thereby unnecessarily transforming chemical energy stored in the fossil fuel to electrochemical energy stored in the batteries with energy losses. Furthermore, such a setup may be preferred over letting the fossil fuel generator operate separately from the other electrical components or circuitry, since one can still make use of the rest of the electrical components of the invention, in particular a connection board or electrical sockets which may be placed on the mobile platform for easy use of the generated electricity.

In a preferred embodiment, the present invention concerns a mobile system whereby said converting unit is capable of transforming alternating current to direct current. In this way, it is possible to recharge the batteries also by connecting the AC connection poles of the converting unit to a power grid.

In another preferred embodiment, the mobile power-generating system of the present invention may comprise a connection device for connecting the AC connection poles of the converting unit either directly or via one or more subsidiary circuits of a distribution board connected to said AC connection poles to the power inlet of another distribution board for supplying this other distribution board with the electricity generated by the collecting systems of the present invention. In this way, the mobile power-generating system of present invention can easily transfer the electricity produced by its renewable energy collecting systems to e.g. the electrical system of a house or to the powergrid.

In a preferred embodiment, the present invention concerns a mobile system comprising a distribution board connected to said AC connection poles of said converting unit, which is capable of distributing an electrical power feed to at least one subsidiary circuit. The electrical power feed may come from the AC connection poles of the converting unit or it may come from an external power grid. A distribution board is well known to a person skilled in the art and can be found in many present-day power-distribution applications. In other preferred embodiments, the mobile system comprises a breaker panel, a circuit breaker panel, a consumer unit or CU, an electrical panel, a fusebox, a fuseboard, a load centre/center, a panelboard, a power

breaker, a service panel or any other electrical power distribution means. In a more preferred embodiment, said distribution board comprises any combination of:

- a DC voltmeter connected to said DC connection poles of said converting unit for measuring and monitoring the DC voltage across said connection poles;
- 5 - one or more fuses for protecting each subsidiary circuit;
- unidirectional or bidirectional connection means for connecting to an external power grid.

A DC voltmeter allows an operator or user to read and monitor the state of the batteries and the voltage at which the DC part of the mobile system is operating. In a more preferred embodiment, the distribution board comprises more than DC voltmeter connected to different parts of the DC part of the mobile system for monitoring different parts of the system. Fuses are useful for protecting electrical devices connected the mobile power-providing system of the present invention and for protecting parts of the mobile system against possible power spikes or short-circuits.

10 In the embodiments of the mobile system which comprise a distribution board, this board is very well suited for providing a connection to an external power grid through which power can be provided either from the external power grid to the system, or from the system to the external power grid, or both. In these embodiments, a unidirectional or bidirectional connection means may be provided for connecting the system to an external power grid.

In a preferred embodiment, the distribution board or the converting unit may comprise one or more connection poles to which external electrical power-providing means can be easily connected, e.g. via a plug, a socket, jumper cables, crocodile clips, etc. These external power means may be the electrical power grid, external solar panels, an external wind generator, etc. These external power means may also be ecological power-providing systems, e.g. a hydro-electric generator or a pedaling system such as a pedal power bicycle generator. In a more preferred embodiment, the mobile platform also comprises a hydro-electric generator or a pedaling generator and electrical cables which may be stowed onto the platform during transport and which can be removed from the platform, the hydro-electric generator or pedaling generator being connected to the electrical circuitry of the mobile platform via the electrical cables. Such a hydro-electric generator may be a hydro turbine, a micro hydro turbine, a Darrieus hydro turbine, a hydrokinetic turbine, a reaction turbine of the Francis, Kaplan, Propeller, Bulb, Tube, Straflo, Tyson or Gorlov type, an impulse turbine of the waterwheel, Pelton, Turgo, Michell-Banki (also known as the Crossflow or Ossberger turbine), Jonval, reverse overshot water-wheel or Archimedes' screw

type, etc. When the mobile platform is used for providing electrical power near a stream, a hydro-electric generator may be placed in the stream and connected to the electrical circuitry, i.e. via the distribution board or directly on the connection poles of the converting unit, with cables.

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In a particularly preferred embodiment, the present invention concerns a mobile system which comprises one or more electrical sockets which are connected to said AC connection poles of said converting unit via one or more electrical circuits either directly or via one or more subsidiary circuits of a distribution board connected to said AC connection poles. It should be clear that the present mobile ecological power-providing system is easier to use if the output means are provided through which electrical AC appliances can receive AC current. In a more preferred embodiment, the mobile system comprises electrical sockets connected to the DC connection poles either directly or via a distribution board. In this embodiment, the mobile system also provides means for powering DC electrical appliances. In a still more preferred embodiment, the mobile system comprises one or more converting units capable of converting the DC electricity received at their DC connection poles to DC electricity at voltages of 12V, 24V and/or 48V, said converting units connected to one or more electrical sockets either directly or via a distribution board. In another preferred embodiment, the mobile system comprises one or more converting units capable of converting the DC electricity received at their DC connection poles to AC electricity at voltages of 110V, 220V or 380V, either single-phase or three-phase, said converting units connected to one or more electrical sockets either directly or via a distribution board.

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In a preferred embodiment, the present invention concerns a mobile system which comprises covering means for covering at least part of and in a particularly preferred embodiment, all of the electrical components of the mobile system. In a more preferred embodiment, these covering means can be applied at least when the components are in a folded or compact position suitable for transport. As such the components of the mobile system may be protected from the environment (rain, wind, storm, air friction, etc.) at least during transport or when the system is not in use. In a particularly preferred embodiment, these covering means comprise a set of covering plates, hingeably attached to the mobile platform such that they can be unfolded to uncover all or part of the components of the mobile system and such that they can be folded, thereby covering all or part of the components of the mobile system. In

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another preferred embodiment, the covering means comprise a covering canvas, sail, awning, canopy, etc.

5 The invention is further described by the following non-limiting examples which further illustrate the invention, and are not intended to, nor should they be interpreted to, limit the scope of the invention.

EXAMPLES

10 Figures 1 and 2 show an embodiment of a mobile ecological power system where all components are in a position suitable for transport and the covering means are closed.

Figure 1 shows a mobile system (1) for providing power at remote locations in a state suitable for transport. The mobile platform (5) is mobile due to two wheels (6) on an axis attached under the platform (5) and comprises a system (7) suitable for
15 connecting the mobile platform to a motorized vehicle. One half of the covering means (10) is shown in Fig. 1, the other half being removed such to show how the other components can be stored on the mobile platform. The wind generator support system (12) is in a compact and essentially horizontal position, suitable for transport. The
20 wind generator (not shown) has been disconnected and may be placed on the mobile platform (5), under the covering means (10). The outer rigid arm of the wind generator support system (12) is hingeably attached (15) to the mobile platform (5). When the wind generator support system is to be placed in a position suitable for extracting wind energy, it can be turned upright and fixed by fixation means on the
25 outer rigid arm (13) and on the mobile platform (14). In present embodiment, these fixation means may be a simple but strong pin put through the openings of the fixation means (13) and (14). The solar panels (20a-20d) are attached to a frame (21) and are shown in a compact position suitable for transport.

30 Figure 2 shows how an embodiment of the mobile system (1) of present invention may look like when it is in state suitable for transport and the covering means (10) cover all components of the mobile system.

Figure 3 shows a mobile system (1) in a state suitable for extracting wind energy and
35 solar energy. The covering means (10) are in an open position. From Fig. 3, it is also clear that the covering means in this embodiment comprise a set of plates, one of which is bent (9a), said plates being hingeably attached to one another (9b) and to

the side of the mobile platform in (11). The wind energy support system (12) comprises an outer rigid arm (16) and an inner rigid arm (17) which are telescopically connected and are shown in an extended, essentially upright position. The wind generator (not shown) can be placed on top of the inner rigid arm (17) before it is extended and can be connected to the electrical circuit of the mobile system (1) via electrical wires which are inside the rigid arm and run basically from top to bottom. The solar panels (20a-20d) are in an extended position. They are attached to a frame (21) which is attached to the mobile platform (5) and which comprises sets of telescopically connected bars (22) which allow the solar panels to be in a compact position essentially covering each other such as shown in Fig. 1, and in a completely extended position such as shown in Fig. 3, whereby none of the panels covers another one, i.e. sunshine can reach all panels. Obviously it is possible to extend some or all solar panels in a partially extended or intermediate position (not shown).

Figure 4 shows a mobile system (1) in a state suitable for wind and solar energy extraction, with the inner solar panels (20b-20c) made transparent in order to show what is underneath. Shown is the fossil fuel generator (30) placed at the back of the mobile platform (5), the converting unit (40) and a number of batteries (50). In another embodiment (not shown), the converting unit is placed near the front of the mobile platform. The fossil fuel generator may furthermore be placed on top of a set of sliding bars or rails and the back or front side walls of the mobile platform may be opened such that the fossil fuel generator can be slid out of the platform for easier access. Also shown is a wind generator (18) which is rotatably placed on the top of the wind energy support system (16, 17) in unfolded position.

Figure 5 shows a top view of the embodiment of the mobile system which is also shown in Fig. 4. However, the wind generator (18) is placed on a small support (19) in the front of the mobile platform and as such is suitable for transportation.

Figure 6 shows the mobile system (1) in a state suitable for wind and solar energy extraction, where the solar panels (20a-20d) are not only completely extended as shown in e.g. Fig. 3, but where the frame (21) onto which the solar panels are attached is also rotated around the hinges (23) with which the frame is connected to the mobile platform (5). The frame is thus fixed in a position which allows the solar panels to collect as much solar energy as possible. If the mobile platform itself is oriented in the correct way, the solar panels can be positioned such that they are perpendicular to the direction of the sun, thereby collecting solar energy most

efficiently. To be more precise, the mobile platform can be easily rotated around a vertical axis due to its wheels (6), and the frame (21) can be rotated around a horizontal axis due to its hinges (23). Because of these two axes of rotation, the solar panels can always be positioned perpendicular to the direction of the sun.

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Figure 7 shows a mobile platform (5) on wheels (6) with covering means (10) comprising plates hingeably attached to each other (9b) and to the side of the mobile platform in (11). The solar panels (20a-20d) are in a compact position suitable for transport. The wind generator (18) is placed on a small support (19) in the front of the platform and is therefore stowed for transportation. In an embodiment, the front and back side walls of the mobile platform can be opened for easier access to and easier stowage of the components of the present invention.

Figure 8 specifically shows the solar panels (20a-20d) attached to a frame with sets of telescopically connected sliding bars or rails (22).

Figures 9 to 10 show an embodiment of a dynamo system (60) with transmission means (55). The dynamo system comprises a dynamo (62) with a rotor with e.g. a static magnet or with windings, attached to an extended rotation axis (63) which goes through a hole in the side panel of the mobile platform. The transmission means (55) may comprise a small wheel (61) attached to rotation axis (63) of the dynamo system (60) and in contact with the wheel (6) of the mobile platform. The transmission means (55) further comprise a set of hinges (56) which hingeably attach the dynamo system (62) to the mobile platform, thereby allowing the dynamo system to follow the up-down movements of the wheel (6). The transmission means (55) further comprise a spring mechanism (57) connected to the dynamo system and the mobile platform. By regulating the tension of the spring mechanism, one can regulate the force with which the small wheel (61) presses against the wheel (6), and thereby the amount of friction between the two wheels.

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Figures 11 to 13 show another embodiment of a dynamo system (70) with transmission means (65). Hereby, the dynamo (72) is attached to the mobile platform (5) with bolts and wired to the DC connection poles of the converting unit by electrical wires (74). The extended axis (73) of the dynamo system goes through a hole of the side panel of the mobile platform (5). The transmission means of the shown embodiment comprise a small wheel (71) attached near the outside end of the extended axis (73). The profile of the perimeter of the small wheel (71) is such (e.g.

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grooved) that a strong rubber band (66) can be spanned over the wheel (71) without the risk of the band (66) slipping of the wheel (71), i.e. the transmission means comprise a belt-and-pulley system. The rubber band (66) can be spanned over a rim (67) with an adapted profile of its perimeter, e.g. a groove (68) which ensures that the rubber band (66) does not slip of the rim (67). The rim is attached in between the shown axis (69) of the mobile platform (5) and the wheel (6).

Figure 14 shows how the different components of the mobile system can be electrically connected in an embodiment. A wind generator (8) can produce a DC current and is electrically connected to the DC connection poles (39) of the converting unit (40). The fossil fuel generator (30) also produces DC current and is electrically connected to the DC connection poles (39) of the converting unit (40). In the present scheme, a switch (29) is foreseen for disconnecting the generator (30) from the electrical circuitry. The dynamo system (60) also produces DC current and is electrically connected to the DC connection poles (39) of the converting unit (40). In the present scheme, a switch (59) is foreseen for disconnecting the dynamo system (60) from the electrical circuitry. Two solar panels (20) are connected to a solar power controller (25) which transforms the electricity produced in the solar panel to the DC current at the desired voltage. The solar power controller (25) thus produces DC current and is electrically connected to the DC connection poles (39) of the converting unit (40). A fuse (49) can be placed in the electrical circuitry for security reasons. The batteries (50) are also connected to the DC connection poles (39) of the converting unit (40). Furthermore, a DC socket (110) is connected to the DC connection poles (39) of the converting unit (40). The converting unit (40) is capable of inverting direct current to alternating current at its AC connection poles (38). A set of AC sockets (100) is connected directly to these AC connection poles.

Figure 15 shows a second example of the electrical circuitry of the present invention, which largely resembles fig. 14. The mobile system in this example comprises a wind generator (8), 4 solar panels (20) and two dynamo systems (60), e.g. one dynamo system connected to each wheel of a two-wheel trailer. The DC current from the solar panels is collected per pair and is converted to the correct DC voltage in two DC-to-DC solar power controllers (25). The DC current from wind generator, solar panels and dynamo systems are guided to the batteries (50) via diodes (26) to ensure a one-way electricity flow. Furthermore, these components can be connected to ground via a wire connected to the mobile platform frame, which on its turn may be connected to ground e.g. by an earth ground strap. The energy extraction means and the batteries

can be connected to the DC poles (39) of a converting unit (40) with a switch. The converting unit (40) may e.g. be able to convert a maximum of 3500 W at 12VDC to 220VAC, i.e. it may receive up to about 290A of direct current at 12V and deliver up to 16A of alternating current at 220V. In fig. 15, a backup power-providing system (31),
5 e.g. a fossil fuel generator or the power grid, may be connected to the converting unit (40) at two AC connection poles (37) at e.g. 220V. The converting unit (40) is able to deliver 220VAC current at its AC connection poles (38), either converted from the 12VDC batteries and energy extraction systems or rerouted from the AC back-up power-providing system (31). A distribution board (97) receives 220VAC via its main
10 switch (98) and 12VDC (109) via a direct connection to the DC connection poles (39) of the converting unit (39). The distribution board (97) further divides the AC current over two sub-circuits which are connected through switches (99). These sub-circuits provide 220 AC electricity to two block of sockets (100).

15 It is supposed that the present invention is not restricted to any form of realization described previously and that some modifications can be added to the presented example of fabrication without reappraisal of the appended claims.

CLAIMS

1. A mobile system which can be a motorized vehicle or which can be towed by a motorized vehicle such as a car or truck, for generating and providing electricity; said mobile system comprising a mobile platform; said mobile system also comprising collecting systems, a converting unit and storage means attached to said mobile platform,

whereby said collecting systems comprise at least one of the following systems

- solar energy extraction means capable of producing electricity from solar energy;
- wind energy extraction means capable of producing electricity from wind energy;
- a fossil fuel generator capable of producing electricity from the burning of fossil fuel; and

whereby the converting unit is capable of transforming direct current received at its DC connection poles to alternating current at its AC connection poles;

whereby said storage means comprise one or more batteries;

whereby said collecting systems and said energy storage means are connected to each other and to said DC connection poles of said converting unit,

characterized in that

said collecting systems also comprise at least one dynamo system connected to said mobile platform by transmission means; said dynamo system connected to said energy storage means and to said DC connection poles of said converting unit via an electrical circuit; whereby said dynamo system is capable of producing a direct current from the kinetic energy of the mobile platform and providing said direct current to said energy storage means and to said DC connection poles of said converting unit via said electrical circuit.

2. A mobile system according to claim 1, whereby said mobile platform comprises one or more axes with one or more wheels for transporting the mobile system; whereby said at least one dynamo system is connected to said one or more axes and/or said one or more wheels of said mobile platform via said transmission means; and whereby said transmission means are capable of transferring the rotational kinetic energy of said one or more axes and/or said one or more wheels to said dynamo system.

3. A mobile system according to claim 2, whereby said transmission means comprise a band or chain spanned around at least one of said axes and/or wheels, said band or chain also spanned around the axis of said at least one dynamo system, thereby capable of transferring rotational kinetic energy of said at least one axis and/or wheel to rotational kinetic energy of said axis of said dynamo system.
4. A mobile system according to any of claims 2 to 3, whereby said transmission means comprise a transmission wheel attached to the axis of said at least one dynamo system, said transmission wheel being into contact with said at least one wheel of said mobile platform, whereby said transmission wheel is capable of transferring rotational kinetic energy of said at least one wheel of said mobile platform to rotational kinetic energy of said axis of said dynamo system through friction.
5. A mobile system according to claim 4, whereby said transmission wheel is pressed against said wheel of said mobile platform by a mechanical force such as a spring, by gravity, or by a combination thereof, and whereby said at least one dynamo system is hingeably attached to said mobile platform.
6. A mobile system according to any of claims 1 to 5 whereby said at least one dynamo system comprises an electromagnet capable of producing a magnetic field when provided with an electrical current.
7. A mobile system according to any of claims 1 to 5 whereby said at least one dynamo system comprises an alternator commonly used in the automotive industry.
8. A mobile system according to any of claims 1 to 7 whereby said one or more batteries of said storage means are connected to said DC connection poles of said converting unit by an electrical circuit, whereby said one or more batteries can be connected in parallel, in serial, or any combination thereof.
9. A mobile system according to any of claims 1 to 8 whereby said solar energy extraction means comprise one or more solar panels connected to a solar power controller;

whereby said solar power controller is connected to said DC connection poles of said converting unit via an electrical circuit, said solar power controller capable of producing a direct current from the electrical current produced in said solar panels, and said solar power controller capable of providing said direct current to said DC connection poles of said converting unit via said electrical circuit; whereby said solar panels are slidably or hingeably attached to said mobile platform and whereby said solar panels can be in a folded position, suitable for when the mobile system is being transported, and in an unfolded position, suitable for collecting as much solar energy as possible.

10. A mobile system according to any of claims 1 to 9 whereby said wind energy extraction means comprise a wind generator which is removably connected to said DC connection poles of said converting unit via an electrical circuit, which is capable of producing a direct current from wind energy and which is capable of providing said direct current to said DC connection poles of said converting unit via said electrical circuit; said wind energy extraction means also comprising a wind generator support system comprising one or more rigid arms which are hingeably or slideably, e.g. telescopically, connected to each other and/or said mobile platform; whereby said wind energy extraction means can be in a folded position suitable for when the mobile system is being transported, and in an unfolded position, suitable for collecting as much wind energy as possible; whereby in said folded position, said wind generator is disconnected from said wind generator support system and said rigid arms of said wind generator support system are in an essentially horizontal and compact position; and whereby in said unfolded position, said rigid arms of said wind generator support system are in an essentially vertical and extended position, and said wind generator is rotatably attached near or at the top of said wind generator support system.

11. A mobile system according to any of claims 1 to 10 whereby said fossil fuel generator is connected to said DC connection poles of said converting unit via an electrical circuit, whereby said fossil fuel generator is capable of producing a direct current from the burning of fossil fuel, and whereby said fossil fuel generator is capable of providing said direct current to said DC connection poles of said converting unit via said electrical circuit.

12. A mobile system according to any of claims 1 to 11 comprising a fossil fuel generator which is capable of producing AC electricity from the burning of fossil fuel and comprises at least one power socket, said fossil fuel generator thereby capable of providing AC electricity independently from other electrical components and circuitry of said mobile system.

13. A mobile system according to any of claims 1 to 12 whereby said converting unit is capable of transforming alternating current to direct current.

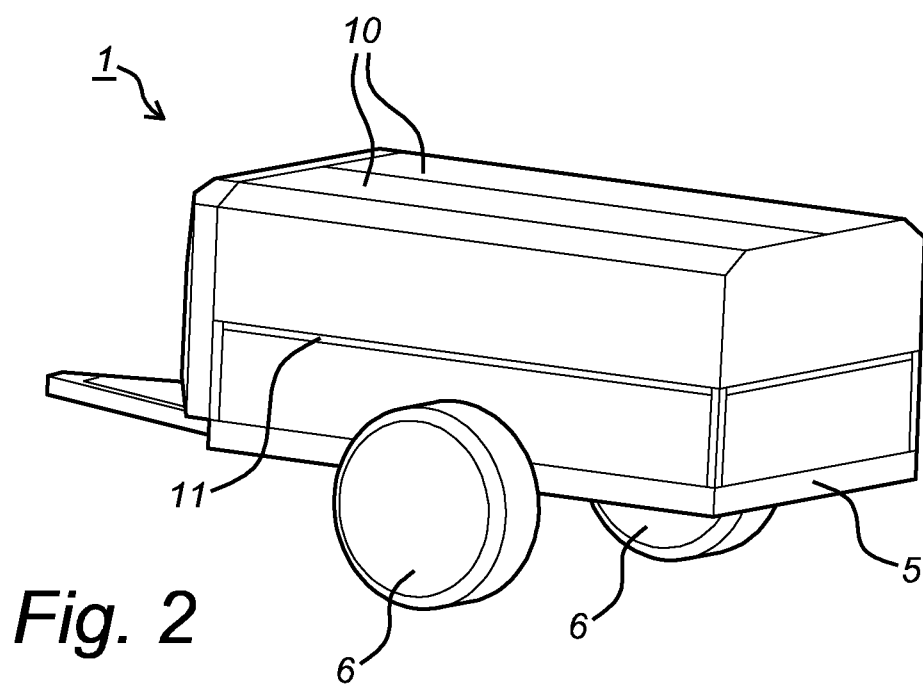
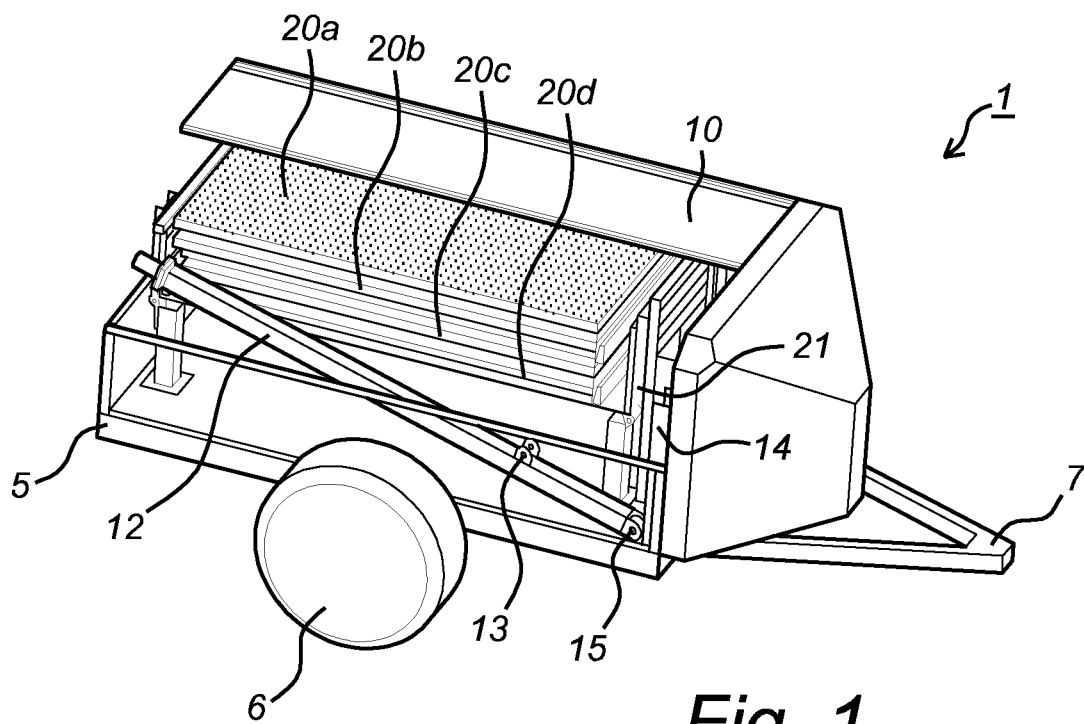
14. A mobile system according to any of claims 1 to 13 comprising a distribution board connected to said AC connection poles of said converting unit, which is capable of distributing an electrical power feed to at least one subsidiary circuit.

15. A mobile system according to claim 14 whereby said distribution board comprises any combination of:

- a DC voltmeter connected to said DC connection poles of said converting unit for measuring and monitoring the DC voltage across said connection poles;
- one or more fuses for protecting each subsidiary circuit;
- unidirectional or bidirectional connection means for connecting to an external power grid.

16. A mobile system according to any of claims 1 to 15 whereby said mobile system comprises one or more electrical sockets which are connected to said AC connection poles of said converting unit via one or more electrical circuits either directly or via one or more subsidiary circuits of a distribution board connected to said AC connection poles.

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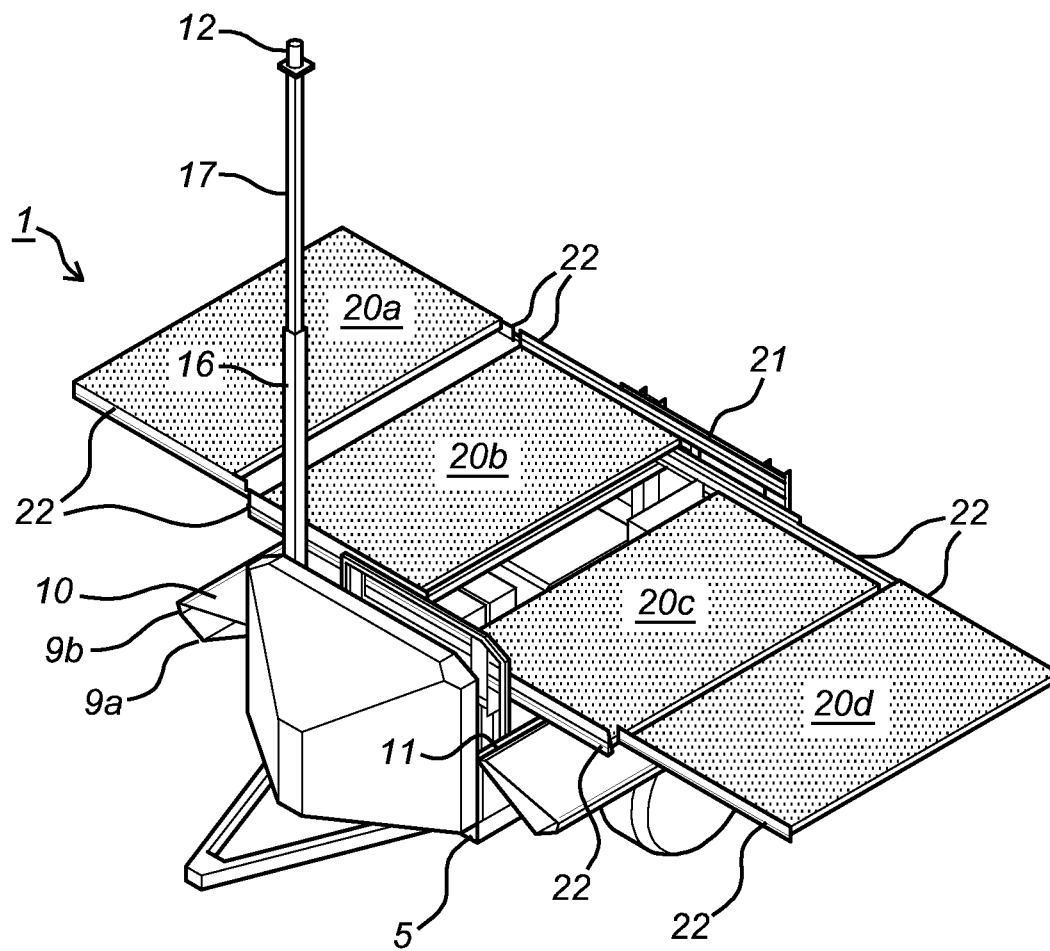


Fig. 3

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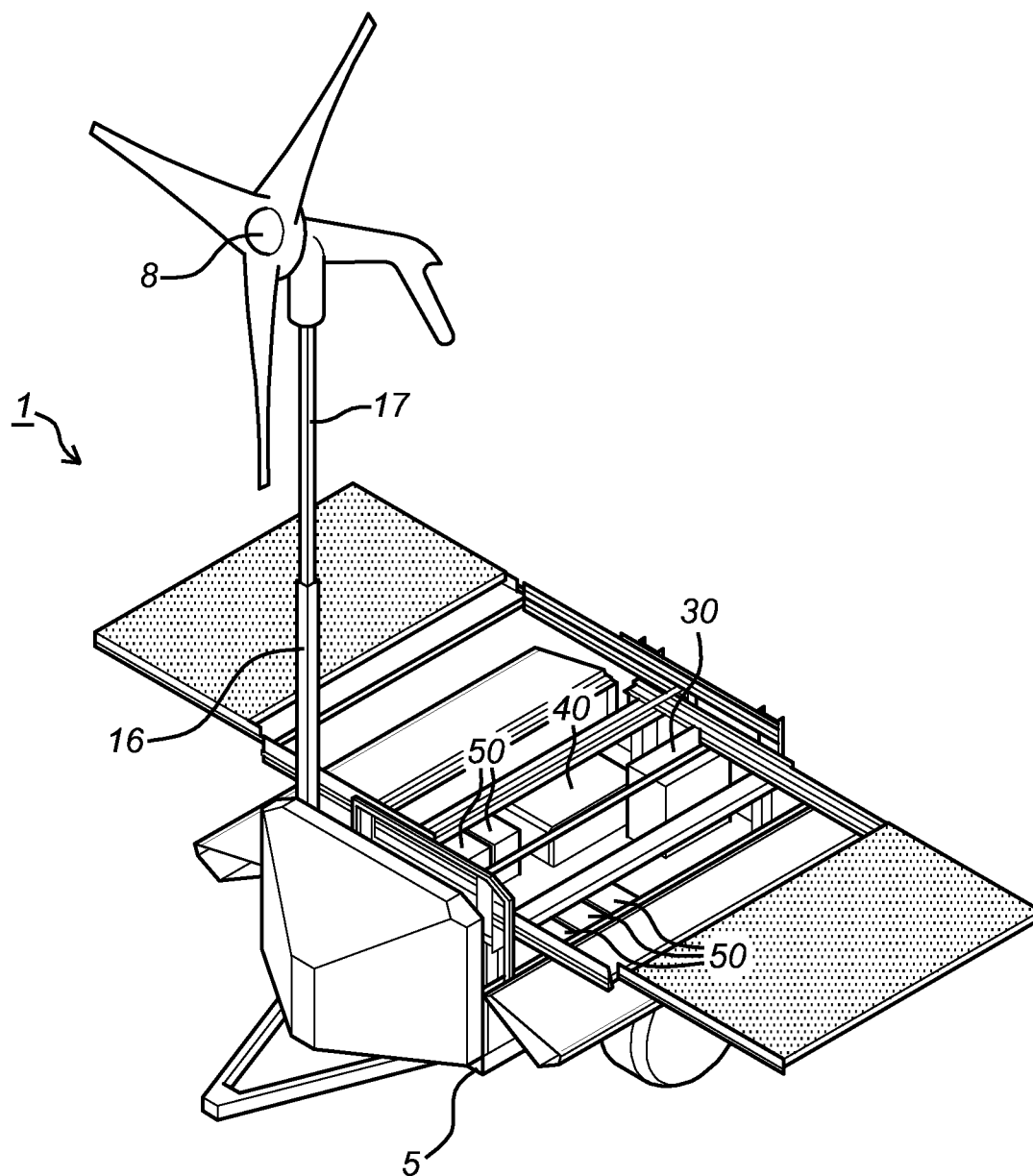
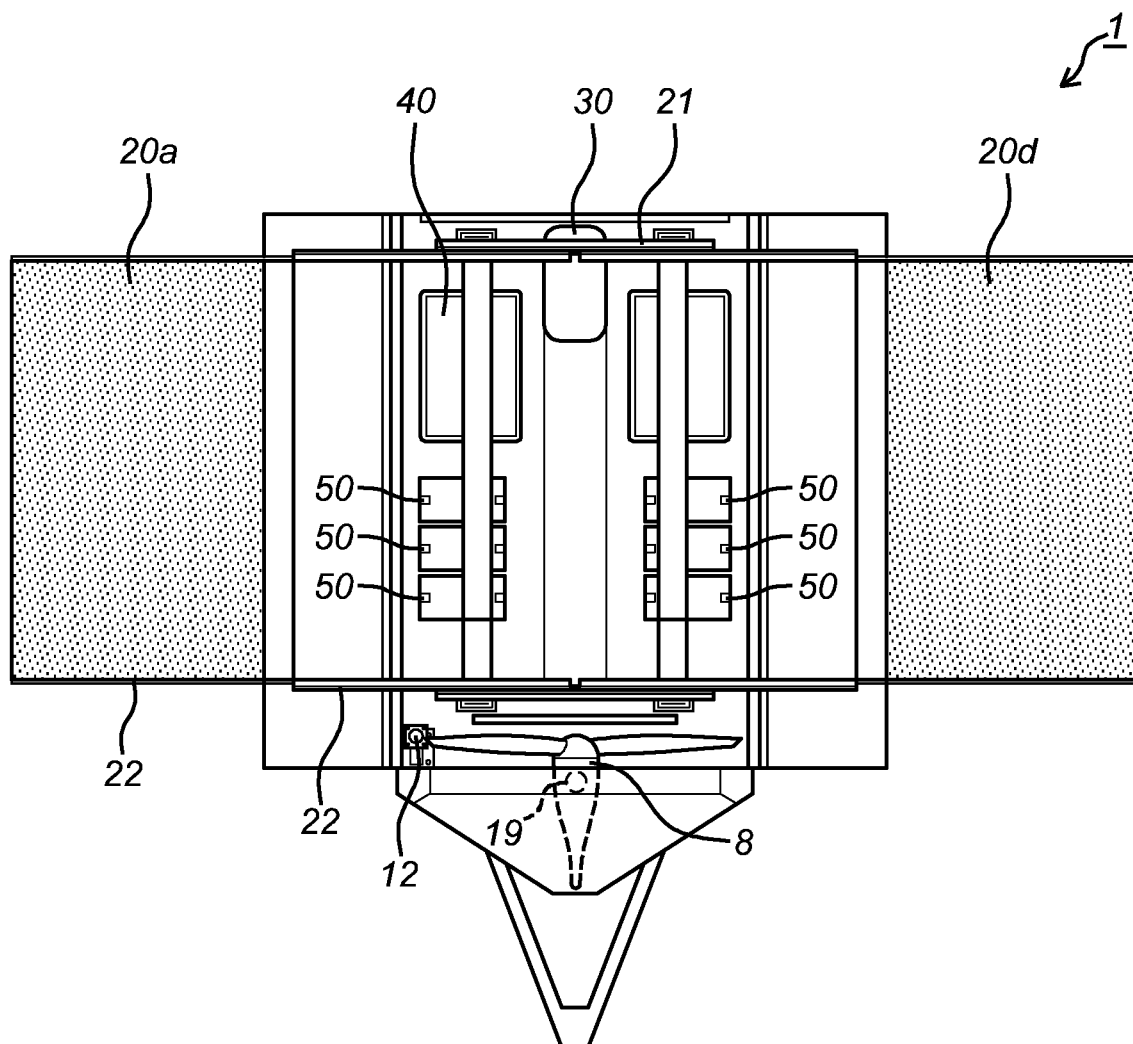
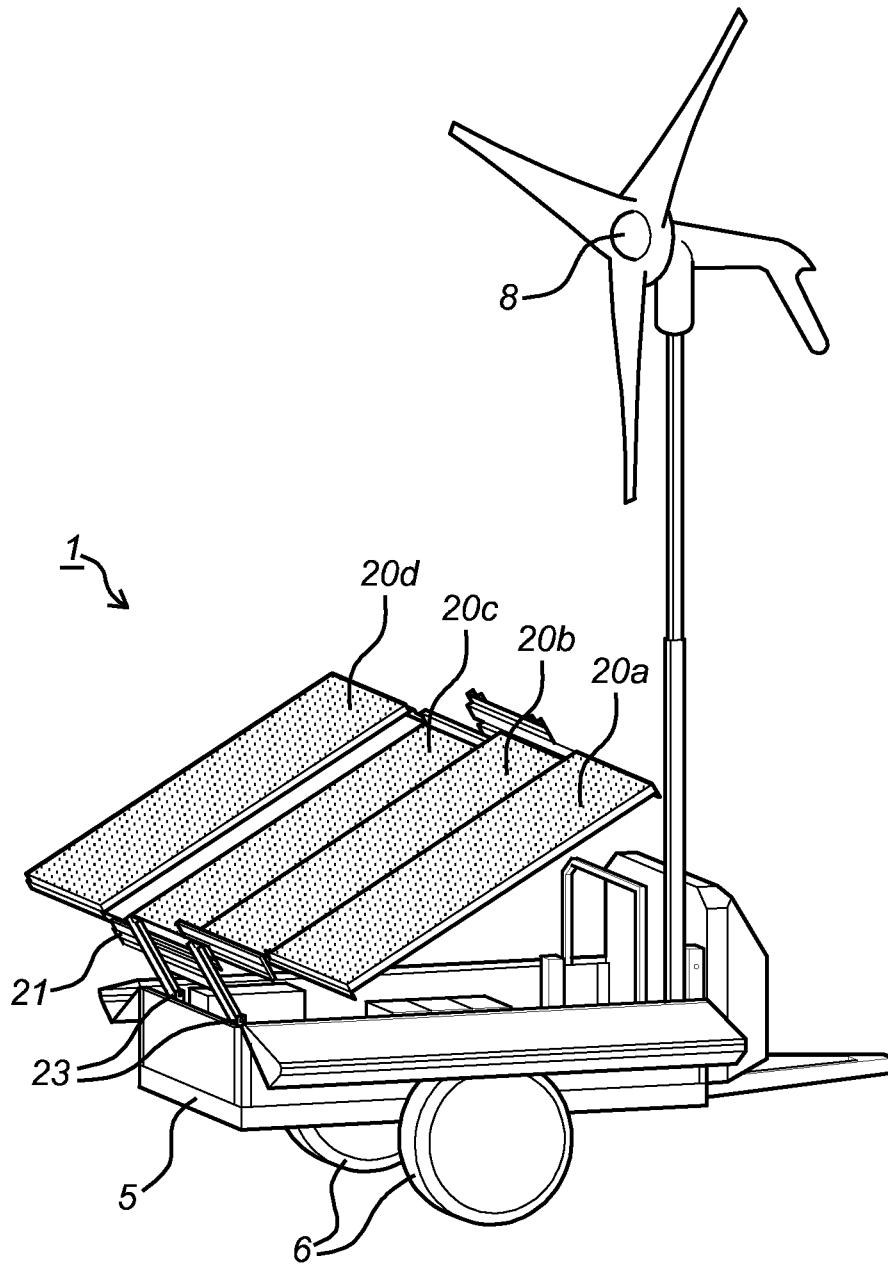


Fig. 4

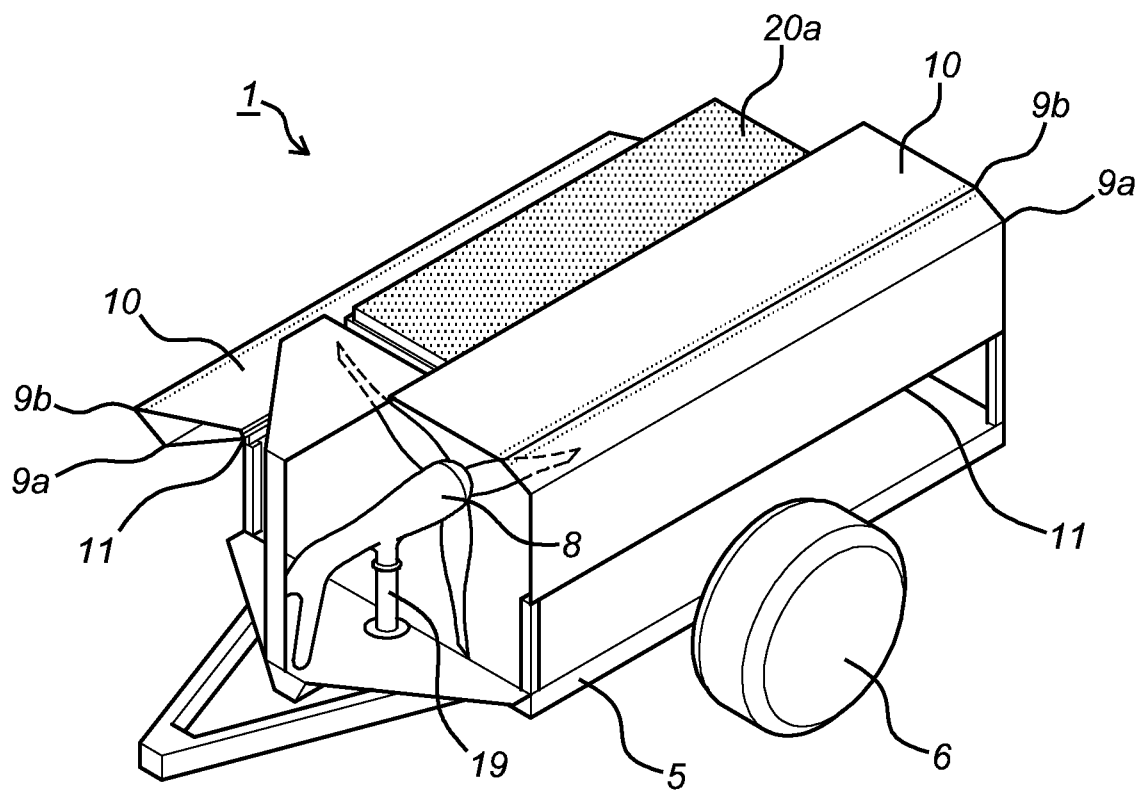
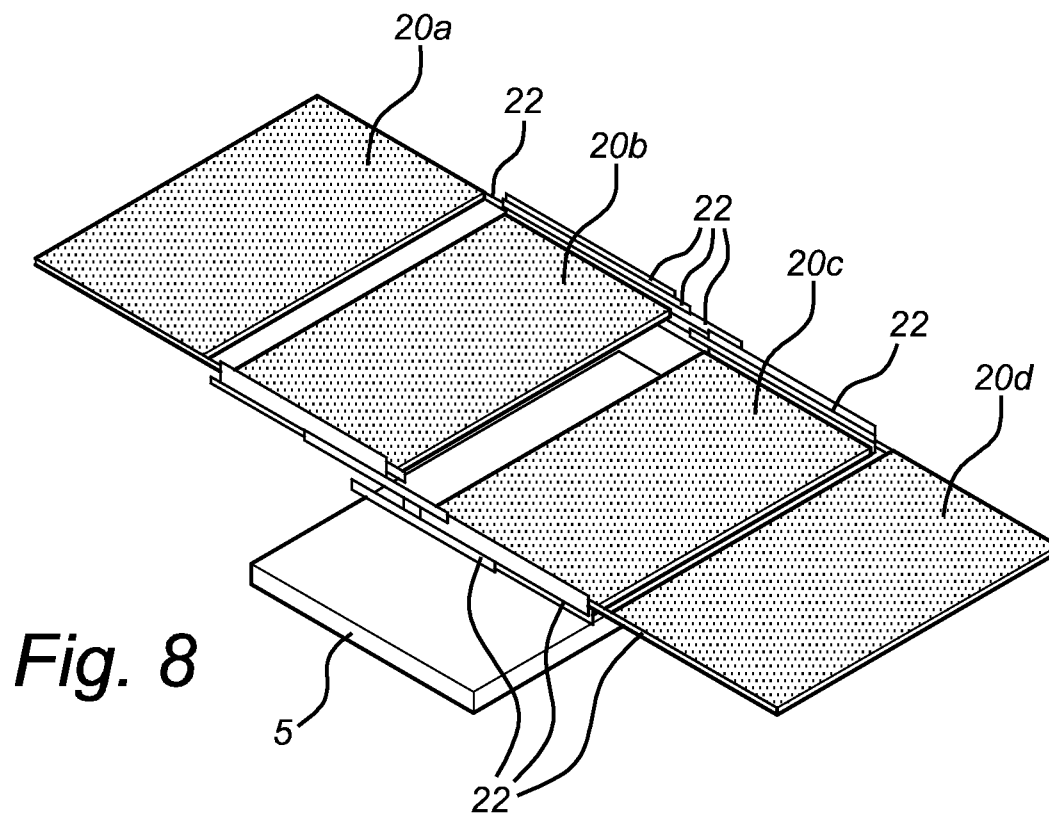
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*Fig. 5*

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*Fig. 6*

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*Fig. 7**Fig. 8*

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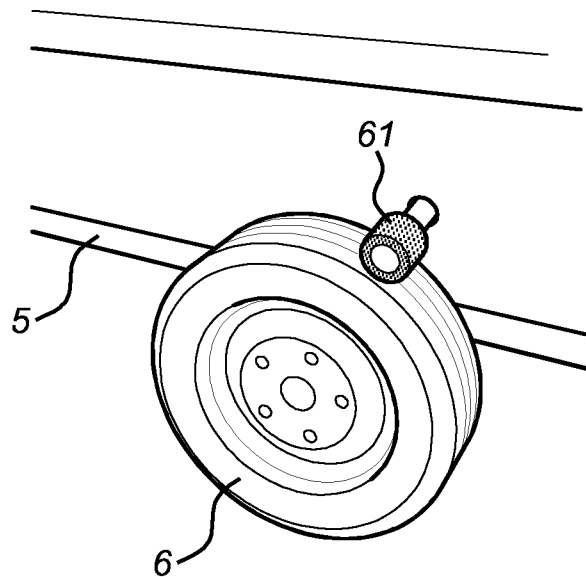


Fig. 9

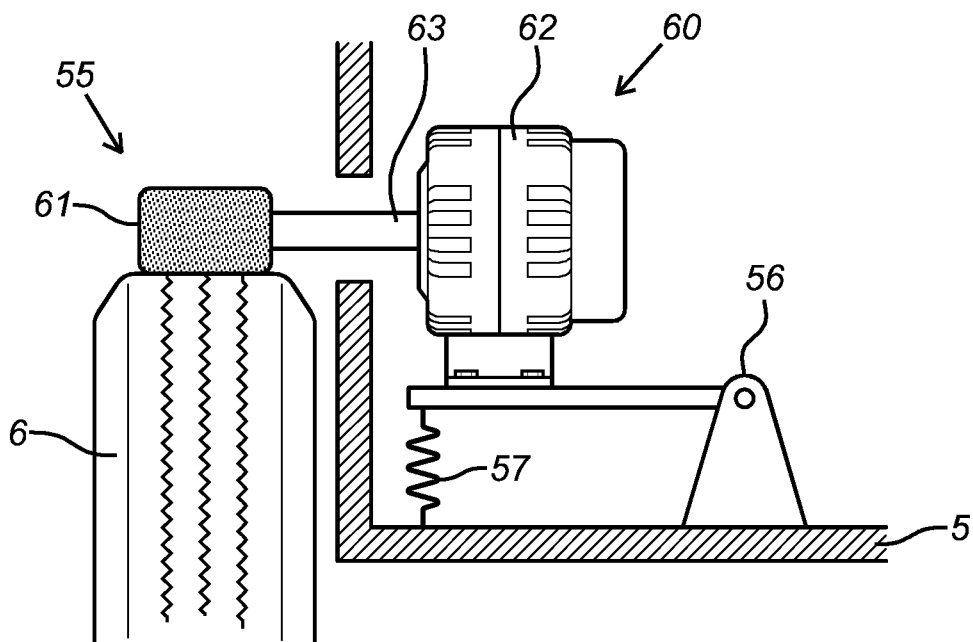


Fig. 10

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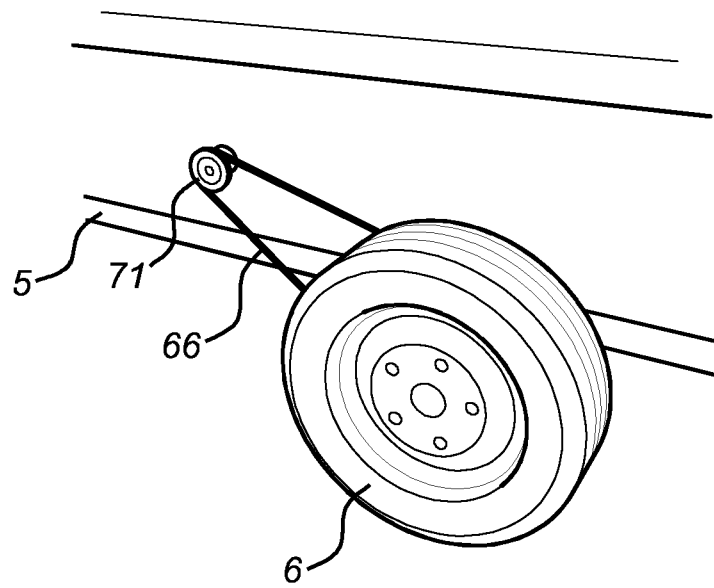


Fig. 11

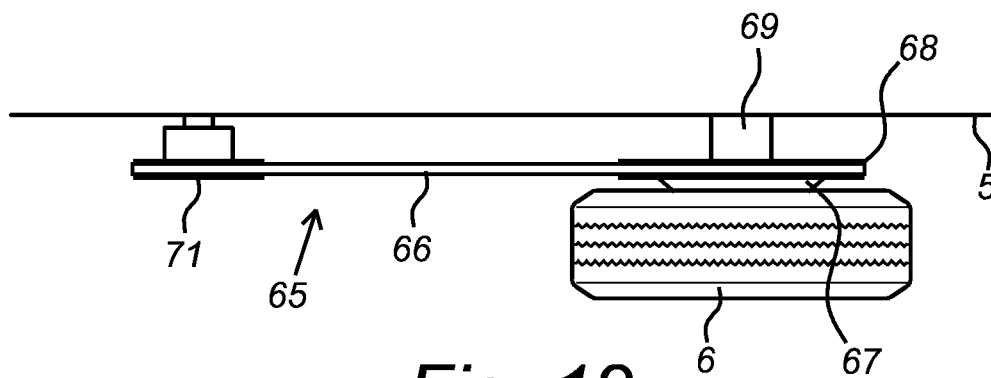


Fig. 12

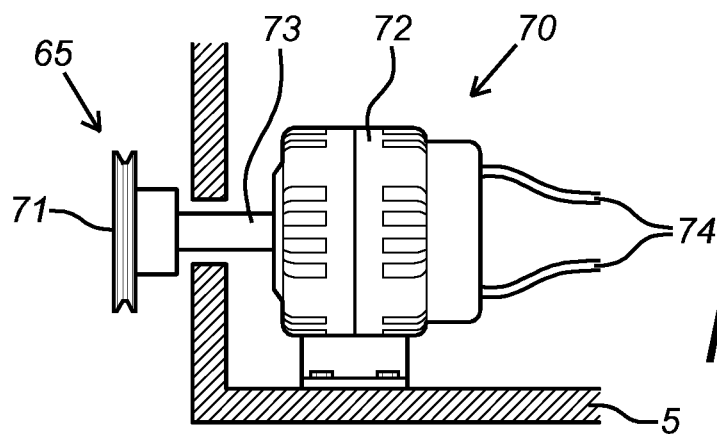
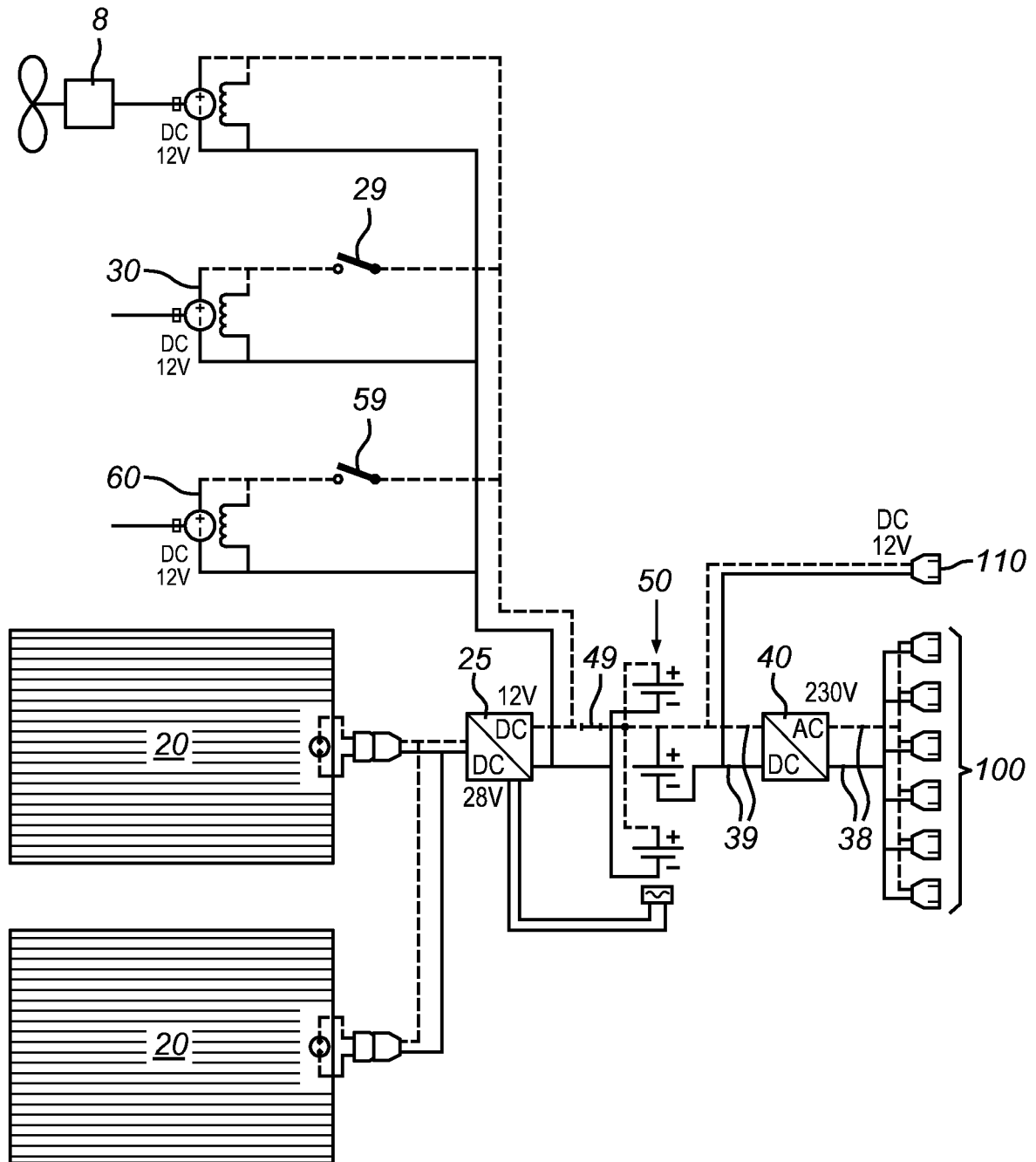
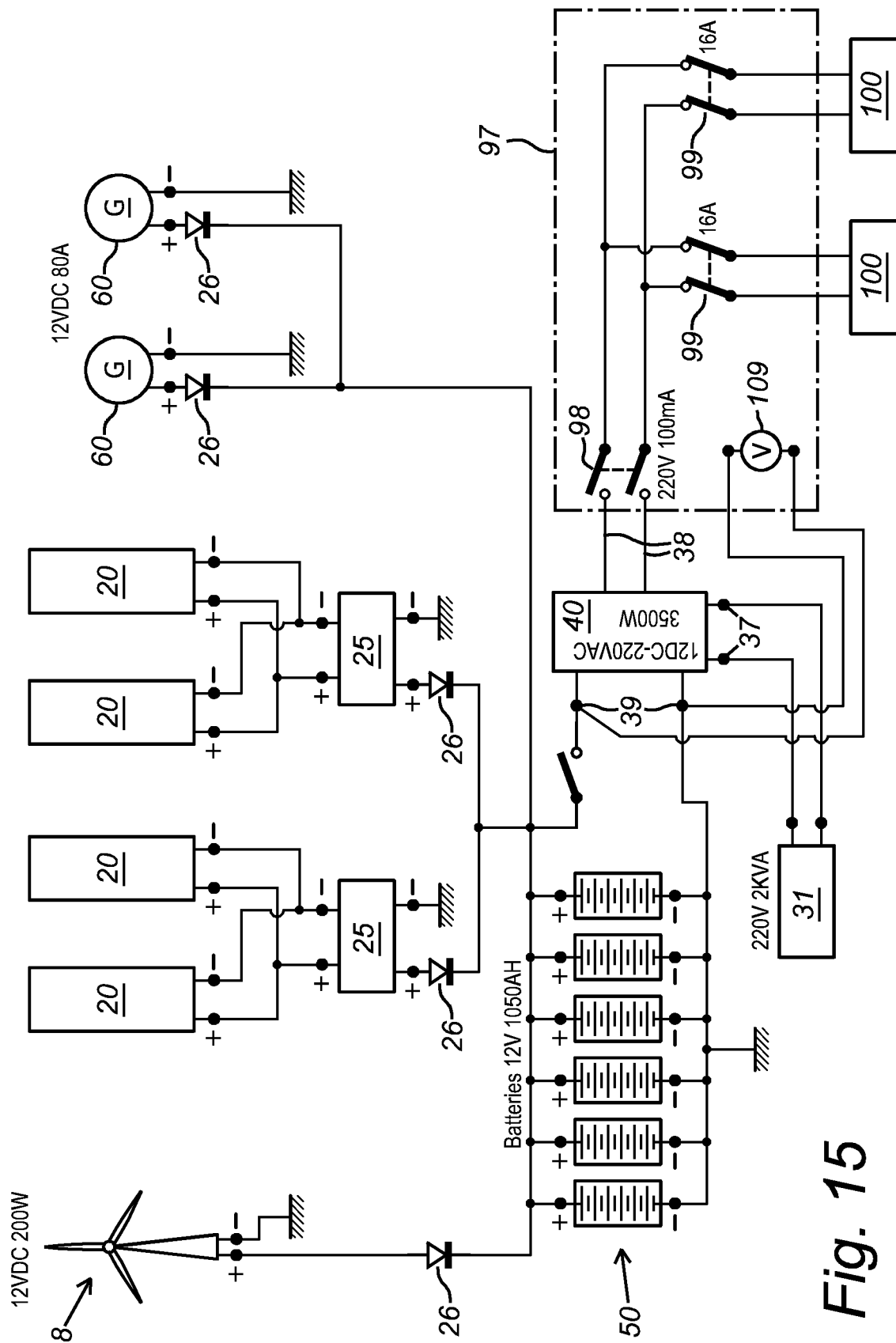


Fig. 13

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*Fig. 14*



INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2011/061811

A. CLASSIFICATION OF SUBJECT MATTER
 INV. H02K7/18 F03D9/00
 ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 H02K F03D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 680 907 A (WEI HE CLYDE R [US]) 28 October 1997 (1997-10-28) page 2, column 2, line 13 - column 4, line 60; figures 1-3, 5 -----	1-3, 6-8, 11, 13-16
Y	US 2005/218657 A1 (WEESNER BRENT E [US] ET AL WEESNER BRENT EDWARD [US] ET AL) 6 October 2005 (2005-10-06) paragraph [0025] - paragraph [0044] ; figures 1-4, 8-11 -----	1-14
Y	US 2007/013244 A1 (KINKAID CHRISTOPHER P [US]) 18 January 2007 (2007-01-18) paragraphs [0004] , [0017] - paragraph [0023] paragraph [0027] - paragraphs [0029] , [0034] ; figures 1-5 ----- -/- .	1-14



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

27 September 2011

Date of mailing of the international search report

12/10/2011

Name and mailing address of the ISA/

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Sedlmeyer, Rafael

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2011/061811

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 2009/315338 A1 (YLVISAKER CARL [US]) 24 December 2009 (2009-12-24) abstract; figures 1-3 -----	1-5
A	US 2007/051542 A1 (WILKS PAUL L [US]) 8 March 2007 (2007-03-08) paragraph [0013] - paragraph [0018] ; figures 3,4 -----	1-5
A	US 7 469 541 B1 (MELTON DAVID S [US] ET AL) 30 December 2008 (2008-12-30) column 3, line 13 - column 4, line 30; figures 1,2 -----	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2011/061811

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