

GRAVITATIONAL ELECTRIC POWER PLANT TECHNOLOGY

Field of the invention

[0001] This invention relates to the field of harnessing gravitational force and to the conversion of the work done by gravitational force into other forms of energy and/or work. More particularly this invention relates • to generation of electrical energy by harnessing gravitational force either solely or in combination with other forms of energy (renewable or non-renewable), with special focus on resource-economy, minimal pollution and externalities.

Background of the invention

[0002] The industrial revolution radically influenced almost every aspect of human life and in pursuit of sophistication and advancement, man's dependencies not only shifted, but also increased exponentially. Today machines created by man govern his life - his households, businesses, transport, agricultural output, food processing, warfare, economy, as well as dictate the quality of his future. Since all machines need power (energy) to process their input, demand for power too has exponentially increased and today the ability to generate enough power is among the key factors that decide a country's stature in the international economic and political arena. Focus until recent decades had been on conventional non-renewable resources (Fossil fuels such as coal, petroleum, and natural gas, and later, types of nuclear power such as from radioactive uranium, and certain aquifers) to meet power demands. But our power plants and heating-cooling-cooking-burning practices are now producing more greenhouse gases than we can tolerate to maintain a stable climate. The international climate science community cautions us to drastically cut our carbon emissions. Further, we are now approaching peak oil and gas production, in which half the amount of total known global supply has already been used, with steadily increasing prices to come; and "clean coal", "sustainable biomass", "safe nuclear" and other such cliches seem mere illusions. The only remaining choices quoted by the international scientific community for our energy future are the 'Renewables'- hydropower, geothermal, biomass, solar thermal, solar electric, wind, tides, waves, ocean- thermal-gradients, and new, unconventional technologies.

[0003] Existing nonrenewable and renewable energy generation technologies and their contribution to the global energy is approximately thus; NONRENEWABLES (93%);- 1. Combustion of petroleum-based fuels (39%), 2. Combustion of natural gas .(24%), 3. Combustion of coal and its derivatives (24%), 4. Hydrogen derived from petroleum, natural gas, or coal, 5. Uranium and plutonium• fission-based nuclear reactors that are highly radioactive_ (5%), 6. "Hot fusion": RENEWABLES (7%); - 7. Wind-based generation systems (0.2%), 8. Solar-based heating and power generation systems (0.1%), 9. Geothermal-based heating and power generation systems (0.4%), 10. Biofuels (ethanol and biodiesel) (1%), 11. Biomass combustion (mostly wood chips)(2%), 12. Fuel cells, 13. Anaerobic digestion of waste to biogas, 14. Conventional hydroelectric generators (3%).

[0004] Several experiments and inventions using gravity form part of the literature relevant to the power sector. However, one common approach taken by many inventors is to build a self sustaining

machine using gravity, to generate power- which may seem feasible in theory, but isn't so in practice- especially in the context of producing substantial amounts of power that can be harvested to run other machines/appliances. This is primarily due to the fact that the work done by gravity on a given (self sustaining) machine is barely enough to sustain itself, and the prospects of additional power generation are therefore unrealistic. For instance US20090115195, a gravity power generation mechanism seeks to run the power generation unit by running a series of single-directional-swing arms that tend to stretch outward on only one side, as they circle the said unit, so as to produce a larger positive torque (purportedly due to the outstretched arms on one side), that would impel and sustain continuous rotational motion of that unit. This however is not true in practice since a greater number of collapsed arms collect on the opposite side and cancel out the positive torque created by the fewer outstretched ones. In Indian Patent No. 207600 (649/MUM/2004), the claimed apparatus seeks to use gravitational force exerted on a falling object suspended by a rope and pulley, to rotate a fly wheel which is said to store the rotational kinetic energy, and which in turn is said to lift the (fallen) object upward; and this cycle of alternate upward-downward movement of the said weight is claimed to be used to rotate a dynamo shaft to generate electricity. This is again not a sustainable design for efficient power generation since it contradicts the 2nd law of thermodynamics that states that some energy in a system is always lost (including during transmission), and therefore a machine cannot make more energy than it uses or even enough to keep itself operating indefinitely.

[0005] It is therefore imperative that an external force be employed to sustain additional work done by a machine, especially one that uses gravity. Therefore in US6445078, an elevated water reservoir fills a plurality of containers that travel downward under the weight of the water and this 'controlled' gravity influenced movement is made to drive a generator, while the said containers after reaching down, are emptied and carried back up by an ad hoc powered mechanism. In US5905312 too, a similar concept is applied wherein water or other fluid from an elevated reservoir feeds secondary tanks that glide under the influence of gravity along a controlled downward path and are emptied into another floor reservoir. This downward gravity induced motion is harnessed to rotate a generator shaft with the help of gears. Water emptied by the said secondary tanks is pumped back into the elevated tank by an ad hoc powered pump. In these systems however, since the downward movement is 'controlled' and is not a free fall, the entire work done by gravity on the load is not available to be harnessed, which directly affects the efficiency of the said systems. Besides, factors including the time taken to fill water into each container/tank, the rate at which water/fluid is fed back into the reservoir, and the maximum feasible size of each container/tank etc., limit the scalability of the set-up and are not ideal for very high power generation requirements. such as those that power a township or even a reasonably large industrial installation. In US8011182, US20110179784 and in US20110162356, gravity acts on a series of buckets fastened to a chain or belt, that descend downward in a liquid medium due to their mass/weight (gravity). Once they reach the bottom, they are filled with gas or other lighter fluid/medium, that renders them buoyant thereby causing their ascent (upward), and upon reaching the top the gas is released out of the buckets. This cyclic upward-downward movement is used to run a generator shaft to produce electricity. Here again, the velocity of descent, and the rate at which gas is refilled into each bucket, the largest feasible size of a bucket, and the torque that can be so created etc., limit the scalability of the invention which cannot be used for high power generation requirements.

[0006] It is therefore apparent from prior art (inventions) that gravity based models thus far have not been able to cater to large or even medium scale power requirements. Gravity being free, perennial, ubiquitous, ecologically safe and above all - directly proportional to product of the mass of the object in question (- promising remarkable efficiency), and independent of climate, season, weather, wind, sunshine, tide, rain, geography or other resources etc., presents an avenue to an urgent as well as long felt need for a viable solution that is safe and sustainable, and that effectively harnesses gravitational force and efficiently converts the work done by gravity into other forms of energy, particularly electrical energy, especially at a very large scale.

[0007] This inventor has developed an apparatus, system and method/s that effectively harnesses gravitational force and efficiently convert work done by gravity into other forms of energy, especially electrical energy, and that is versatile and almost illimitable as to its scalability.

Objects of the invention

[0008] It is therefore the main object of this invention to effectively harness work done by gravitational force, and to efficiently convert the same to other forms of energy and/or work, more particularly electrical energy, in an economical, eco-friendly and safe manner.

[0009] It is another main object of this invention to design and implement an apparatus, system and method/s that harness and convert gravitational force so as to generate large, medium and small scale electric power, whereby the aspect of scalability is almost illimitable, applicable anywhere and around the year.

[0010] It is another main object of this invention to enhance the effectiveness of harnessing gravitational energy.

[0011] It is another main object of this invention to enhance the efficiency of conversion of gravitational energy to other forms of energy, especially electrical energy.

[0012] It is another main object of this invention to allow for a heavy mass to fall freely under the influence of gravity, so as to increase the total work done, for harnessing and conversion; and to provide for controlling its fall and for lifting the said heavy mass back up, by a counterbalancing means such that the net weight that is lifted is the difference between the two, thereby increasing efficiency of the system.

[0013] It is another object of this invention to optimise the number of units employed, with the distance and speed of the free fall of the object/s with heavy mass, whereby upward or downward movement of either the Main weight or the Counterweight in any given unit is eventually passive and driven by gravity, so as to achieve minimal input of power, and superlative efficiency.

[0014] It is yet another object of this invention to provide for auxiliary power generation mechanisms in the gravity power generation system to enhance overall output of power generated and thereby enhance the efficiency of the system.

Statement and summary of the invention

[0015] According to this invention, there is therefore provided an apparatus, system/s and method/s that on the one hand, maximise work done by gravity, by allowing free fall of an object

with a heavy mass to harness energy and output therefrom, and on the other, maximises efficiency by counterbalancing this heavy mass by another similar mass such that only the net difference of the said two masses needs to be worked upon by input power mechanisms in order to lift the fallen object back up to its original position, along the direction of gravity or otherwise, to repeat the cycle. A plurality of such units are used in synchronised tandem to maintain a continuous movement of the gear/flywheel/shaft connecting a high output generator. Besides, this invention also envisages auxiliary energy generation mechanisms known in the art to further augment efficiency of the system; each such unit comprising; (i) A hollow vertical channel, erected above ground level, provided with at least two guide rails along its inner walls through which (ii) a Main-weight comprising (ii)(a) an upper component called the 'Head' made of a material of suitable mass and density, preferably Titanium, shaped preferably corresponding to the cross section of the channel and provided with means at its periphery, that conform with and slide through and along the said guide rails of the said vertical channel, and (ii)(b) a lower component being a vertical shaft made of a material of suitable mass and density, preferably Titanium, which bears teeth at least on one side of its length that engage a (iii) Main gear that in turn directly or through a flywheel and/or secondary gear/s, to rotate the (iv) Horizontal shaft of a generator, as the said vertical shaft moves downward with the falling Main weight due to the gravitational force. The said main gear is constructed like a free wheel so as to permit bi-directional engagement, and uni-directional rotation of the said Horizontal shaft of the generator, when the said vertical shaft moves downward.

[0016] (a) The upper said component (ii)(a) of the main weight is preferably (but not limited to) cylindrical, or cylindrical-oval, square-prism or such other shape corresponding to the said hollow vertical channel and depending on specific requirements of a project. For instance, where the project caters to large scale electricity generation wherein very heavy and large weight is used, it is preferable to use cylindrical, oval or square prism shape in order to accommodate a larger number of ropes to suspend the said weight. As the said main weight makes a downward freefall under the influence of gravity, its upper component or Head reaches the bottom of the hollow vertical channel where it is gradually halted with the help of (v) retarding/halting means that include but are not limited one or more of the following; Air Chamber/s, Air Pusher/s,, spring/s, brakes, Electromagnet/s, Means that exert Lenz's force/s, Opposing movement of the Counterweight on the other side; and the Vertical shaft being the lower component of the said mainweight enters a (vi) vertical subterranean hollow tube.

[0017] The said weight is suspended by (vii) ropes from a (viii) system of pulleys wherein the other ends of the said ropes are attached to (ix) a Counterweight, which is mounted on a (x) lift such that the said lift (along with the said counterweight) is suspended to slide upward and downward in (xi) a vertical frame erected parallel to the said hollow vertical channel, such that the direction of movement of the Main weight is opposite that of the counterweight which is as heavy as or marginally heavier or lighter than the main weight, depending upon the design of a given embodiment/version/variant of this invention.

[0018] The Counterweight, that counter-balances the Main weight, is mounted on a powered Lift system to carry it upwards and downwards at predetermined speeds to synchronize the falling Main weight such that revolution of the horizontal shaft of the generator is continuous. The said ropes in each unit rim over a system of pulleys; each system comprising a plurality of rows of pulleys,

designed to provide for auxiliary power generation so as to allow for mounting coils/magnets to produce electricity.

[0019] The synchronisation of upward-downward movements of the main weight and counterweight is executed with the help of sensors and signalling means to synchronize and control the velocity of the counterweight and hence that of the main weight of one or more units, so as to maintain a continuous movement of the generator shaft.

Brief description of the Drawings:

[0020] Figure 1: Schematically depicts two units and their constituents, wherein the Main weight of one unit is in its free falling/dropping phase while that of the other unit stands hoisted, in synchronized tandem.

[0021] Figure 2: Describes in perspective, the general layout for three units and their respective constituent parts.

[0022] Figure 3: Shows a close up focused on the Main weight as it drops to the bottom of the Hollow vertical channel while the retarding and halting means act on it.

[0023] Figure 4: Shows the Systems of pulleys and ropes suspending the Counterweight along with the Lift (as well as the Main weight- which is not shown), in perspective

[0024] Figure 5: Depicts a partial vertical cross-sectional view of the hollow vertical channel and particularly shows the guide rails along the inner walls of the hollow vertical channel and rollers of the main weight.

[0025] Figure 6: Shows the vertical shaft and teeth on the vertical shaft.

INDEX OF ITEMS DESCRIBED IN THE DRAWINGS:

- [0026] 1. Hollow vertical channel
- [0027] 2. Ropes
- [0028] 3. System of pulleys
- [0029] 4. Head of the Main-weight
- [0030] 5. Vertical shaft of the Main-weight
- [0031] 6. Halting and braking system within the Hollow vertical channel
- [0032] 6-A. Air pusher as part of braking system
- [0033] 6-S. Spring as part of braking system
- [0034] 7. Sensors and signaling means
- [0035] 7-(1). Sensor-1

- [0036] 7-(2). Sensor-2
- [0037] 8. Main gear
- [0038] 9. Vertical subterranean hollow tube
- [0039] 10. Vertical Frame
- [0040] 11. Counterweight
- [0041] 12. Lift
- [0042] 13. Horizontal shaft
- [0043] 13-A Auxiliary Power generating unit in System of Pulleys
- [0044] 13-H. Horizontal shaft holder
- [0045] 14. Generator
- [0046] 15. Auxiliary Power generating unit
- [0047] 15-P. Auxiliary Power generating unit in System of Pulleys
- [0048] 16. Guide rail
- [0049] 17. Roller
- [0050] 18. Shaft teeth
- [0051] 19. Ground Level

DETAILED DESCRIPTION OF THE INVENTION:

[0052] It is pertinent to mention that the description herein is meant to explain the design, construction and method/s by which the invention can be worked, more particularly and especially in a manner that applies to (but is not limited to) high capacity power generation plants, without limitation as to obvious alterations, modifications and adaptations of the parts, construction and method/s described; and that the diagrams/drawings herein are not drawn to scale but only serve to schematically explain the construction, working concept of the invention and represent the broad dimensions, shapes, spatial arrangement and inter-relationships of the parts, without limitation to their interchangeable or other obvious modifications and/or adaptations.

[0053] This invention anticipates material/s other than those specifically mentioned to describe the working embodiments, their various forms, adaptations and versions and various other metallic alloys and other combinations commonly used in the art for manufacture of power generation equipment.

[0054] Obvious and rather trivial details that do not warrant specific mention and which are known and obvious to a person skilled in the art are not mentioned and/or explained and/or drawn, while they are very much a part of this invention.

[0055] The description herein therefore shall not be construed to unduly limit the intended scope, spirit and extent of the invention.

Detailed Description And Working Of Preferred Embodiment I:

[0056] According to the preferred embodiment the apparatus, system/s that effectively harness and efficiently convert gravitational force/energy so as to generate large scale electric power comprising (without limitation and more particularly, to provide a simplistic example and explanation) three identical units wherein; each single unit comprises; (i) A first hollow vertical cylindrical channel, 48 meters in height, inner diameter of 1 meters 30 cms, and wall thickness of 50 cm, erected above ground level, provided with at least two guide rails along its inner walls through which (ii) a Main-weight comprising (ii)(a) an upper component called the Head made of preferably (but not limited to) Titanium 30 cm in height, weighing 500 kg, diameter 1m, cylindrical in shape, corresponding to the cross section of the channel and provided with rollers at its periphery, that conform with and slide through and along the said guide rails of the said vertical channel and (ii)(b) a lower component being a vertical shaft preferably made of (but not limited to) Titanium 45 meters in length, and weighing 100 kg per meter of height, = 4500 kgs in weight, and which bears teeth on one side along 40 meters, i.e., from top 5th to bottom 44th meter of its length that engage a main gear with a perimeter of 1 meter, that in turn directly rotates the Horizontal shaft of 0.96 meter radius of a generator, as the said vertical shaft moves downward with the falling Main weight due to the gravitational force at a velocity of 3 mtrs/sec = 13.3 seconds for a fall of 40 meters, i.e., having due regard to the atmospheric air resistance, and the impedance offered by the gear on the Horizontal shaft that it is meshed with and rotates. The upper said component or Head (ii)(a) of the main weight is preferably (but not limited to) cylindrical, or cylindrical-oval, square-prism or such other shape corresponding to the said first hollow vertical channel and depending on specific requirements of a project. For instance, where the project caters to large scale electricity generation wherein very heavy and large weight is used, it is preferable to use cylindrical, oval or square prism shape in order to accommodate a larger number of ropes to suspend the said weight. The said Main gear acts as a free wheel so as to permit bi-directional engagement and uni-directional rotation i.e., when the said vertical shaft moves downward.

[0057] (a) As the said Main weight makes a downward freefall under the influence of gravity, its upper component or Head reaches the bottom of the hollow vertical channel where it is gradually halted with the help of -a combination of Air Chamber/s, Air Pusher/s, spring/s, Brakes, Electromagnet/s, as well as by the Opposing movement of the Counterweight on the other side;; and the Vertical shaft being the lower component of the said Main weight enters a vertical subterranean hollow tube 45 meters in depth.

[0058] The said weight is suspended by heavy duty: 24mm traction ropes made up of (but not limited to) self lubricated fibre synthetic traction ropes, from a system of pulleys wherein the other ends of the said ropes are attached to (iii) a Counterweight, which is mounted on a lift such that the said lift (along with the said counterweight) is suspended to slide upward and downward in a vertical frame erected parallel to the said hollow vertical channel, such that the direction of

movement of the Main weight is opposite that of the counterweight which according to this embodiment is marginally heavier than the main weight, i.e, 5100 Kg .

[0059] The Counterweight that more or less balances the main weight is mounted on a powered Lift system to carry it upwards and downwards at predetermined speeds to synchronize the falling weight such that revolution of the horizontal shaft of the generator is continuous. The said lift is powered by a 20 HP motor which lifts the counterweight at 45 meters in 15 seconds, whereby the power required is 12 KW in 15 seconds. Hence in this embodiment comprising 3 units, the total power consumed by each of the 3 lifts is $(12 \text{ kw} \times 4 \times 60 \times 24) = 69 \text{ MW}$ in a day. The main weight and counterweight of each unit are suspended by a set of 9 heavy duty 24 mm traction ropes.

[0060] The said ropes in each unit run along a system of Pulleys; each system comprising 12 rows of pulleys and hence a total of 36 pulleys are employed in this embodiment comprising 3 units. Each pulley is made of manganese bronze and has a diameter of 50 cm. Each system of Pulleys is designed to provide for auxiliary power generation so as to allow for mounting coils/magnets to produce electricity.

[0061] The synchronisation of upward-downward movements of the main weight and counterweight is executed with the help of Magnetic sensor/s which is placed at a distance of 40 meters from the apex of the first vertical channel, to control the velocity of the counterweight and hence that of the main weight.

[0062] When the Head of the said Main-weight reaches the bottom of the first hollow Vertical channel at 40 meters depth, the Magnetic Sensor in Unit I will activate an Electronic Signal in the Lift of Unit I to exert necessary retarding effect by means of brakes or motion in the same direction as the Main weight of Unit I, thereby first controlling/retarding the fall of the said Main weight, and subsequently setting it in motion in the opposite direction to travel back upwards to its original position.

[0063] The said Sensor in Unit I, will also activate an Electronic signal in the Lift in Unit II to commence the free falling phase of the Main weight in Unit II. This cycle is repeated by the Magnetic Sensor in Unit II, in tandem, in order to signal to activate the Lift in Unit III to commence the free falling phase of the Main weight in Unit III, and likewise the cycle repeats for the Magnetic Sensor in Unit III, in tandem, in order to signal to activate the Lift in Unit I to commence the free falling phase of the Main weight in Unit I, thereby ensuring that at least one vertical shaft (of one of the 3 Units) will be in its descending/dropping phase at any given time.

The Process/Method of Generation of Power/Electricity:

Start-up:

[0064] (a) According to this embodiment, since the Counterweight is heavier than the Main weight, the default position before start-up would be; the Main weight raised up at 45.5 meters height in the first vertical hollow channel and the Counterweight (along with the lift) stationed at the bottom of the vertical frame. The start-up operation would therefore involve, among others, operating the said Lift in an upward direction to cause the main weight to

drop. This process step consumes the higher input power/energy particularly at the beginning of this step since the direction of movement of the Lift (along with the Counterweight) is against gravity, but as the Lift moves upward the burden on it is merely the difference between the weights of the Main weight and the Counterweight which is not more than 10% of the falling weight. Moreover, as the falling weight gains momentum under the influence of gravity it accelerates steadily whereby its velocity tends to increase linearly and the distance covered in unit time tends to increase quadratically. It is during this phase that maximum work is done by gravity which is harnessed by engaging the Vertical shaft of the Main weight to engage the Horizontal shaft of the generator to rotate. However, as the Main weight drops and reaches the bottom, it is gently retarded and halted by a retarding and halting mechanism comprising (but not limited to) brakes and Opposing movement of the Lift (along with the Counterweight) on the other side.

Routine operation

[0065] (b) In the next step (i.e., after the Main weight drops), the Lift (along with the Counterweight) which stands hoisted at the upper end of the vertical frame, is triggered by the sensor and signalling mechanism as explained hereabove, to commence downward movement. This downward movement consumes minimal power/energy for two reasons, (i) since the total weight of the Counterweight (along with the Lift) is greater than that of the Main weight on the other side, and (ii) this downward movement is along the direction of, (and is therefore additionally aided by) gravity. In embodiments comprising greater number of such units, this step can be executed even without running the lift on power since the heavier Counterweight would automatically outweigh the Main weight and lift it back up.

[0066] (c) The sensor and signalling mechanisms synchronise with the movement and direction of the Lift along with the Counterweight to ensure that at least one vertical shaft (of one of the 3 Units) will be in its descending/dropping phase at any given time to maintain continuous movement of the Horizontal shaft of the generator.

[0067] (d) This embodiment can therefore generate net power output in the range of at least 562 MW per day (having regard to 30% of power input consumed to sustain the upward-downward movement of the Mainweight and Counterweight).

[0068] (e) The ideal configuration for a plant would therefore be based on the quantum of power requirement, to optimise the number of units employed, with the distance and speed of the free fall of the object/s with heavy mass, whereby upward or downward movement of either the Main weight or the Counterweight in any given unit is eventually passive and driven by gravity, so as to achieve minimal input of power and superlative efficiency.

Embodiment II:

[0069] In another embodiment, the input power requirements can be further minimised wherein all other conditions, parameters being the same as in the preferred embodiment I detailed above, the distinguishing features are;

[0070] (i) The System of Pulleys positioned horizontally above the vertical chamber and frame are connected to one or more motors powered either by an external source or by a part of the output energy generated by this invention, so as to rotate in clock-wise and/or anti-clock wise direction to lift or drop the Main weight or Counterweight, as the case may be, either in addition to the said lifts as mentioned in embodiment I above or without the use of any lift.

[0071] (ii) In this embodiment, the means that run over the said pulleys and that suspend the weights need to exert sufficient friction and grip over the pulleys so as to pre-empt slipping. A good alternative to the said ropes as mentioned in the preferred embodiment I is (but not limited to) belts of suitable material known in the art, provided with teeth that mesh with the teeth of the said pulleys that are suitably modified to resemble gears with teeth to correspond to those in the said belts.

[0072] (iii) In this embodiment therefore the Main weight and Counter weight are preferably equal in mass and weight and hence, once the weights are set in motion by the rotating pulleys, a mere fillip is sufficient to accelerate the drop of the Main weight, thereby conserving input power and enhancing output efficiency.

Embodiment III:

[0073] In another embodiment, the input power requirements can be further minimised wherein all other conditions, parameters being the same as in the preferred embodiment I detailed above, the only distinguishing features are;

[0074] (i) The Main weight and counterweight are exactly equal,

[0075] (ii) Each Main weight and Counterweight is further attached to an Upper lift (that positioned above the respective weight (i.e., Main weight or Counterweight) and a Lower lift positioned below the respective weight (i.e., Main weight or Counterweight) and wherein each of the said Upper and Lower lifts is detachable from its respective weight.

[0076] (iii) The sensor and signalling mechanisms, based on a calculation that rationalizes and optimises the distance, speed/velocity, and number of units in the system, govern the programmed attachment and detachment of the said lifts from their respective counterweights.

[0077] (iv) Each of the said lift has its own mass and weight which is constant across lifts in a given unit.

[0078] (v) When a given lift attaches itself to its respective weight, while another lift detaches itself from its respective weight a disequilibrium or imbalance is brought about, which in turn causes the weight from which one or both lifts are detached to get automatically hoisted as the weight on the other side with both its respective lifts attached to it and therefore being heavier to drop, either freely under the influence of gravity or due to the powered movement of the respective lift/s.

[0079] (vi) This upward and downward movement, leverages gravitational force to the maximum and thereby minimises the requirement of input power so as to achieve superlative power generative efficiency of the system.

CLAIMS

1. A system for converting kinetic energy activated through gravitational force into electrical energy, the system comprising:
 - a plurality of power generating units arranged in series and operable in tandem synchronization, each unit of the plurality of power generating units comprising:
 - a main gear;
 - a main weight comprising a head portion and a vertical shaft extending downwardly from the main weight head portion; the vertical shaft of the main weight having a longitudinal axis and a lateral wall along the longitudinal axis;
 - a vertical channel with a bore therethrough, the vertical channel sized to permit passage of the main weight head portion therethrough in a fall movement of the main weight head portion from an upper elevation portion of the vertical channel to a lower elevation portion of the vertical channel, the lateral wall of the vertical shaft operably engageable with the main gear to rotate the main gear as the main weight is falling from the upper elevation portion of the vertical channel to the lower elevation portion of the vertical channel;
 - a counterweight heavier than the main weight, the counterweight comprising a counterweight head portion, the counterweight head portion coupled to a proximal end of one or more connecting members and the main weight head portion coupled to a distal end of the one or more connecting members;
 - a pulley assembly configured to receive the one or more connecting members so that the main weight head portion and counterweight head portion are suspended from opposite sides of the pulley assembly and the one or more connecting members dimensioned to allow a tight connection between the main weight and the counterweight at least when one of the main weight head portion and the counterweight head portion is positioned at the lower elevation portion and the other one of the main weight head portion and the counterweight head portion is positioned at the upper elevation portion;
 - an electricity generator comprising a horizontal shaft, the horizontal shaft operably connected to the main gear of each unit of the plurality of power generating units and rotatable in response to downward movement of the main weight head portion and rotation of the main gear, wherein rotation of the horizontal shaft drives the generator to generate electricity;

control means for controlling the plurality of power generating units, the control means configured to control and synchronize movement of the main weight and the counterweight in each unit of the plurality of power generating units such that, when the one or more connecting members are in tight configuration, movement of the main weight is directly related to movement in the opposite direction of the counterweight, and when the one or more connecting members are not in tight configuration, downward movement of the main weight is independent of upward movement of the counterweight; the control means further configured to synchronize and permit movement of the main weight of one unit in the plurality of power generating units in relation to movement of the counterweight of another unit in the plurality of power generating units arranged in series with the one unit such that the main weight in the one unit is allowed to fall from the upper elevation portion to the lower elevation portion when the counterweight in the other unit is at the lower elevation portion; and

lifting means controlled by the control means for lifting the counterweight of each unit from the lower elevation portion to the upper elevation portion, the lifting means and the control means initially powered by an auxiliary power source and the energy generated from the plurality of power generating units is used to supplement power exerted from the auxiliary power source.

2. The system as claimed in claim 1, wherein the upper elevation portion and the lower elevation portion define a free-fall height, and wherein the vertical shaft extending from the main weight head portion has a length equal to or greater than the free-fall height.
3. The system as claimed in claim 2, wherein the main gear and the electricity generator are located in proximity of the lower elevation portion.
4. The system as claimed in claim 3, wherein the vertical shaft engages and rotates the main gear at all times during the fall of the main weight.
5. The system as claimed in claim 4, wherein the lateral wall of the vertical shaft comprises shaft teeth, the shaft teeth and main gear operably engageable with each other to rotate the main gear according to a rotation axis perpendicular to the fall direction as the main weight head portion falls between the upper elevation portion and the lower elevation portion.

6. The system as claimed in claim 1, wherein each unit further comprises a retarding and halting member configured to retard and halt movement of the main weight head portion in proximity of the lower elevation portion.
7. The system as claimed in claim 6, wherein the retarding and halting member comprises at least one of an air chamber, an air pusher, springs, brakes, electromagnets, and the counterweight.
8. The system as claimed in claim 1, wherein the vertical channel comprises guide rails and rollers adapted to enable the main weight head portion to slide inside the vertical channel between the upper elevation portion and lower elevation portion.
9. The system as claimed in claim 1, wherein the vertical channel has a cross-section corresponding substantially in shape to a cross-section of the main weight head portion.
10. The system as claimed in claim 1, wherein the horizontal shaft extends along a rotational axis of the main gear and is rotatable in a rotational direction when the vertical shaft engages and rotates the main gear while the vertical shaft moves downwardly during the fall of the main weight, and the main gear prevents the horizontal shaft from rotating in a direction opposite to the rotational direction when the vertical shaft engages the main gear while moving in an upward direction.
11. The system as claimed in claim 1, wherein each unit further comprises a hollow tube located below the vertical channel along the fall movement direction and configured to accommodate passage of the vertical shaft as the main weight falls from the upper elevation portion to the lower elevation portion.
12. The system as claimed in claim 11, wherein the hollow tube is subterranean.
13. The system as claimed in claim 1, wherein the main weight and the vertical shaft are made of titanium.

14. The system as claimed in claim 1, wherein the main weight is substantially cylindrical in shape and has a diameter of about 1 meter.
15. The system as claimed in claim 14, wherein the vertical shaft is about 45 meters in length and has a weight of around 100 Kg per meter of length.
16. The system as claimed in claim 15, wherein the weight of the vertical shaft is around 9 times the weight of the main weight head portion.
17. The system as claimed in claim 16, wherein the main gear is circular in shape and has a perimeter of around $1/45$ the length of the vertical shaft.
18. The system as claimed in claim 1, wherein the plurality of power generating units includes at least three power generating units arranged in series and operable in tandem synchronization to maintain a continuous rotation of the main gear such that at least one unit is in operation at any time for engaging and rotating the main gear.
19. The system as claimed in claim 1, wherein the control means comprise sensors and signalling means for ensuring the tandem synchronization between the units.
20. The system as claimed in claim 1, wherein, the lifting means are configured to hold the counterweight stationary at the upper elevation portion and wherein, when the one or more connecting members are in tight configuration, the counterweight is adapted to be in counterbalance cooperation with the main weight for slowing down the main weight in proximity of the lower elevation portion during the fall of the main weight.
21. The system as claimed in claim 20, wherein the pulley assembly and the one or more connecting members are adapted to provide the counterbalance cooperation between the main weight and the counterweight.
22. The system as claimed in claim 21, wherein the control means of each unit comprise sensors and signalling means for controlling and synchronizing a velocity of movement of the counterweight while in counterbalance cooperation with the main weight such that the

rotation of the main gear remains substantially continuous during the fall of the main weight.

23. The system as claimed in claim 1, wherein each unit further comprises a second vertical channel with a bore therethrough, the second vertical channel sized for receiving and guiding the counterweight head portion in an upward and downward movement.
24. The system as claimed in claim 23, wherein the control means control activation and deactivation of the lifting means, wherein deactivation of the lifting means induces the downward movement of the counterweight and induces vertical upward motion to the main weight through the vertical channel from the lower elevation portion to the upper elevation portion when the one or more connecting members are in tight configuration.
25. The system as claimed in claim 1, wherein the counterweight is up to 10% heavier than the main weight.
26. The system as claimed in claim 22, wherein the sensors to control and synchronize the velocity comprise at least one of magnetic sensors, light beam/laser sensors, passive infrared sensors, knock sensors, pressure sensors, proximity sensors, and electric sensors.
27. A method of generating electrical energy using the kinetic energy induced by gravitational energy, the method comprising:
providing a system comprising a plurality of power generating units arranged in series and operable in tandem synchronization, each unit of the plurality of power generating units comprising a main weight having a main weight head portion and a vertical shaft downwardly extending from the main weight head portion and a counterweight having a counterweight head portion, the counterweight heavier than the main weight;
coupling the counterweight to the main weight by one or more connecting members, such that the counterweight head portion is coupled to a proximal end of the one or more connecting members and the main weight head portion is coupled to a distal end of the one or more connecting members, and the one or more connecting members are held by a pulley assembly so that the main weight head portion and the counterweight head portion are suspended from opposite sides of the pulley assembly, and the one or more connecting members dimensioned to allow a tight connection between the main weight and the

counterweight at least when one of the main weight and the counterweight is positioned at a lower elevation position and the other one of the main weight and the counterweight is positioned at an upper elevation position;

operating the power generating units in repeating cycles, each cycle comprising the steps of:

- a) using control means initially operated by an external power source to hold the main weight head portion and the counterweight of each unit at the upper elevation position;
- b) allowing the main weight in a first unit of the plurality of power generating units to fall from the upper elevation position to the lower elevation position along a fall direction, wherein downward movement of the main weight is independent from corresponding upward movement of the counterweight;
- c) activating a main gear located in proximity of the lower elevation position with the vertical shaft in the first unit as the main weight falls from the upper elevation position to the lower elevation position, such that downward movement of the vertical shaft causes the vertical shaft to engage the main gear and causes rotation of the main gear according to an axis of rotation perpendicular to the fall direction during the fall of the main weight;
- d) turning a horizontal shaft of a generator by engagement of the main gear with the horizontal shaft to produce electricity;
- e) using the control means to allow the counterweight of the first unit to fall from the upper elevation to the lower elevation when the main weight reaches the lower elevation, the fall of the counterweight resetting the main weight to the upper elevation where the main weight is held by the control means;
- f) repeating steps a) to e) for a next unit arranged in series in the plurality of power generating units; wherein once the counter weight of a last unit of the power generating units reaches the lower elevation position, the control means allow the main weight of the first unit to fall again causing a first cycle to be completed and a next cycle to be initiated;
- g) before completing the cycle, lifting the counterweight in each unit of the plurality of power generating units in tandem synchrony, such that before the next cycle is initiated, at least the counterweight of the first unit is lifted to and locked in the upper elevation position; wherein the control means control the lifting means; and
- h) using the electricity produced to supplement the use of the external power source in operating the control means and in maintaining the system in operation.

28. The method of claim 27, further comprising:

providing a retarding and halting member and by means of the control means, retarding and halting movement of the main weight head portion in proximity of the lower elevation portion.

29. The method of claim 27, further comprising:

providing a vertical channel with a bore therethrough between the upper elevation position and the lower elevation position, the vertical channel sized to permit passage of the main weight head portion therethrough; and
guiding the fall of the main weight head portion from the upper elevation position to the lower elevation position by allowing it to slide inside the vertical channel.

30. The method of claim 27, further comprising:

providing sensors and signalling mechanism for controlling and synchronizing a velocity of movement of the counterweight such that the rotation of the main gear remains substantially continuous during the fall of the main weight.