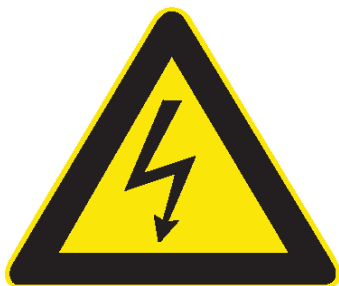


DIRECT ELECTRICAL POWER

From the utilization of renewable ions



Full Disclosure 7th Edition



DIRECT ELECTRICAL POWER

From the utilization of renewable ions
Full Disclosure 7th Edition

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Written & Disclosed by Bruce A. Perreault
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Author Biography

Bruce A. Perreault, of Dorchester, New Hampshire, expands on his radioionic valve discovery to harness the ions which surround our planet Earth to generate useful electrical power for our appliances and machinery. His dedicated efforts have rewarded him with this very plentiful source of energy which is available all year, even without wind or sun light.

Bruce has an extensive background in electronic equipment troubleshooting and repair. He creates innovative electronic schematics for prototypes for a science that does not yet exist in our present time frame. He has fine tuned his skills as an active researcher and designer for futuristic self-sustaining communities. He is internationally known for his scientific essays, articles, research reports, patent papers and idealistic community living based upon high moral standards.

His informal education comes from observing nature and her processes. This has given him a strong foundation in the fields of science and alternative energy technologies. His skills are diversified in electronics, mechanics, molecular & nuclear chemistry, metallurgy, machine tool operation and scientific glass work that provides him with a well-balanced knowledge base. He enjoys his life as a free spirited natural scientist and attributes his successes to living his life with a high degree of ethical standards, treating people the way he would like to be treated. Bruce is an individual who marches to a different drummer. His ideas, though unconventional, are not out of touch with reality. Bruce's strong individuality enables him to stick to his ideas in spite of what some people feel are too unconventional.

His unique way of looking at problems stems from the fact that he doesn't just accept as a given what the textbooks say; he goes beyond current thinking to bring about truly creative technical and philosophical innovations. Even though his lab is small, his ideas are expansive. The concepts that he strives to develop on a daily basis are designed to improve on the human condition. Bruce is capable of viewing the present as but a meager step toward the future of a better life for all worthy people around the globe. He is recognized today as being the principal leading investigator into harnessing the almost limitless supply of energy that surrounds our planet, making the key discovery how it can be efficiently converted from its useless ionic state into electromagnetic currents which is commonly called "electricity." The future survival of life on this planet may depend on this unique natural resource.



Radioionics™ Research is the gateway to generating safe, clean, and reliable energy. Based on the discoveries of Bruce A. Perreault, it is now possible to harvest the ambient energy that bathes our planet and transform it into useful electrical power. This energy appears to be an inexhaustible supply of energy. Our planet literally floats in this sea of energy that is abundant day or night. Bruce has devoted most of his adult life to perfecting the technology that is used to harness this ambient energy. When it is perfected he will offer it for a moderate price to anyone who will use it to better our human condition. He expects that a fully developed product will cost little to maintain.

We build and test high wattage radioionic energy receivers which harvest the abundant sea of radiant energy that continually bathes our planet. An insulated from the ground antenna wire and earth ground is electrically connected to this receiver which draws ambient radiant energy from our planet. Alternatively, a loop antenna and a bare antenna wire that is stretched between two electrically non-conductive poles can be electrically connected to a radiant energy receiver. With the use of a properly crafted ion valve corona discharger, plentiful ambient ions can instantly be converted into high frequency electromagnetic energy. When it is converted into a pulsating unidirectional flow of electrical current its high voltage can then be transformed into a lower voltage, to be stored in a bank of capacitors or other direct current storage components. The method to accomplish this will be revealed in this full disclosure book in easy to comprehend language. No new exotic physics theories are necessary to understand the science involved.

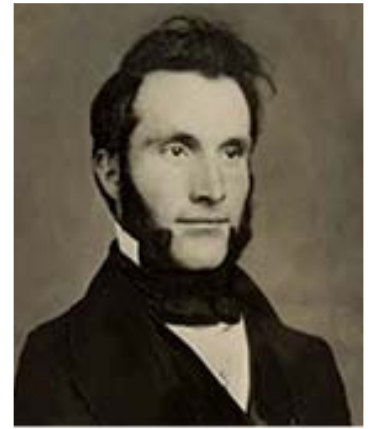
A new science is presented to extract useful naturally occurring electrical power from the sea of ambient energy from the planet which appears to be limitless. This energy source is available during the day or night, all year round, for no more maintenance than from a radio receiver, you cannot ask for a better energy source.

Historical Background

Copy of Hand Written Article

Signed by Dr. Mahlon Loomis, January 7, 1872

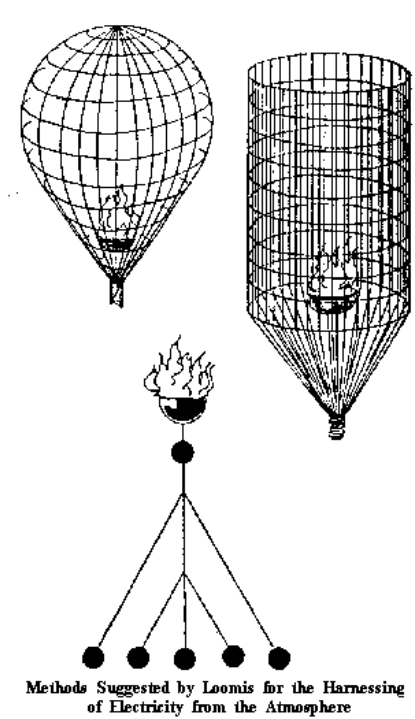
Thomas Appleby, in his 1967 biography "Mahlon Loomis", includes an 1868 letter Loomis sent to his brother, in which he declared -- "Telegraph! That's the least important result I expect to attain..." International wireless communication was merely the first of many spectacular advances Loomis thought could be accomplished by harnessing atmospheric electricity. The text of this 1872 lecture by Mahlon Loomis, reviewing his predictions of an amazing future including, among other things, an inexhaustible source of free electricity and the eventual ability to modify the Earth's climate, comes from S. R. Winters' article, "The Story of Mahlon Loomis."



Radio News

November, 1922, pages 974-978 Loomis lecture extract:

What I contemplate in this undertaking, which is based upon acknowledged scientific facts and mathematical truth, is to send messages from Continent to Continent across the oceans without the use of a cable or artificial battery; or between two stations on the earth, however distant from each other, without intervening wires.



This is the primary undertaking, but with it comes also the ability to draw light, heat and motive power for all purposes, and that without expense beyond the original outlay for cost of apparatus. This is to be accomplished by using the Electrical Element from the inexhaustible supply of nature; not by using artificial batteries and chemical compounds which are but an imitation of nature, as I shall presently attend to, but by drawing from the great aerial reservoir ready-made and never-failing. Where do we look for the greatest display of might and power but to the atmosphere with its restless and appalling thunderbolt, coming unforeseen and shooting at random? In all nature nothing is so powerful, nor so terrible because powerful. And yet this great element goes to utterly idle waste, often causing death and devastation; strange to say, no attempt is ever made to utilize this immense wealth to the purposes of man. But when we consider the expense and imperfection of oceanic telegraphy in its present condition; when we consider the expense of fuel, and heat, of motive power, whether from animals, the waterfall or steam, when we consider these things, I say, and contrast them with the proposition to furnish for all of these, *one subtle*

Element, tractable and obedient, inexhaustible and utterly without cost, or tax or tariff, then that proposition becomes fraught with an importance of the greatest magnitude.

In the first place, *is* there such an element? It is a well established fact of science that free electricity abounds in our atmosphere; that scarcely any traces of it are found less than four feet from the ground or surface of the earth; but on attaining greater height, it becomes more apparent, and the greater the altitude the more this element abounds; so that in reaching an elevation above the clouds it becomes so prevalent as to form a continuous and distinct element, in which our globe with its surrounding atmosphere lies and floats. That is a demonstrated scientific fact.

It is a well established fact in all electrical phenomena that certain *electrical conditions*, called “positive” and “negative,” must exist in order to form a “circuit” or current with the electrical fluid. And these conditions we find most admirably arranged in the great electrical battery of nature. The earth, like the outside of a Leyden jar, or the copper plate of a galvanic battery, is always highly charged with negative electricity. The atmosphere, like the inside of a Leyden jar, or the zinc plate of a galvanic battery, is always highly charged with positive electricity, and the intervening air, like the glass of the Leyden jar, in the separated poles of the galvanic battery, is a perfect non-conductor, thus forming and constituting the most complete and colossal electric battery that ever gave an electric spark, but standing all unused. It is *just as much* superior to all artificial batteries combined as the sun is superior to our tallow candles.

It is, indeed, a mooted question with philosophers how this electricity comes there--whether the earth was primarily formed magnetic, and this atmospheric electricity is an “inductive” element, or whether it is eliminated from space and source unknown; but whether it is the one, or the other, the *great fact of its existence* remains, and pending the disagreement of the doctors as to its origin I simply make use of the elements as I find them.

Although it be a well-established fact that this element pervades space around our planet as abundantly and in the same manner as our atmosphere does, still can we reach and control it, and will it answer our purposes if we can do so?

Whatever methods may be devised in the future I am not competent to say, but there is *one way already demonstrated by experiments* by which we can reach, and avail sources of its benefit and value, and that is to *seek the highest mountain tops*, and thus penetrate this immense and unexplored field, whose virgin soil awaits the plowshare for a fruitful seedtime and harvest. Common hilltops, or inconsiderable mountain ranges, are inadequate to a successful demonstration, as ascending currents of heated air, or dampness and mists particularly peculiar to the elevation of the generality of clouds, would necessarily prevent the successful working of a long line of range, when attempted for permanent telegraphic purposes. But at an elevation of twelve or sixteen thousand feet, which is easily reached on the Rocky Mountains and the Alps, we may tap the storehouse of the mighty thunder and make it whisper glad tidings over the seas.

And this fluid, abounding as it does without limit, is the very kind or nature most desirable for our uses, from its uniform tension and persistent quality, being superior in kind and better in practical action than that generated by artificial means, and all that remains to be done to make it available in telegraphing and the varied purposes of life is to properly reach forth and pluck it from thus its slumbering bed. That it will fulfill our requirements is

recognized by scientific axioms and abundantly demonstrated by common and familiar occurrences in casual meteorology.

It is within the knowledge of almost everyone that during severe and heavy thunderstorms, or in the time of brilliant displays of the Northern lights, long lines of telegraph have been worked by the inductive force of these meteoric displays, which, although casual occurrences firing themselves into notice, nevertheless has cumulative evidence in behalf of my proposition (system). For absolute date of time and place, I will refer to one distinct instance out of many as illustrating the inductive effect of the electricity of the atmosphere working a telegraph line. On the 2nd of September, 1859, communications were sent over the wire between South Braintree and Fall River stations in Massachusetts, a distance of 40 miles, with the aid of the celestial battery alone. This was during the appearance of the Northern lights, which are computed to be, on the average, from two to five miles in height and frequently to possess strength of current equal to that produced by a battery of 200 grose cups. Many cases are recorded also of communications having been made during thunderstorms. And let me here observe that these local and limited displays are similar in their effect to the great overlying stratum which will forever yield its power without diminution; and furthermore, that the first telegraph with its double wire to form the circuit bears the same relation to the one now in use (since one wire has been abandoned, making use of the earth in its stead), as the present system bears to the one which I now actuate. The earth now forms one-half of the circuit in all the telegraph lines, and I simply propose to discard the remaining wire or cable and penetrate the insulating medium of the dense atmosphere reaching the electrical stratum above and around the earth, to form the other half as well, or to make this atmospheric element practically and usefully reciprocate its fellow element of the earth. The advantages gained in this, simply in the art of telegraphy, are immense and greater than might at first appear aside from the saving of a cable (which is \$12,500 per annum for the W. U. Co.) is that also of the battery power, and yet a persistent current of volume and intensity is supplied, like the air we breathe freely, abundantly and without cost.

Independent of its use in the art of telegraphy, it will otherwise result beneficially, almost beyond computation. Disarming the tornado and the thunderstorm of their terror and subduing their power to useful purposes, even as in times past have been the waterfall and steam power, this element will come forth from its heavenly home the willing messenger of glad tidings and great power.

Professor Since, of London, in the last edition of his work on electricity, says: "The value of the steam engine over electrical contrivances depends upon the cheapness of coals as compared with zinc, for if ever the philosopher should discover an effective carbon battery where there is no decomposition of zinc, then will the steam engine cease, then will gas companies be compelled to stop their works and a total revolution will be produced in all the physical forces employed by man."

I say, the great battery of nature is most essentially and emphatically this "carbon battery," for consumes no metal, its volume is unlimited and it's working power inexhaustible and without diminution.

And now it remains for us to simply avail ourselves of this immense treasure yielding us the three great essentials of human life, viz., light, heat and physical power as well as land or oceanic telegraphy, without

artificial battery, wire or cable and all without expense beyond the original outlay for construction, as it will last forever when once established. De La Rire says: "The Aurora, or Northern lights, is due to electric discharges taking place in the Polar Regions between the positive electricity of the atmosphere and the negative electricity of the earth."

This is doubtless true and correct, but I will go further and say also that it is only the *accidental* reunion of the two electricities, and that it can be brought about regularly and constantly by artificial and suitably established means as well.

Lightning is the *accidental* reunion of the two separate electricities through an incidental or casual conductor, and my proposition is to harmonize its working, or systematically regulate this intermittent and unequal action, by suitable channels of communication.

We have levied upon the forests to warm our hearthstones; we have mined into the earth and made her yield up her coal, and her still more refined products of oil and gas; but the expense of them all outweighing in value the wealth of the land and the seas lies untouched and undisturbed.

The waterfall goes to waste, unless we cut and build artificial channels to avail ourselves of its power. The bed of the river is often choked with obstructions, extending in consequence its seething marshlands, which yield malarious death and devastation, until the channel is so constructed as to give it free current to the sea.

So this great electrical ocean, slumbering with giant power, untold wealth and willing aid, waits but the proper sluiceways or conducting channels to illuminate and to drive the wheelwork of the world. But in its unclaimed usefulness, its wild and random freaks only cause death and universal terror.

The mill and factory will then run with a more subtle power, although the waterwheel stands dry and idle. Our dwellings will glow with wholesome heat on wintry days and be illuminated with clear, unwavering light in the night time from the steady and exhaustless flow of this vital element, and the miner of coal shall leave his toil in the shaft for a nobler handicraft among his fellows up in the sunlight and the world. The crude gold of Ophir may lie in the ground, but the pure smelted metal of Omnipotence lies in the stratum over it.

We of the present century have taken great and unwarrantable self-glorification unto ourselves for the so-called "taming of the lightnings of the heaven" or of "harnessing the thunderbolts of Jove to do our bidding." It sounds grand and intellectually powerful, but this is in fact all bombast and utterly incorrect—for the lightnings of heaven are *just as much untamed as ever*. That great natural electrical ocean from which the thunder draws its kindling spark has not yet been explored nor even invaded by the "taming" hand of man. All that man has done so far is to set up little, puny "lightning rods" all over the land to be protected in some slight degree from its untamed power and appalling demonstrations, yet shrinking with terror from their inefficiency whenever the dark cloud gathers in the sky. *Franklin* demonstrated the practicability of drawing electricity from the clouds to the earth, but not one step has since been taken to pursue that fact to a profitable practice. Thousands of human lives and millions of dollars are sacrificed because we have not "tamed" this power, and still we will not

understand or heed this loud voice proclaiming from the skies what might and majesty of concentrated power the Almighty has put in store for the benefit, and not the destruction, of man. Air, fire and water are formed and transformed by this element or power-made and unmade it. They are all convertible elements. And this electrical essence will yet melt the icebergs in the seas of Thor, and vessels may ride in safety on their "Northern passage," the entire globe made more productive, all malaria cleared from the atmosphere and the entire climates of this our planet toned and tempered by it.

When the Black Hills of the West are reported to contain in many places particles of gold dust forthwith thousands of eager toilers dare dangers, deprivations and death in hope for the uncertain pursuit. But in this limitless field--richest of all domains--how comparatively few there are to labor! Yet the certainty of its unfathomed wealth is patent to every reflecting mind. It is the new Garden of Eden of whose ripened fruits we may reach forth and partake in the way that God prescribed only, avoiding the wrath of His flaming sword by avoiding the evil of tampering with its apples through the sin of ignorance, for on the day we do that *we shall surely die*.

It is the grand element of life, as well as usefulness and power. It dallies gently with a straw and yet chains a universe of worlds in absolute obedience to its laws. Notwithstanding we know its many ways and workings, still the scalpel of chemical surgery, though honed and whetted with 60 centuries of human brain oil, cannot dissect the anatomy of its closely woven fibres nor reach the heart of its mighty pulse beat. We view with curious eye the several little phenomena which it produces, but we sink appalled at the terrible demonstrations of its live energy and might! The bud and leaf unfold and grow beneath its vital force and the subtle springs of human life pulsate with its glow. 'Tis the germ-essence throughout all animated nature and the power that compels all inanimate nature into obedience to perfect law and order.

It "Warms in the sun, refreshes in the breeze, Glows in the stars and blossoms in the trees; Lives through all life, extends through all extent, Spreads undivided, operates unspent." And all serenely above the tornadoes conflict this promethean torch smoulders with lambent flame, to awaken whose majesty and might we need but touch its celestial brazier, and Neptune's strident rising from the sea will "tame" and utilize the thunder. No greater field for discovery and usefulness could possibly be opened to men and the immense advantages that would immediately reward the opening of the ports into this Celestial Empire would transcend all the great physical works of the earth. In her youth continents spread out with broad domain teeming with the fruitage of a new inheritance, and if we charter forth but one small vessel on an expedition to its genial shores, we may rest assured that it will return laden with more than the golden sands of the memorable Castellan fleet of three.

Sanded discoveries necessarily have limits set and their outlines are well-nigh traced. But in this dominion is the home of that mystic needle which points the way to all other lands and space and the limits of this domain are only measured by the red-winged spark from the eternal God into the dim haze of the uttermost Thule.

No great Alexander need ever weep again because he has no kingdoms to conquer, for here is ample field for noble ambition. Battalions armed with the hand of thought may march forth to profitable victory here. Here is field to construct interminable highways whose fleet chariots shall be laden with human thoughts coming and

going for the good of man; and in these field new empires shall be conquered and new habitations built. Expeditions to the ice field of the North Pole offer but a meager reward even in the event of successful return. The immense work of the Pharaoh pyramids is great in the world's history. Bridging or tunneling the Straits of Dover and opening the Suez and Darien Canals are mighty projects, which, completed with the expenditure of untold treasure, will, no doubt, add many comforts to many nations; although their immediate benefit is of a local nature, but verify this proposition and the very *world* will shake and tremble at the august consummation and the souls of all her people will rejoice and be made glad.

What is there in this proposition savoring of impossibility, when all the elements of success involved are based on acknowledged facts and laws, as it is in science? The only argument that can be brought against it is the time-honored one, ever urged with so much pertinacity--*that it never has been done*--hence it is a vision and a folly. But the history of all important projects is that they have, from the remotest antiquity, been opposed simply on the ground of their being new. New and original enterprises never lack specious arguments to show their fallacy; and that which does cause and forever has caused strongest opposition to new realities in the public mind is the mere fact that they are *new* and previously unaccomplished. Yet everyone knows the futility and folly of this. The greater the magnitude of the enterprise, the greater might is this fallacy allowed to have.

When the theory of the rotation of the earth was first asserted it was denounced as the vagary of an aberrated mind, because it was new and startling.

The theory, although well established by logic and reasoning, that there was another opposite side of the world from Europe was not kindly entertained there late in the fifteenth century. Thirty years ago Morse was looked upon as a crazy man. Just previous to laying the first Atlantic cable men eminent in learning gave an abundance of sage reasoning *why* it could never be made to transmit a message.

But all these combatted truths, which come up from time to time, appearing strange and erroneous simply because they are startlingly new, and because the scientific world has never previously recognized them in a collective and distinct manner, are the very leaven of our civilization--the sword and artillery that fight the hosts of the prince of darkness and elevate the standard of humanity. Nothing was ever lost by granting breath to the new-born child of science; but the world has forever lost and suffered by attempts at strangulation or the coldness of sympathy and neglect. It is one thing to strike physical fetters from oppressed races of man and aid them in their toil for prosperity and pursuit of happiness, but it is another and still greater to unbar the imprisoned thoughts of man--these angelic slaves--struggling under the lasts of derision and starving from cold neglect, especially when the purple and fine linen of our generation's pride of cultured elevation are spun and woven by the loom and anvil brain-stroke of these same enslaved and patient silent workers. But the world has from all time united in keeping them down and aided in maintaining this slavery.

The morning comes slowly, but the hour is about passed and gone when men may slight with impunity or turn indifferently away from the new born revelations that toiling, pioneering minds garner from rugged fields planted by the living God for our higher harvest and refinement. And it is not well for any man to oppose the growth or progress of these new plants that bud and promise, for the surely avenging Nemesis will follow on

the trail of him or them who dare oppress the struggling truths of God, for shame and disgrace shall come sooner or later as their well-merited inheritance.

It is touching a class of sacred matters, which to the disgrace of individuals and the world has been ignored too frequently. And it is high noon of the day when the tide must turn and these slighted truths vital to our well being and our first pride of humanity must be allowed the sunlight and the helping hand. And if this my plan which promises so much for the benefit of man is erroneous or unimportant then prick it as a bubble and expose its empty nothingness. But meantime I am firm in the faith that this immense belt, like the rings around our sister planet Saturn, will yet form the halo of greatness and intelligence about our heads.

Common sense and intuitive perception declare it to be right; scientific facts and all the elements of earth and air array themselves in its defense; for it is founded on the solid was laid of the universe and its corner-stone was laid by the Great Builder.

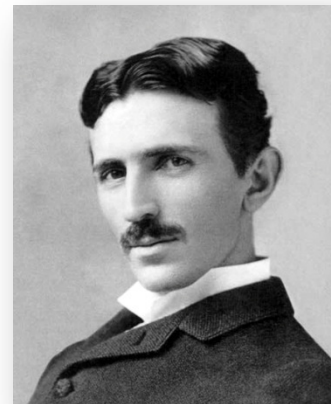
MAHLON LOOMIS
January 7, 1872

Brooklyn Eagle

July 10, 1932

Nikola Tesla States:

“I have harnessed the cosmic rays and caused them to operate a motive device. I have advanced a theory of the cosmic rays and at every step of my investigations I have found it completely justified. The attractive feature of the cosmic rays is their constancy. They shower down on us throughout the whole 24 hours, and if a power plant is developed to use their power it will not require devices for storing energy as would be necessary with devices using wind, tide or sunlight. All of my investigations seem to point to the conclusion that they are small particles, each carrying so small a charge that we are justified in calling them neutrons. They move with great velocity, exceeding that of light. More than 25 years ago I began my efforts to harness the cosmic rays and I can now state that I have succeeded in operating a motive device by means of them. I will tell you in the most general way, the cosmic ray ionizes the air, and setting free many charged ions and electrons. These charges are captured in a condenser [capacitor] which is made to discharge through the circuit of the motor. I have hopes of building my motor on a large scale, but circumstances have not been favorable to carrying out my plan.”



Philadelphia Public Ledger

November 2, 1933

Tesla 'Harnesses' Cosmic Energy



Inventor announces discovery to displace fuel in driving machinery. Calls Sun main source. A principle by which power for driving machinery of the world may be developed from the cosmic energy which operates the universe, has been discovered by Nikola Tesla, noted physicist and inventor of scientific devices, he announced today. This principle, which taps a source of power described as “everywhere present in unlimited quantities” and which may be transmitted by wire or wireless from central plants to any part of the globe, will eliminate the need

of coal, oil, gas or any other of the common fuels, he said.

Dr. Tesla in a statement today at his hotel indicated the time was not far distant when the principle would be ready for practical commercial development. Asked whether the sudden introduction of his principle would upset the present economic system, Dr. Tesla replied, “It is badly upset already.” He added that now as never before was the time ripe for the development of new resources. While in its present form the theory calls for the development of energy in central plants requiring vast machinery. Dr. Tesla said he might be able to work out a plan for its use by individuals. The central source of cosmic energy for the earth is the Sun, Dr. Tesla said, but “night will not interrupt the flow of new power supply.” Clearly Tesla is not talking about an atomic reactor. He spoke about directly converting the ions contained within the confines of our Planet’s Atmosphere, where they are created from the Radiant Energy of the Sun and are directly converted to electrical power!

Tesla believed that the Sun generates cosmic rays that strike the atmosphere of our planet which creates these highly charged particles. These charged particles (air ions) are the re-transmitters of Radiant Energy; it is this transfer of energy that could be used for practical purposes.

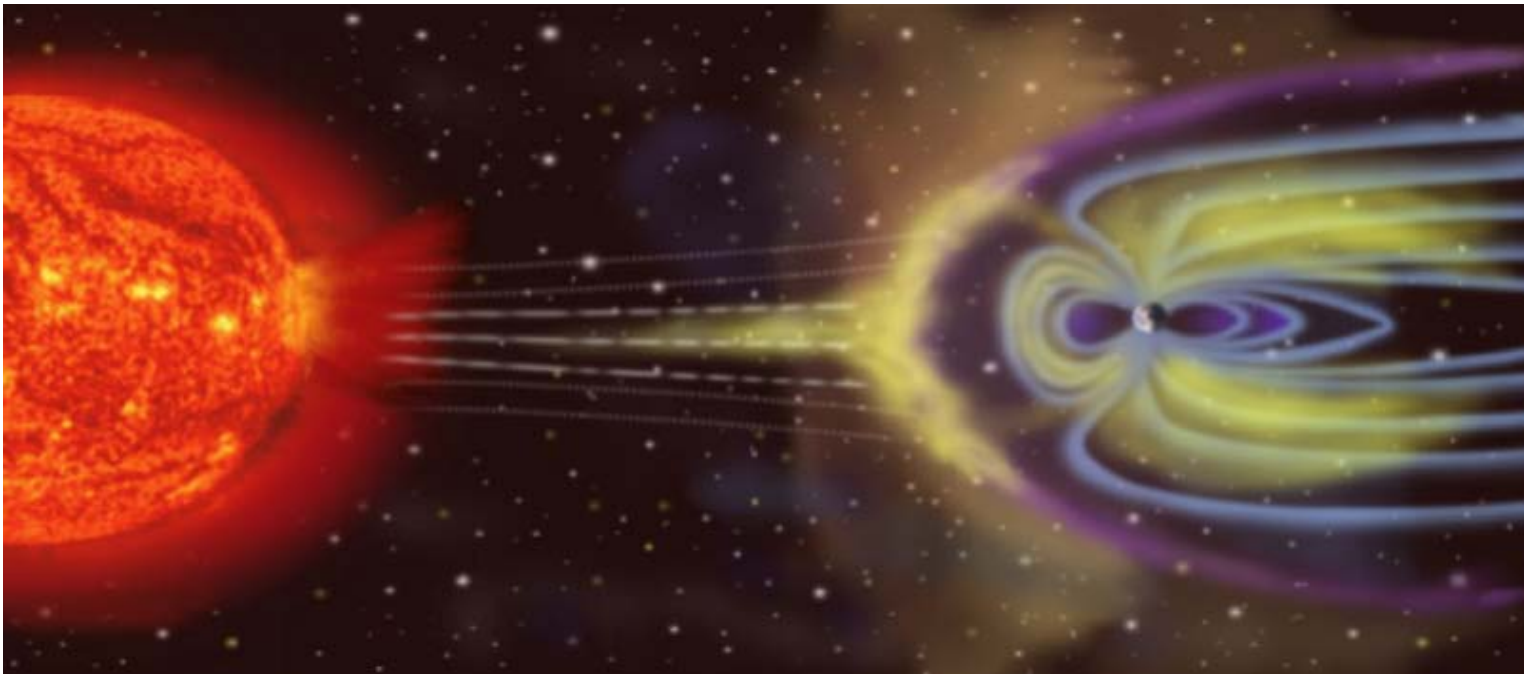
The mystery surrounding the direct conversion of the Radiant Energy of the Sun, the Cosmic Rays and the natural background radiation will unlock untold amounts of energy. Under the proper conditions, it can be rendered susceptible to the most incomprehensible changes caused by the oscillations, pulsation and surging throughout the Universe.

With Minimal Environmental Impact; a unique ion-valve has been designed and constructed by the author of this radiant energy research manual to provide a dam to the ionic surging of the atmosphere of our planet. If an oscillating tank circuit is used in conjunction with this valve, and it has the correct impedance, reactance and inductance, it will absorb the energy which can be transformed into useful electrical power. The tank oscillations are kept alive by establishing resonance with the surging throughout the Universe. Therefore, energy is not drawn from the transformer that powers the tank circuit. In the case of the radiant energy receiver, it becomes possible to draw energy into a properly designed electronic circuit with the aid of specially constructed electrical plasma tubes (ion valves). The implication of this energy source is mind boggling. A properly constructed receiver will harness electrical power from the energy of the Sun, the Cosmic Rays and from the Natural Background Radiation of the planet. It is a glorified Radiant Energy receiver, and one that is designed to receive and convert the oscillations of the Universe which is being generated. The device locks onto the very wheelwork of nature. When properly constructed it should last for many years with very little maintenance, no more than is required for a good radio receiver.

It will be understood that the energy that is being harnessed is not perpetual energy. Everything in the Universe eventually returns from whence it came. What is claimed is a device that can extract energy from the charged intermolecular ions that surround our planet, otherwise referred as the radiant energy of the Sun.

All that is needed is to build a receiver that will collect and convert it into useful electrical power. Present day alternative energy researchers find hope in that, one day, power will be obtained from the energy that runs the Cosmos. In reality, this dream has only proved to be a lure to its followers, beyond the limits of credibility. A quagmire of unsubstantiated hypotheses exists that are bottomless and lack reality. The facts of many newly conceived energy concepts are wholly inadequate, lacking justification, and is incapable of throwing any light on the promise of an inexpensive, abundant sources of energy. The Earth is indeed bathed in a sea of untapped energy that can be transformed into useful electrical power.

When electrically charged gas ions discharge it appears to be an incidental event that amounts to nothing more than a passing curiosity. It is sometimes seen as a natural event called "**Saint Elmo's fire.**" It occurs when negatively and positively charged air molecules are mutually attracted to each other and neutralize each other through a process known as **corona discharge**. The fact is that this electrical discharge phenomenon is at the very heart of the radioionic receiver. Sharp pulses of electromagnetic energy are generated, which can then be transformed into useful electrical power with the use of a properly designed radioionic energy receiver.



Atmospheric Electricity and Terrestrial Magnetism

This energy receiver uses its ion valve corona discharger to electrically neutralize positively charged atmospheric ions with negatively charged ground ions. The end result is a pulsating unidirectional flow of radioionic oscillations which is further transformed into a useful flow of electrical power. When the radioionic receiver is synchronized (tuned) to the frequency of the generated electromagnetic ionic charge oscillations it transforms the high potential, low current into a more useful lower potential, higher current oscillating flow of electricity. Since the time of Benjamin Franklin's famous kite experiments not much has been learned about the nature of electrical charge and how to convert it into useful power. Certain people have discussed this to some extent. Some theoretical papers in the so-called "free energy" field have been written. Many of these theorists will even consider that ionizing particles can be utilized to produce usable amounts of electrical power. Nevertheless, I have taken it upon myself, with great personal conviction, to find a solution to converting charged particles that are stored within the Earth's Atmosphere into useful electrical power. I have found with the correct circuits and components, that ions can be efficiently transformed into useful electrical currents. It is my desire to be able to furnish irrefutable proof of this discovery. To begin this journey, scientists and researchers alike will have to snap out of their state of denial. The utilization of ionizing energy on completely new ground has to take place. The production and utilization of energy obtained from natural sources for the well being of humankind has been the goal of scholars and researchers for many years. This is because well intentioned researchers turn away from the simple fact that there is free electricity to be obtained from the planetary storehouse of ions. When large enough quantities of atmospheric ions are collected they can be converted into useful electrical power. Many researchers after investigating atmospheric electricity become astonished when they realize that it is a source that can be converted into useful electrical power and that it has been right under their noses all along.

To capture these ions an opposite polarity must be applied to one lead of an electrical capacitor. The electrostatic potential difference (high voltage) which is stored between the capacitor plates must be

transformed into a suitable form of electricity because our electrical appliances aren't designed to function on this form of energy.

“Helium discovered on March 26, 1895, by Scottish Sir William Ramsay. He isolated it from the mineral cleveite which is a variety of uraninite. In every case where helium has been isolated, a radioactive substance has also been found in the mineral. The assumption has therefore been made that, since radium is continually changing into helium, where there is helium there is still, or must have been, radium; hence the obvious suggestion has been made that there is radium in the sun, and even that it plays a large part in the solar radiation. It has been calculated that 3.6 grams of radium per square meter of the sun's surface would amply suffice to supply all the heat the sun radiates. This throws a new light upon the age of the sun. Lord Kelvin, basing his arguments upon the consideration that the sun is a slowly cooling white-hot body, stated that it could not possibly be more than 20 million years old. Geologists, to account for the deposition of continents and the period of elevation, demanded at least 100 million years. The discovery of radium has thrown quite a new light upon the question. If the solar radiation is due either entirely, or in part, to the presence of radio-active bodies in the sun, it may be considerably older than was before considered possible by the physicist. The idea may occur that as radium gives off rays which are harmful to man, would the presence of so large a quantity of radium in the sun be detrimental, if not fatal, to life on the earth? Strutt and Joly have considered the problem from a mathematical point of view, both coming to the conclusion that it is very improbable that any of the radium rays could reach us at our great distance from the sun. Plausible explanations can be given of the earth's electricity and magnetism on the assumption that the sun's radiation is due wholly, or in part, to the presence of radium. It has long been known that the higher regions of the earth's atmosphere are at a higher potential than the lower. What this means is that the electricity of the higher regions is positive compared to that of the lower regions. If the sun's radiation is due to radium, the alpha radiation, proceeding towards the earth, would be absorbed by the outer layers of the earth's atmosphere, thus charging them with positive electricity. The beta radiation, being much more penetrative, would not be absorbed nearly so easily, and might reach the lower layers and the earth itself.

This would account for the negative potential of the lower layers of the atmosphere and of the earth. It has been experimentally shown that during the daytime, up to mid-day the outer layers of the air have been absorbing the alpha rays, while the beta radiation has mostly passed through. This accumulation of positive electricity stops to a much greater extent the negatively charged beta rays. A maximum effect is, therefore, produced about mid-day. The charges will be gradually dissipated as evening approaches, so that the potential difference diminishes. Looking down upon the earth above the north Geographical pole, the direction of rotation is counter clockwise. If the negatively charged particles in the lower regions of the atmosphere are carried round by the diurnal rotation, a magnetic field is thus established with the south pole in the position of the north geographical pole, and vice versa. It is well known that magnetic storms on the earth occur at periods of maximum sun-spot activity. This may be explained by the greater activity of the sun causing it to project electrons at a maximum rate towards the earth at such periods.”



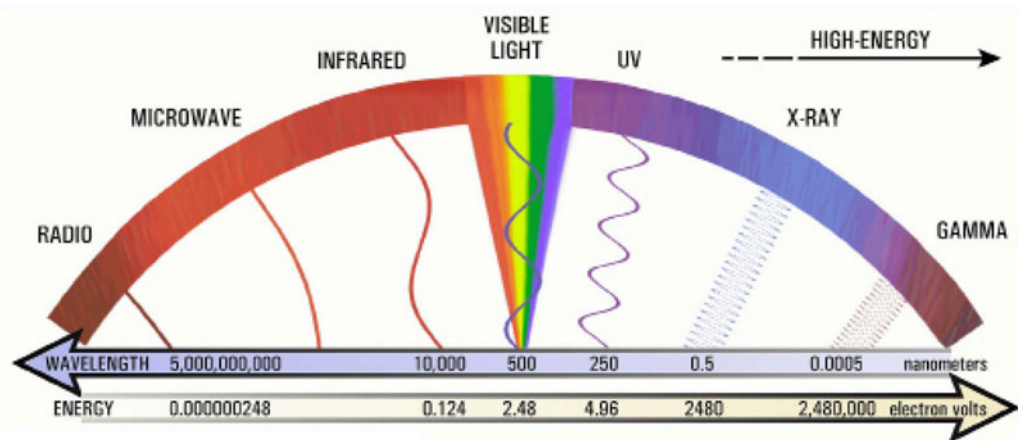
The Study of Meteorology

When the study of meteorology first began there was a big interest in atmospheric electricity. Many in this field thought to use it. This is revealed through the patents of the time. The first relevant patent was granted to inventor Dr. Heinrich Rudolph of St. Goarshausen, according to the German Patent Office; D.R.P. No. 98180 January 19, 1897.

Hermann Plauson was successful in converting atmospheric energy into useful electrical currents. He was granted a patent titled "Conversion of Atmospheric Electric Energy" U.S. Patent No. 1,540,998. In his patent he states, "St. Elmo's fire and the northern lights can be more or less absorbed in the same way as a receiver in wireless telegraphy absorbs waves coming from a far distance." It contains the foundation to building a powerful ion energy receiving and power conversion device.

There are three major causes of atmospheric ionization. The first one is due to the cosmic rays and the second cause is due to the solar winds. Over 95% of the particles in the solar wind are electrons and protons, in roughly equal numbers. Almost all of these high-energy particles interact with the earth's upper atmosphere causing it to become ionized. This is why the upper atmosphere is called the ionosphere. However, the area where the reaction between the solar wind and the magnetosphere takes place is far outside of the earth's atmosphere. The charged solar wind particles rattle the magnetic cage of our planet long before its gas envelope neutralizes them. The third cause of atmospheric ionization is due to the content of radioactive gas contained in the air that we breathe. In the ground radioactive substances such as radium, thorium, and actinium are spread throughout the soil. These elements generate gaseous radioactive emanations that spread in the air and ionize its molecules. The actinium-emanation generated from the decay of U235 plays a major role because of its brief radioactive half-life of only 3.9 seconds. Air, a mixture of gases, is largely composed of nitrogen and oxygen. It is generally considered as an insulator, and would be an excellent one if all the oxygen and nitrogen molecules were in the neutral state. However, the air is actually composed of varying quantities of neutral molecules and positive and negative ions. As the number of ions in the air is increased, the air becomes a progressively better conductor. In general, gradually more ions are found the higher we ascend until, at about a height of forty to fifty miles, a region called the ionosphere is reached. Here, there are sufficient numbers of ions to reflect radio waves. The ionosphere, although conductive, can be considered as a whole as being uncharged. This is due to the number of positive ions being equal to the number of negative ions plus electrons that are distributed in layers varying in height and in degree of ionization. In contrast, the earth has a surplus of electrons and is actually about 300,000 to 400,000 volts negative with respect to the ionosphere. This potential difference together with the total conductive qualities of the atmosphere is sufficient to cause the earth to continually lose electrons to the ionosphere. The entire earth's surface and the ionosphere may be considered to be oppositely-charged plates of a vast capacitor with the air between them acting as a rather inferior insulator, for it leaks continuously. In addition to the presence of ions, which make the atmosphere slightly conductive, various meteorological processes called precipitation or hydrologic cycle, contribute to the leakage rate of this earth capacitor. Falling rain tends to bring down the less-mobile large ions toward the earth while electrons are

carried upwards on rising moisture-laden air. This steady loss of electrons from the earth is called ionic current, and, infinitesimal as it is, it has been measured and amounts to about 9 micro amps for every square mile of the earth's surface. This current flows from the earth via the most convenient conductive path or those offering the least electrical resistance. Most of the electrons are discharged at natural and man-made points that project into the atmosphere. Static discharge can also occur when electrically charged particles (raindrops, snow, dust, etc.) strike the antenna of a radio receiver, inducing a current impulse in the associated circuitry and thereby producing broadband radio frequency noise.



The Origin of Lightning

In the "Origin of Lightning," Lockheed Service Digest Professor Langley showed that out of the total amount of radiation which is coming from the sun, that the visible portion represents only 19% of the total spectrum. He presented the theory that there is only one kind of energy radiated from sunlight. That, heat, and chemical effects depend entirely upon the state or condition which radiant energy may happen to fall on matter.

The Italian physicist Melloni stated that, "light is merely a series of caloric indications sensible to the organs of sight, or vice versa, the radiation of obscure heat are veritable invisible radiation of light." Melloni wrote this in 1843, but it was not adopted until Langley by his elaborate researches, more refined and complex, that proved when a mighty tongue of white hot matter darts across the abyss of a large spot or cavern on the sun, the equilibrium of the Earth's magnetic field is disturbed and the effect is an electromagnetic storm.

The needle of any magnetograph throughout the world will quiver and oscillate. These vibrations pass from the sun to the surface of our planet that is closest to it. These impulses then pass to the most distant side, whether through or around the planet's surface. After centuries of investigation from Gilbert to Tesla, this most wonderful research still holds admiration and mystery for all that study this vast science; electrostatics. Power is cut out of the seemingly emptiness of space, and the hurrying waves are caught and chained to servitude in artificial light and electric appliances. The sun, being electromagnetic, emits waves that carry power, which beat and surge against the earth. A magnetic field is space that surrounds a magnet.

The most memorable magnetic storm occurred on November 17, 1882. This was one of the most violent recorded. The daily press was burdened with accounts of widespread magnetic disturbance. In some places

telegraphic communication was suspended. The turbulence stretched from New York to Yankton, Nashville, and Winnipeg. In Milwaukee, the carbons in the electric lamps were lighted, rendered incandescent by currents of electricity flowing on the wires. At other locations, switchboards in telegraph offices were set on fire and sending keys were melted, while electric balls were seen hovering on the telegraph lines in Nebraska.

The earth's aurora holds the key to harnessing the sun's daily pulsation. An aurora is the visible effect of obscure undulations from the sun, as they come dashing on the earth with a speed of 186,000 miles per second. In a six-month winter, say at the North Pole of the earth, where the sun is far south of the equator, and none of its rays can shine on the earth's northern pole, the aurora is very bright. It displays many colors, and these flash and glow with rapid variations.



This space might be filled with air, wood, stone, glass, or might be a vacuum. Nevertheless, the waves are not quenched. They flow through all of these things. A freely suspended magnet in a magnetic field will move, and the earth's surface is surrounded by a magnetic field, that is acted upon by the sun's magnetic field. Suspend a sewing needle by a silk fiber in the earth's magnetic field and it will come to rest parallel to the field's north and south poles. Now, if this field becomes disturbed, that is, if it becomes stronger or weaker, the needle will move. This is a magnetic storm. When a gas jet is hurled across a spot on the sun, the disturbance reaches the earth in the same time that light does. Therefore, the radiance travels at 186,000 miles per second reaching the earth in eight minutes and nineteen seconds.

The light, although caused by the sun, does not come direct. It is caused by the turbulence set up in the earth's magnetic field by electromagnetic upheaval on the sun. The field of the earth is "tuned" with the sun's field, as was the coherer in the days of wireless telegraphy and telephony. The aurora is known to be electrical, magnets and compass needles on ships are always affected. Could the coherer of the days of old teach us something new?

No magnet can be placed near a "current" of electricity or a static charge without making an oscillation. Every oscillation sends out a wave, like a stone falling in water. An electromagnetic wave from the sun disturbs the earth's magnetic field in the same way that an induction coil used in wireless telegraphy does. The earth and

coherer are both doing the same thing with the same kind of electromagnetic waves. The coherer in a distant receiving station will react to natural electromagnetic wave fronts from the sun. It will likewise react to the artificial wave fronts coming from the induction coil. The electromagnetic wave makes the loose particles of metal between the knobs in the glass tube coherer generate dots and dashes.

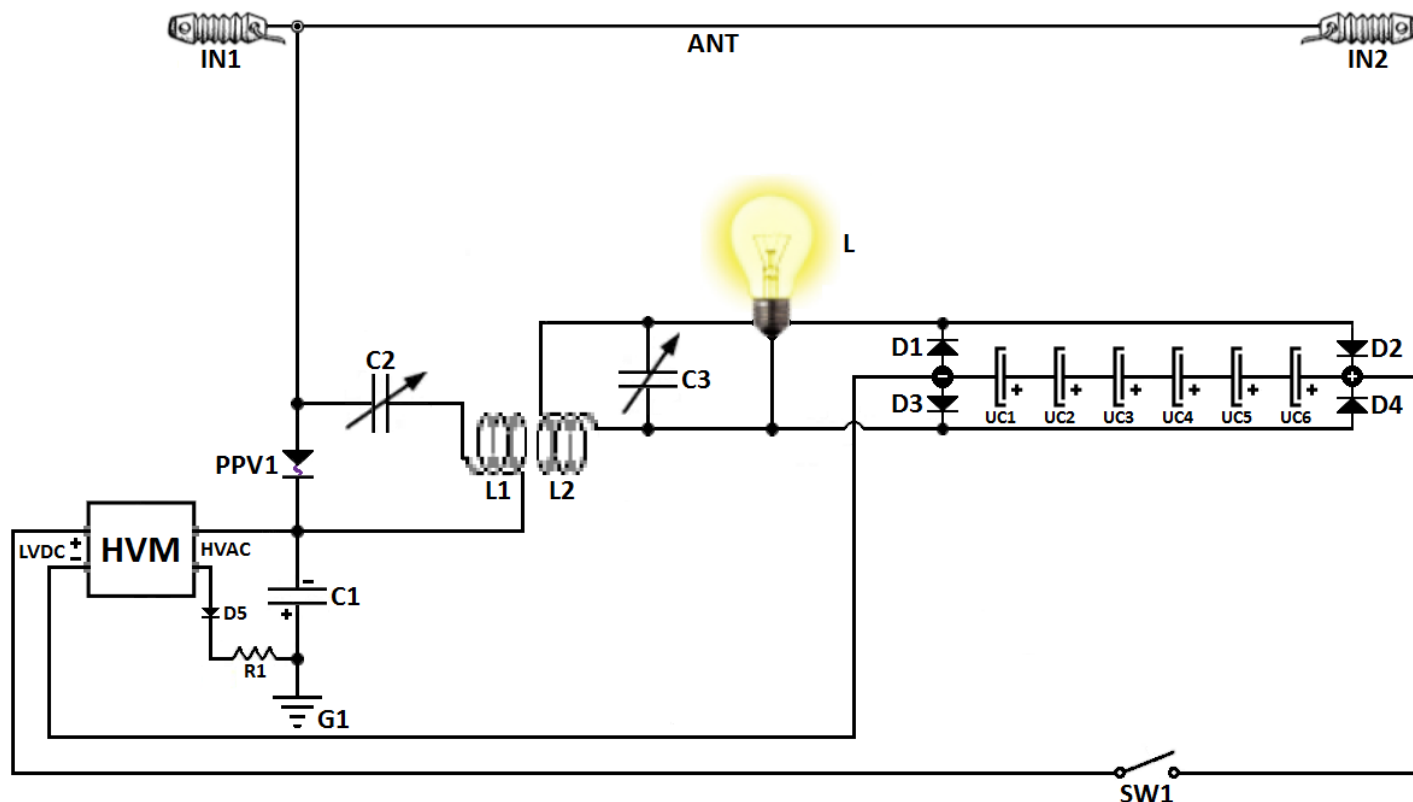
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At first glance there aren’t enough charged ions in the air to be converted into electrical power. This assumption on the surface appears to be a correct calculation assumption. You can say that there are not enough of them floating about. However, these ions are in a state of constant surging motion. By studying this particular sea of energy we can gather clues to obtaining power from its charged particles. To obtain electrical current from a generator its magnets must also be in a state of constant motion. Do you see a correlation here? What we learn is that charge in motion **induces** electrical current. The earth floats in a sea of ions that are forever present in its atmosphere. They are mostly generated when ultraviolet light coming from the Sun is absorbed in the ionosphere which surrounds our planet.

The Aurora Borealis is definitely considered an electrical phenomenon produced by the motion of electric charges through the rarefied gases of the upper atmosphere. The conducting ionosphere causes instability of this Earth energy model by short circuiting the ions in the Earth electric field. Auroral displays result in a process called ring currents, which occurs along magnetic field lines that connect the magneto tail with the ionosphere. This is the primary supply of planetary ionic energy for what is seen as the “aurora,” setting up an oscillating field of ionized particles; therefore forming the aurora light display. It generates **radioionic radiation**. The light display is generated by ion convection currents that are formed in the plasma energy field of the magneto tail. These ion convection currents curve toward the Earth on the night side and enter or create the aurora light display at around 68 degrees latitude between 22 and 24 hours local time. The RIR has a frequency spectrum from around **17 to about 500 kHz**, with a peak power at around **200 kHz**. The total power is about 1,000 Megawatts. It originates at a low altitude, less than three Earth radii, with a power factor of about one per cent of the energy dissipation of the auroral ion particle streams. It appears that the on rushing ionizing particles excites the ionosphere, thereby generating powerful energies. Very strong radioionic currents have been reported, between **17.8 and 100 kHz**, with the greatest amplitude at around **31.1 kHz**. Some of these same frequencies have been observed by the Voyager II when it passed through the magnetospheres of Jupiter and Saturn.

RADIOIONIC ENERGY RECEIVER v5.4.7



Fundamental Description

The earth floats in a sea of ions that are forever present in its atmosphere. They are mostly generated when ultraviolet light coming from the Sun is absorbed in the ionosphere which surrounds our planet. To capture these ions an opposite polarity must be applied to one lead of an electrical capacitor. The electrostatic potential difference (high voltage) which is stored between the capacitor plates must be transformed into a suitable form of electricity because our electrical appliances aren't designed to function on this form of energy. They cannot be powered with raw ions. They require electromagnetic energy to function. No means were known to directly or to indirectly convert ionic charge (electrostatic) energy into electromagnetic energy (electricity).

Similar to the reception of radio waves, a properly tuned radioionic energy receiver can be tuned into resonance by the right arrangement of inductance and capacities. The components respond to the particular wave frequency "oscillations" of energy from the Planet. An ion valve dams the charge coming from the antenna and charges a bank of capacitors. The high voltage charge thus obtained can be stepped down into useful electrical power utilizing conventional electrical circuits.

The radioionic valve converter generates only a minute amount of waste heat and it can be built into a compact and light weight system. It offers a huge advantage of power to weight ratio, than all other energy sources, to the best of my knowledge. A conventional electrical generator must have mechanical power applied to it to make its rotor revolve while my radioionic generator sits perfectly still, requiring only an antenna to pick up the energy from its surroundings. There is an unlimited source of electricity that surrounds our entire planet that can be efficiently harnessed using radioionic valve converters.

I am not claiming any new laws of physics as having been discovered. I am simply expanding on what is presently known. What I do claim is that my method to convert the energy that is contained in the Earth's atmosphere is unique. Electrical power "generation" is accomplished through the utilization of oscillating ions. It is my objective to offer to the common person an affordable radioionic energy receiver which generates useful electrical power from the plentiful supply of planetary ions. The ever present quantity of "free" ions that are stored in the air and in the ground are diverted to flow through a new and improved ion valve, which doesn't require any exotic materials. The radioionic valve functions as a cold cathode corona mixing component which generates radioionic electrical power, using only the energy taken from the planet.

The antenna of a radioionic receiver draws in energy from the plentiful supply of ambient ions, which are generated from the ionizing ultraviolet solar radiation. The radioionic generator doesn't require the direct exposure of the Sun to maintain ionization as it operates during the night hours. Cosmic rays, terrestrial radioactivity and man-made electrical noise sources contribute only a small amount to the ionization process. The Sun is the primary cause of planetary ionization.

Circuit Key

To understand how the circuitry works you must already have a basic understanding of the elementary principles of radio technology. Granting this, it is of course reasonable to believe that you will understand how an oscillating current is set up in a circuit comprising an inductance or coil of wire, a capacitor and a spark gap.

The energy that is building up in the capacitor (**C2**) exists between the anode, cathode inter electrode gap of Perreault Plasma Valve (**PPV1**) literally over-reaches itself, just as a pendulum will swing past its neutral point when given a push by the hand. After the first rush of current passes in one direction, a reversal of the cycle occurs and a second rush in the opposite direction occurs. This operation is repeated many thousands of times per second. The discharge gradually dies down as all the energy is either completely radiated, used up in heating or in performing work. The oscillations cease once the potential across the capacitor has been reduced, and can no longer sustain a plasma field within the Perreault Plasma Valve (**PPV1**). The capacitor (**C2**) and inductor (**L1**) constitutes a tank circuit which is charged with the high tension ions that exists between the earth and its soil, where a highly energetic plasma field exists within the Perreault Plasma Valve (**PPV1**). The Perreault Plasma Valve (**PPV1**) acts as a high speed switch which disrupts the field causing it to pulsate at an extreme rate of frequency. The Perreault Plasma Valve (**PPV1**) discharges thru a succession of crashing sparks. Capacitor (**C2**) can immediately take a fresh charge from the antenna (**ANT**) that is a supply of **electropositive ions**, which in turn generates the plasma field within the Perreault Plasma Valve (**PPV1**), and the entire cycle of operations is repeated. The variable **1 to 20,000 volts** high voltage multiplier (**HVM**) is driven by the voltage multiplier (**HVM**) module. The high voltage module (**HVM**) obtains its power from the charged Ultra Capacitors (**UC1 – UC6**). The tank circuit inductor (**L1**) and capacitor (**C2**) is kept alive through the discharge of the Perreault Plasma Valve (**PPV1**). It will be understood that all of this passes in an infinitesimal fraction of a second. It should also be understood that if this oscillating tank circuit has the correct impedance, reactance, and inductance, it will absorb energy from the antenna source of ions. With the correct conditions being met the tank oscillations can be kept alive by establishing resonance with the supply of planetary ions. The surge of radioionic high frequency waves is generated through the inductor (**L1**) coil. The high frequency electrostatic oscillations (radioionic) waves produced are induced into inductor (**L2**) transforming them into useful electromagnetic energy.

ANT – Bare copper wire, electrically isolated at least 5 feet height from the ground, optimally around 468 feet in horizontal length.

IN1, IN2 – Electrically non-conductive insulators.

G1 – Earth grounding rod.

L1 – Inductor: Tesla Secondary Coil; resonant in the 500 kHz range.

L2 – Inductor: Tesla Primary coil.

T1 – PVC tube for Tesla coil air core, not shown.

PPV1 – **Perreault Plasma Valve**: an open air improved, compact, open air valve, for efficiently generating high frequency, high power, electromagnetic oscillations with direct current. It consists of an *iron (Fe) cathode* and *aluminum anode (Al) thermoelectric* dissimilar metal couple. This thermoelectric couple generates intense radioionic oscillations with high efficiency, consuming the least amount of current, so that the maximum amount of current can flow through the inductor (**L1**), capacitor (**C2**) tank circuit, to provide power to the load (**L**). A more efficient cathode, anode combination might be used. Check with a good thermoelectric series chart. The most efficient and practical thermoelectric couple combination appears to be iron (**Fe**) and aluminum (**Al**). The choice made all depends on efficiency of the couple, material availability, cost, and the difficulty level working with the materials chosen. When you use a new Perreault Plasma Valve (**PPV1**) the output power of the receiver starts out much lower than when it has been used. Every second you use it the better it performs. You will find that the longer it is used the more energy is obtained from the receiver. A new, not yet used Perreault Plasma Valve (**PPV1**) will only give a fraction of the power of a broken in Perreault Plasma Valve (**PPV1**).

The Perreault Plasma Valve (**PPV1**) generates an oscillating electromagnetic field with every ionized particle that impinges upon its thermoelectric cathode to anode couple. An avalanche of secondary ions is also emitted with every ion which impinges upon the cathode. When the positive and negative ions mix they neutralize each other, generating a surge of electromagnetic waves of electrical power. Simply stated, the radioionic receiver obtains natural energy from a common radio antenna. This unique valve conducts oscillating ionic energy and converts it into oscillating electromagnetic energy. The high frequency can be transformed into a more desirable voltage, using a step down transformer configuration. This high frequency electricity can be used to supply power to conventional incandescent light-bulbs which provides a highly efficient light source.

The radioionic frequency is so high that its oscillations are a product of all the inductances of the circuit which are ringing from the high frequency spikes. The more voltage, not current, that is applied across the Perreault Plasma Valve (**PPV1**) the more power output will be obtained to power loads. To generate the radioionic oscillations efficiently you need only high voltage and no, or little current. If too much current is supplied then the current will suppress the high frequency radioionic oscillations. So, basically your source of high voltage must have a very high, if not infinite resistance and impedance from the positive air ions, as compared to the **electronegative** ground ions; the higher the potential difference that is supplied to the receiver the better. The high voltage module (**HVM**) fills this requirement.

To sum it all up; the Perreault Plasma Valve (**PPV1**) converts the high potential **electropositive air ions** into a high speed, high frequency electric power, and while doing so only allow current to flow only in one direction. Tank circuit inductor (**L2**) and capacitor (**C3**) is used to step down the voltage that surges through inductor (**L1**).

This tank circuit converts the high voltage into a useful lower voltage. The electrical power that is generated to power electrical loads is high frequency. When this form of energy powers a light bulb, or fluorescent lamp an intense white light is produced. The light from a lamp that utilizes this form of electrical energy imparts an unusual glow to the light bulb. A light bulb displays a clear brilliancy without the associated haze that normally surrounds its filament when conventional 60 Hz electricity is used. Another added benefit of this high frequency electricity is that expensive and potentially hazardous fluorescent lamps that contain mercury can be replaced. The high frequency electricity can also be transmitted over hair size wires, minimizing the use of expensive wire. The wires that connect to the lamp will not generate heat as is normally expected, which is the case when using conventional electricity. It is surprising to see that when a lamp is electrically shorted with a piece of wire it still shines brightly! The high frequency electricity can be used directly to power lamps, or specially wound high frequency motors. When it is converted into **12 volts** direct current, using a diode that responds well to the high frequency, it can charge a direct current storage component.

C1 – Fixed capacitor: .001/20K volts.

C2, C3 – Variable air tuning capacitor: 250pF/1,500 volts.

PPV1 – Perreault Plasma Valve: See description on page 23.

D1, D2, D3, D4 – Diode: Shottky 1N5817 or equivalent. This is a low voltage radio frequency diode which converts radio frequency into a direct flow of useful current, where it is then stored in a bank of Ultra Capacitors (**UC1 – UC6**). An alternative method to store the electrical current that is received from the inductor (**L1**) can also be used. The stored energy is used to power the high voltage module (**HVM**), which allows the radioionic energy receiver to be self sustaining.

D5 – Diode: 20kV fast recovery.

R1 – Resistor: 10M ohm, fixed. This limits the output current of the high voltage module (**HVM**).

HVM – High Voltage Module: 20kV step up from 12 to 16 volts, 20-50 kHz, low current, variable output source. Diode (**D5**) puts a positive ionizing charge on the antenna (**ANT**). A half-wave series 250,000 volt Cockcroft–Walton multiplier (Greinacher multiplier) can be added as an option to the output, not shown. The addition of a voltage multiplier will increase the collection area of the antenna (**ANT**).

L – High Frequency Load: 12 volt RV or automotive repair incandescent bulb. The wires going to a light bulb don't get hot, only the bulb, or load (**L**) emits heat, this is because the electrical power is a high frequency, which can also be electrically shorted with a piece of wire and still provide power.

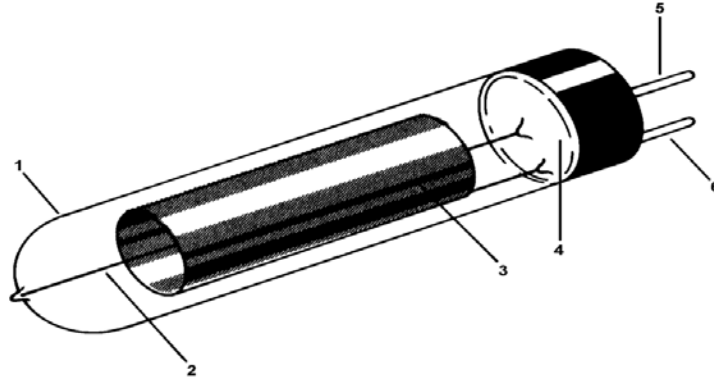
UC1, UC2, UC3, UC4, UC5, UC6 – Ultra Capacitor: 2.7 volt 500 Farad.

SW1 – Switch on/off.

Circuit Theory

1. The circuit shown draws into its elevated antenna (**ANT**) ambient ions that are stored in the air and in the soil of the planet. Positively charged air molecules (**+ions**) concentrate around the antenna (**ANT**) that is elevated in the air and is fed to an inductor (**L1**).
2. The aluminum (**Al**) anode cylinder of the Perreault Plasma Valve (**PPV1**) receives a positive charge from the positively charged antenna wire (**ANT**) and the high voltage module (**HVM**). Negatively charged ions are generated along the surface of its iron (**Fe**) cathode wire.
3. Negatively charged ions ground ions concentrate around an earthed grounding rod (**G1**) that is embedded in the earth's aerated soil. The cathode wire of the Perreault Plasma Valve (**PPV1**) receives a negative charge from the negatively charged ground rod (**G1**). Negatively charged ions are generated on the surface of the valve corona wire of the Perreault Plasma Valves (**PPV1**).
4. The Perreault Plasma Valve (**PPV1**) neutralizes the positively charged ions on its aluminum (**Al**) anode cylinder with onrushing negatively charged ions that are emitted from its iron (**Fe**) cathode wire. It is here where the oppositely charged ions are electrically neutralized and are converted into useful electromagnetic energy through the inductance of air core inductor (**L1**).
5. The high voltage oscillating electromagnetic field of primary inductor (**L1**) induces an electrical current into the secondary inductor (**L2**). Capacitor (**C2**) and capacitor (**C3**) tunes their respective tank circuits to synchronize with each other to maximize efficiency.
6. Inductor (**L1**) and variable air tuning 250pF 1,500 volt capacitor (**C2**) functions together as an electrical tank circuit. Capacitor (**C2**) is charged with the ever present positively charged ambient air ions which flow from the (**ANT**) to the ground (**G1**) supply of negative ions. The inductor (**L2**) has a lower number of turns compared inductor (**L1**). This has the effect of transforming the received high voltage oscillations into a lower voltage, higher amperage, alternating electrical current of useful electrical power.
7. The alternating electrical current is then rectified with diodes **D1**, **D2**, **D3** and **D4**, which are low voltage, radio frequency, **Shottky 1N5817**, or equivalent diodes.
8. The rectified electrical power charges **2.7 volt** 500 Farad (**UC1**), (**UC2**), (**UC3**), (**UC4**), (**UC5**), and (**UC6**) Ultra Capacitors, where they becomes a useful source of **12 – 16 volts** of stored direct electrical power.
9. Balancing resistors, not shown in the circuit, for simplicity, are used to ensure that the Ultra Capacitors **UC1**, **UC2**, **UC3**, **UC4**, **UC5**, and **UC6** are equally charged to avoid damage to them. A 12 volt regulation circuit is also used to avoid damaging the Ultra Capacitors **UC1**, **UC2**, **UC3**, **UC4**, **UC5**, and **UC6**.
10. The high frequency current at the load (**L**) can be used to power lamps, other high frequency motors, or inductive heating appliances. When it powers a light bulb, or fluorescent lamp, the light is pure white and it is extremely bright!
11. A **lightning arrester**, not shown in the diagram can be added to protect the circuit against lightening strikes. It would be connected between the antenna (**ANT**) and earth ground (**G1**).

Operating Instructions



1. Glass enclosure 2. Cathode corona wire 3. Anode cylinder 4. Radon (radium ore) impregnated ceramic disc 5. External; corona wire electrical contact terminal 6. External anode cylinder electrical contact terminal.

What makes the present method to obtain electrical power from the planetary ions practical is that extreme antenna height is not required. It does this with the aid of a high voltage, low current, electronically generated source, shown as a high voltage module (**HVM**) in the circuit diagram. This high voltage electronic source is a replacement for the **Atomic Ion Valve**, which is diagrammatically shown and described in my Alpha Fusion Electrical Energy Valve; **U.S. Patent No. 7,800,285**. This low wattage source consumes only a fraction of what the radioionic energy circuit receives. The negative ions generated by the electronic source draw into the receiver the oppositely charged electropositive atmospheric ions, or highest potential through mutual attraction. The positive ions that are generated by the electronic source draw into the receiver the oppositely charged planetary ions in its soil, or lowest potential through mutual attraction. The quantity of energy received depends on the potential difference of the electronic source. In the working device the electropositive atmospheric ions corresponds to the excess of electricity, which forms an invisible conductor around the channel of air around the antenna (**ANT**). Electrical power or electromagnetic energy is generated when the two electricities, electropositive and electronegative ions are combined in a type of mixing chamber, Perreault Plasma Valve (**PPV1**). It has been known for a long time that the atmosphere always contains ions, which is electricity in its fluid state. When the weather is good the atmosphere usually holds electropositive ions and the soil through induction holds an electronegative charge of ions. It is also known that the amount of stored ions is greater at higher elevations.

It is important that it is understood that a radioionic valve is a cold cathode tube, which utilizes a plasma field to regulate voltage, and to rectify high voltage. It utilizes a **thermoelectric cathode to anode couple**, which generates a multiplication of ions at the surface of the cathode. The radioionic valve functions on a form of ionic action that liberates more ions from the surface of its cathode, in place of the common electronic liberation that occurs in conventional radio tubes. A unique type of ionic liberation is accomplished when thermoelectric elements are bombarded with ionized particles. This is called ion multiplication.

A very small area cathode and large area anode is used in the construction of radioionic valves. A radioionic valve suppresses any arc (voltage) discharge but allows the ions to flow through it. The correct voltage polarity must be observed or a radioionic valve will arc itself out until its thin corona wire breaks and shorts to the cylinder anode. Without the use of the Perreault Plasma Valve (**PPV1**), continuous oscillations cannot be obtained. Instead, you get spikes that are spaced far apart. Also, a lot more current and energy is taken from the high voltage module (**HVM**) module, whereas with the radioionic valve, only a small amount of current is required to power the high voltage module (**HVM**).

The radioionic valve works due to a unique effect that occurs between the inter electrode spacing of the thermoelectric elements. It is here where the positive and negative ions coming from the antenna (**ANT**) and the ground (**G1**) neutralize each other, generating heat radiation which produces a desired **thermoelectric effect**. The reaction generates of an appreciable amount secondary ions. This isn't perpetual motion... the atmospheric ions receive energy from the ultraviolet radiation which the Sun generates.

*What isn't disclosed in this patent is the fact that it is an atomic battery, where its generated high ionic potential was being used to draw planetary ions into the receiver circuitry. It is an *ion pump* because it pumps ions through the radioionic energy receiver. The atomic ion valve is now replaced with the high voltage module (**HVM**).*

The radioionic valve is unique in that it attracts airborne ions to itself. This omission was done purposely to avoid having a possible secrecy gag order slapped on it. The required high ionic potential is now being generated with an electronic source that replaces the use of radioactivity. The use of radioactivity was a major block to putting the radioionic energy receiver into public use.

My radioionic valve discoveries possess unusual merit. A properly constructed, tuned circuit is able to collect and convert planetary ions into useful electrical power. The technology provides a highly efficient, relatively low-cost, high power to weight ratio power supply. I have spent several years of research using my own personal funds on this ground breaking energy technology. Just as solar cells react to visible light, or let us say wave lengths, within a certain range, is it too difficult to comprehend how electromagnetic radiation is generated when ionized particles impinge upon the thermoelectric cathode to anode couple, in this unique plasma valve? I declare that it is heart of a radioionic energy receiver, which allows it to convert and tune into the plentiful supply of planetary ions, generating useful electrical power.

The high voltage module (**HVM**), and the tank circuit (capacitor **C2** and inductor **L1**) can be compared to a gasoline pump in an automotive vehicle. In the automotive vehicle gasoline is pumped to its combustion engine, where it is transformed into mechanical power. In the radioionic power generator ions (fuel source) are pumped to the Perreault Plasma Valve (**PPV1**) where they are transformed into electrical power. The fuel pump in an automotive vehicle pumps gasoline (fuel source) to its combustion engine. The pump isn't the source of power. It merely feeds the combustion engine with gasoline and air where they react chemically. The resulting violent reaction generates intense heat which is converted into mechanical power. In the radioionic energy generator the tank circuit (capacitor **C2** and inductor **L1**) pumps positively and negatively charged ions into the Perreault Plasma Valve (**PPV1**) where they are violently neutralized generating electromagnetic energy which is converted into useful electricity to provide power to electrical load (**L**).

The tank circuit capacitor (**C2**) and inductor (**L1**) is tuned with capacitor (**C2**) to synchronize with the Perreault Plasma Valve (**PPV1**) pulsation rate. This maximizes circuit efficiency.

The Ultra Capacitor bank (U1-U6) when fully discharged must be primed with an external **13** to **16** volt direct current energy source. Once the circuit is kick started into oscillation the priming battery is no longer required.

On/off switch (**SW1**) is closed to supply power to the high voltage multiplier (**HVM**). A small amount of power from the Ultra Capacitor bank (**U1-U6**) is used to provide power to the high voltage module (**HVM**). The high voltage module (**HVM**) attracts and directs planetary ions into the radioionic energy receiver, through the antenna (**ANT**).

Summary

To capture positively charged atmospheric ions an opposite negative polarity must be applied to one of the plates of an electrical capacitor, the positively charged end being connected to an antenna (**ANT**). The stored electrostatic potential which is stored is transformed into a more suitable lower electric potential, because our electrical appliances aren't designed to function on raw electrostatic energy. They require electromagnetic energy to work for us. At the onset of the radio era semiconducting crystal materials, called detectors, were used to convert oscillating, high frequency, electromagnetic energy (radio waves), into a current that flowed only in one direction. This was done because a sound reproducer (speaker) only responds to an electrical current which flows in one direction.

Radio crystals were the subject of an intense search to find a crystal that would provide the best result in converting alternating, high frequency, radio waves into a direct flow of current. Many thousands of radio amateurs tested numerous materials in different circuits and configurations. It was found that a single of "steel galena" offered the best results over all other crystals, a fact that holds true to this day. No means were known to convert raw electrostatic, "static" energy, into electromagnetic energy (electricity).

On November 5th, 1901 Nikola Tesla was granted patents; U.S. Patent No. 685,957 and U.S. Patent No. 685,958. These patents describe charging a high voltage capacitor with ions he obtained from the air. He is the first person known to have harnessed planetary ions. His results demonstrated the basic principle to capture atmospheric ions and then converting them into a small electromotive power.

Hermann Plauson was granted U.S. Patent No. 1,540,998 on June 9th 1925, which expands on Tesla's ground breaking discovery. Plauson showed that he could obtain several kilowatts of useful electrical power. Plauson's system requires sending balloons to high altitudes, which carry an ion collecting antenna.

My method to obtain useful electrical power from atmospheric ions further expands on Tesla and Plauson's methods they described in their patents. I accomplish this with the aid of an electronically generated high voltage source, improved ion collection antenna, and ion discharge components (plasma valves).

PATENTS

US Patent 7,800,286, Alpha Fusion Electrical Energy Valve, Bruce A. Perreault, Sept. 21, 2010

(12) **United States Patent**
Perreault

(10) Patent No:

US 7,800,286, B2

(45) Date of Patent:

Sep. 21, 2010

(54) **ALPHA FUSION ELECTRICAL ENERGY VALVE**

(56) **References Cited**

U.S. PATENT DOCUMENTS

(76) Inventor: **Bruce Alan Perreault**, 1072 NH Route 118, Dorchester, NH (US) 03266-6409

| | | | | |
|-----------|-----|---------|-------------|--------|
| 2,926,268 | A * | 2/1960 | Ralph | 313/54 |
| 2,958,798 | A * | 11/1960 | Anton..... | 313/54 |

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 758 days.

* cited by examiner

Primary Examiner — Ashok Patel

(21) Appl. No. **11/744,769**

(57) **ABSTRACT**

(22) Filed: **May 4, 2007**

Prior Publication Data

(65) US 2008/0272680 A1 Nov. 6, 2008

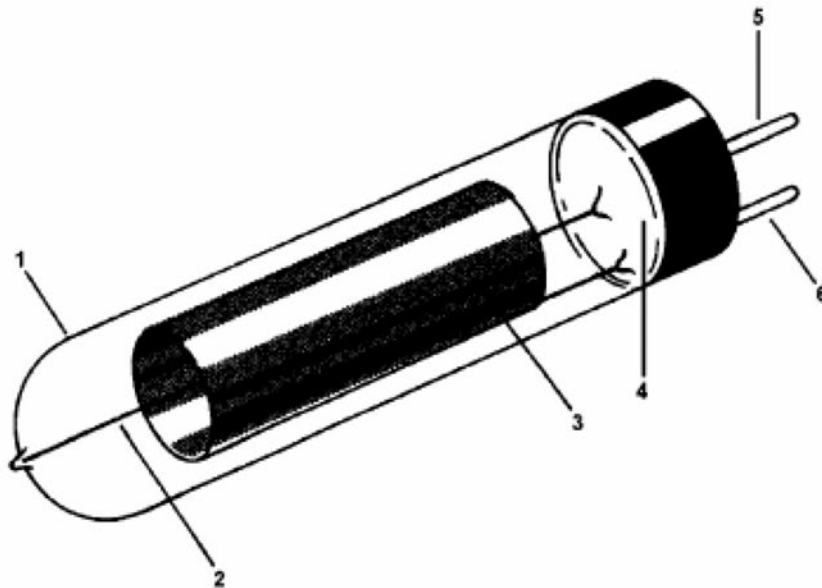
(51) **Int. C1**
H01J 17/32 (2006.01)
G21H 1/00 (2006.01)

(52) **U.S. C1** **313/54**; 313/310;
310/305

Alpha particles are directed and focused onto a delta-ray cathode target, where an alpha fusion reaction is generated. Delta radiation or high-energy secondary electrons are generated from the said alpha reaction. The cathode also becomes thermally active generating thermionic electrons. The electrons flow in the direction of an anode that absorbs their energy, generating electrical current in one direction, known in the electrical field as direct current.

Field of Classification Search.....None
See application file for complete search history.

1 Claim, 2 Drawing Sheet



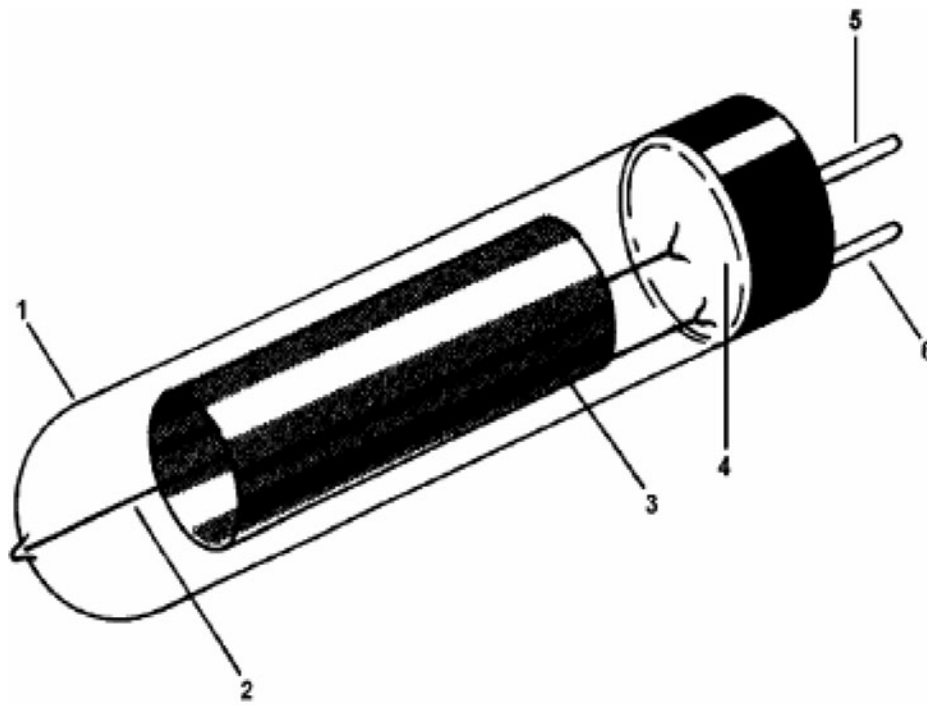


FIG. 1

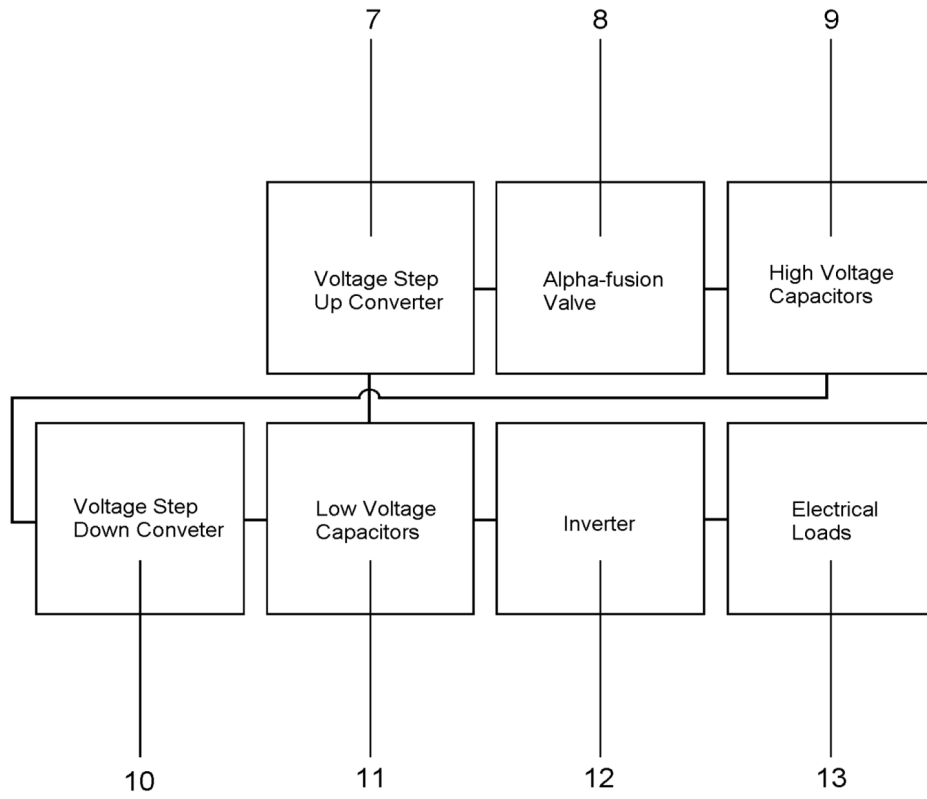


FIG. 2

ALPHA FUSION ELECTRICAL ENERGY VALVE

FIELD OF INVENTION

This invention in general is related to atomic cells and nuclear batteries.

BACKGROUND OF THE INVENTION

Prior art atomic cells and nuclear batteries are limited because they generate low currents. Another drawback is that expensive radioisotopes are obtained from a nuclear reactor in their construction.

The present invention overcomes the aforementioned limitations by utilizing an alpha fusion reaction and radon emissive material. The alpha fusion reaction economically generates high power densities. The present invention provides a unique concept that offers improved performance over prior art direct nuclear conversion systems. The new and novel invention that will be described utilizes an alpha fusion reaction that generates practical and useful electrical current.

Devices that convert ionizing energy to electrical current have been used in prior art, but with poor results.

Atomic cells generate electric currents by utilizing charged particles that are ejected from radioactive substances. The Direct Conversion of Energy was published by the GPO in 1964. On pages 28-29 William R. Corliss discusses the direct use of charged particles that are ejected from radioisotopes. He states that high velocity beta particles ejected from $_{38}\text{Sr}^{90}$ generates a flow of electrical current.

The negative charges on the particles become neutralized when they strike a metallic cylinder. The neutralized particles find their way back to the $_{38}\text{Sr}^{90}$ becoming again ionized. This cycle repeats itself so as long as the $_{38}\text{Sr}^{90}$ remains radioactive.

U.S. Pat. No. 2,926,268 describes a self-powered electron tube that generates secondary electrons when high-energy radiation, particularly from beta particles strike a semi-conductive material.

The power generated by the above two sited examples generate high-voltage but produce extremely low amperage. There are numerous patents issued world wide relating to the direct conversion of charged atomic particles that generates electrical current but all produce low power densities in the millionth of a watt range.

Despite the prior art that exists in this technology, it is believed that there has not previously existed a small, compact electrical device capable of generating a high power output. It is the object of this inventive to provide a method embodying a new and novel device to furnish an efficient and economical source of electrical power. The present invention resolves limitations of the prior art.

The primary object of the present invention is to provide a method that directly utilizes charged particles to produce electrical current, and a new and novel device for utilizing an alpha-fusion nuclear reaction to generate the charged particles.

SUMMARY OF THE INVENTION

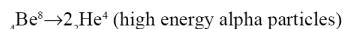
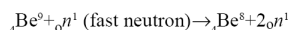
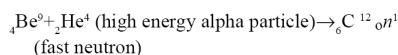
The present invention relates to a method that generates electrons which can be converted to electrical energy and more particularly, to electrical power generation through the fusion of alpha particles with carefully chosen target elements, compounds, or alloys.

The present invention may serve as a source of electrical current that is consistent a full 24 hours per day which is safe and non-polluting.

The present invention is an original approach to the generation of electrical current, which relies upon an alpha fusion reaction. It is the main object of the present invention to provide a method and device for generating electrical energy that result from the reaction of alpha particles with specific materials.

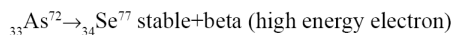
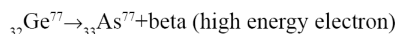
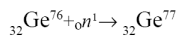
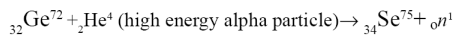
It is generally accepted that helium gas will not form compounds in any chemical combination. This gas generally is believed to be chemically inert. What is not readily realized is that helium will react with a few substances when sufficiently excited. It is a well-established fact; helium is a gas that accompanies all radioactive minerals in an excited state. The name for a high-energy helium atom is called an "alpha particle" in the scientific literature. Until now, its role in nuclear transformations has not been fully realized. The quantity of energy that is released under certain conditions is considerable. This conclusion was reached by the early scientific community because the small amount of ejected particles coming from radioactive matter possesses an enormous velocity, carrying with them enormous amounts of energy. The alpha particle reaction is a liberator of an enormous reserve of stored atomic energy.

An example of an alpha fusion reaction can be demonstrated by depositing radon gas onto a beryllium wire. The resulting reaction was used to generate neutrons in the early days of atomic energy to initiate a fission reaction using fissile $_{92}\text{U}^{235}$. The reaction is expressed in the following equations;



In these equations, beryllium reacts with an excited alpha particle generating a fusion reaction with neutrons as its by-product. Enrico Fermi describes this reaction in his U.S. Pat. No. 2,206,634 Process for the Production of Radioactive Substances. The atoms are not fragmented in the above expressed reaction as is the case when a fission reaction is created. A fusion reaction can produce non-radioactive stable by-products, along with a supply of useful electrons, unlike a fission reaction that creates a number of radioactive deadly waste products.

In the present invention a germanium plated, negatively charged corona cathode wire or thin rod, used in conjunction with a palladium or graphite positively charged anode concentric cylinder, can be utilized in its construction. Other materials can be used and this will not depart from the spirit of the present invention. Germanium used as a target material is a good choice because $_{32}\text{Ge}^{72}$ will react with alpha particles generating stable $_{34}\text{Se}^{77}$ and high-energy electrons within the process, in which:



It takes at least 6.06 MeV of energy to generate a $_{32}\text{Ge}^{72}$ alpha fusion reaction. Alpha particles are ejected from Po^{212}

with the energy release of 8.78 MeV, Po^{214} with the energy release 7.68 MeV, Po^{216} with the energy release of 6.78 MeV; these elements can be used to generate ${}_{32}\text{Ge}^{72}$ alpha fusion reactions. Therefore, Po^{218} with the energy release of 6.00 MeV cannot be used to generate a ${}_{32}\text{Ge}^{72}$ alpha fusion reaction. Po^{210} with the energy release of 5.30 MeV cannot be used to generate a ${}_{32}\text{Ge}^{72}$ alpha fusion reaction. These two later radioisotopes cannot be used to generate a ${}_{32}\text{Ge}^{72}$ alpha fusion reaction because their energy levels are below the threshold of 6.06 MeV that is required to initiate the reaction. Rn^{220} with the energy release of 6.29 vMeV of energy and can also be used to generate a ${}_{32}\text{Ge}^{72}$ alpha fusion reaction. It is a good choice because it is the daughter product of Th^{228} , which is abundant on the earth. It is a daughter product of Th^{232} , which is said to be more abundant than lead. The cited equations are a few theoretical examples from whence the present invention obtains its energy. Numerous reactions are possible. Other radioisotopes, than what is cited herein, might also be used and this will not depart from the spirit of the present invention.

A number of electron emitting and electron collecting materials can be used and this will not depart from the spirit of the invention. Other cathode and anode geometries may also be used and this will not depart from the spirit of the invention. However, the target material or cathode must be a delta-ray emitter. In the scope of the present invention, "a delta-ray is characterized by very fast electrons produced in quantity by alpha particles. Collectively, these electrons are defined as delta radiation when they have sufficient energy to ionize further atoms through subsequent interactions on their own."

In the present invention, a new and novel improvement in the art of the direct conversion of nuclear energy is made apparent. The present invention generates electrons that are the result of atomic reactions that are efficiently converted to electrical current, which is novel in the field. Converted atomic energy within the scope of the present invention is directly available for driving motors, lighting, production of heat, and can be used in electrochemistry, etc...

It is a further object of this invention to provide a device for generating electrical current that results from a self-generating electron source that is simple in construction and compact.

Thus, in accordance with the present invention there is provided a method of generating delta-rays, or secondary electrons through the prescribed fusion reaction. The present invention provides a method and device that gives improved performance over prior art that utilizes the direct conversion of atomic reactions to obtain electrical power.

Other objects and advantages of the present invention will become apparent from the following description of the preferred embodiment of the present invention, with references to the attached drawings, in which:

FIG.1 is an embodiment in its most basic form illustrating the alpha fusion valve which is unique in the present art of generating electrical power; and

FIG.2 is a block diagram that illustrates the invention in a useful embodiment. The diagram shows an electronic high voltage, low amperage, high frequency power supply. A means to rectify the output of the high frequency power supply is provided. The output of this power supply is coupled to the invention which activates the alpha fusion valve. The polarized current coming from the output of alpha fusion reaction vessel charges a storage capacitor.

The stored charge is then connected to a voltage step-down circuit.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The method to generate electrical energy includes a cathode which reacts with alpha particles generating electrically charged particles.

Furthermore, it will be understood that the generated electrical current can be directly converted into a useful voltage and amperage.

The conversion of the electrons that are emitted from said cathode generates useful electrical current that will be made apparent and that the alpha fusion valve is unique in generating electrical power. It will be made apparent in the following descriptions;

Referring now to FIG.1 of the drawings, the said invention consists of a vessel **1** that is made out of an electrically insulating airtight material, such as glass, ceramic, plastic or the like.

It is preferred that a natural alpha source be used but an artificial alpha source might also be used and this will not depart from the spirit of the present invention.

Vessel **1** includes a corona wire **2**, made out of a delta-ray emissive element, compound, or alloy, such as germanium, silicon, or lead-sulfide, etc. . . . delta-ray emissive substances emit delta-ray electrons when bombarded with alpha particles.

The vessel **1** contains a high work function electron-collecting cylinder **3**, preferably made out of palladium because this metal can absorb a large volume of gas. After a period of time, the alpha particles lose their charge, become helium gas, build up, and the present invention eventually becomes electrically blocked. This is because helium gas is electrically non-conductive. A high work function material that has the ability to absorb gas will delay this process. Other alternative electrical collector materials, such as activated carbon, which has the ability to absorb large volumes of gas, may be used and this will not depart from the spirit of the invention.

Radon gas emissive radioactive material **4** is placed at the base inside vessel **1**. The radioactive material **4** can be placed in a number of locations within vessel **1** and still not depart from the spirit of the invention. The electron emitter **2** can take the form of a wire, rod, cylinder, disc, plate, etc. . . . The electron collector **3** can also take the form of a wire, rod, cylinder, disc, plate, etc. . . . I do not stake my claim on the form or geometry of the electron emitter or electron collector. I stake my claim on the method used to generate electrical power using an alpha fusion reaction.

In the instant invention a negative charge of one-thousand volts or higher is applied to pin **5**, which is electrically connected to corona wire **2**. Respectively, a positive charge is applied to pin **6** which is electrically connected to a high work function electron collection cylinder **3**. This has the effect of attracting and concentrating radon gas onto the corona wire **2** which becomes an abundant supply of alpha reactive particles. A lower voltage may also be applied across pin **5** and pin **6**. The applied voltage will depend on the parameters of the wattage design of the present invention, which are too numerous to mention.

Electrically conductive pin 5 and pin 6 exit through an airtight seal at the bottom of vessel 1, not shown. There are a number of sealants that are available in the field. The inner cavity of vessel 1 is evacuated of air at a low pressure of about 1/10th of an atmosphere. The amount of air that is evacuated is not critical but care must be taken not to obtain too low of a vacuum because this can result in the generation of undesirable x-ray emission. There are a number of high voltage sources that can be used to apply the required activating potential through pin 5 and pin 6 and this will not depart from the spirit of the present invention. I stake my claim to my new and novel method that directly generates electrical power which results from alpha fusion process and I do not stake my claim to the activating external voltage source thereof.

The speed in which the present invention will build up power depends on the potential difference that is applied to it and type of radon gas that it contains. The quantity of the alpha particle source determines the amount of amperage that is generated. The target material 2 is also a determining factor of how much current will be generated. When the target material 2 temperature rises, a greater number of electrons are emitted from its surface. The heated cathode 2 increases the odds of alpha particles hitting head on with its atoms, thus, producing a greater number of alpha fusion reactions, which further increases the surface heat boiling off additional thermally generated electrons. The surface area of the cathode 2 and anode 3 is also a determining factor of how much electrical current will be obtained.

The present invention generates a high voltage direct current. The present invention also generates a greater amperage per given density from what has been obtained from any previously known method or device in the prior art.

The instant invention described can be slightly modified to convert high voltage, high frequency, and radio frequency currents into a direct current. This feature is accomplished by adding an electrically conductive substance such as mercury, not shown, into the electrically non-conducting vessel 1. Any number of electrically conductive substances that will form a vapor or gas when heated can be used and this will not depart from the spirit of the invention. Said modification can also be utilized without the use of the radioactive substance 4, if the input source has enough energy to excite the vapor or gas into its electrically conductive state. The present modifications of the primary invention is more efficient than the prior art in converting alternating or oscillating currents because there is less electrical resistance in the conversion process. Therefore, energy can be more efficiently received and converted into a direct current.

Referring now to FIG.2 of the drawings:

The present invention is named alpha fusion valve 8 in the block diagram that follows:

The block diagram shown illustrates an example of how an alpha fusion valve 8 can be utilized in a practical application. Many differing types of systems are made possible using the present invention and will not depart from the spirit of the invention.

The alpha fusion valve 8 must be energized by an external potential difference to function if it is initially inactive or is allowed to become inactive after it has been producing power, not shown. This can be accomplished by applying a high voltage charge obtained from an electronic power supply 7. The reactions will build up within the alpha fusion valve 8 to the point where the surface of its internal electron emitter is totally bathed with radon gas. The alpha fusion valve 8 has to be

primed with a potential difference to begin generating electrical power. The alpha fusion valve 8 produces a high voltage direct current. The output of the alpha fusion valve 8 can be used to charge a high voltage capacitance 9. The high voltage is then lowered to twelve volts through a step-down converter 10. The twelve volts then charges low voltage capacitance 11 which can be set of parallel-connected twelve-volt storage batteries. A set of parallel-connected high farad capacitors could also be used. The stored energy in capacitance 11 can be used to provide power to electrical loads that require a twelve-volt direct current or it can provide a twelve-volt power supply to an inverter 12. The output of the inverter 12 can be designed by methods known in the art to provide a voltage and frequency that is required by specific electrical loads 13. It is preferable that an electronic voltage source be used to keep the alpha fusion valve 8 in a constant energized state, which can be alternating or non-alternating. Numerous electronic circuit designs may be used to supply the potential difference required to energize the alpha fusion valve 8. Such electronic circuits are known in the field and are not what I stake my claim to. Alternatively, a strong enough source of alpha, beta, gamma radiation or a combination thereof may also be used to energize the alpha fusion valve 8.

A simple earth ground and antenna raised to a suitable height can be used to take advantage of the potential difference that exists between the planet and its atmosphere, although this is not always practical. Charging capacitance 9 with this method is unpredictable and slow. Any suitable circuit may be used to supply the required potential difference to energize the alpha fusion valve 8 and this will not depart from the spirit of the invention.

Having thus described the invention, what is claimed is:

1. An electrical energy generator for generating electric energy comprising:

a vessel constructed of an airtight, electrically insulating material, said vessel including a base and defining a cavity, the vessel further including:

- (a) a negatively charged corona wire made of a low work function delta-ray emissive material which functions as an electron emitter, and including germanium, silicon or lead-sulfide for emitting delta-ray electrons when bombards with high energy alpha particles;
- (b) a high work function electron collector having a cylindrical shape and made of palladium (Pd) or an activated carbon and located coaxially inside the vessel;
- (c) a radon gas that decays to a radio isotope having an energy level greater than 6.06 MeV, which expands and thereby fills the cavity of the vessel; and
- (d) first and second electrically conductive pins being attached to the base through airtight seal and facing away from the cavity, the first pin being electrically connected to the corona wire and the second pin being electrically connected to the high work function electron collector,

Wherein the corona wire is initially charged through an external negative charge applied at the first pin, and the high work function electron collector is initially charged through an external positive charge applied at the second pin, and

Wherein, after charging of the corona wire and the high work function electron collector, the first and second pins act as cathode and anode respectively of the electrical energy generator.

* * * * *

Nov. 12, 1957

L. R. CRUMP

2,813,242

POWERING ELECTRICAL DEVICES WITH ENERGY
 ABSTRACTED FROM THE ATMOSPHERE
 Filed March 12, 1954

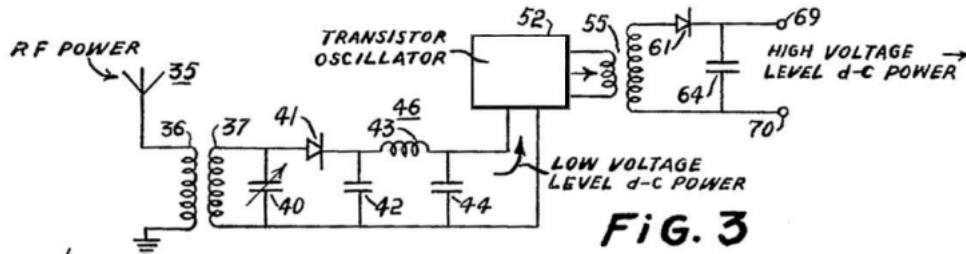


FIG. 3

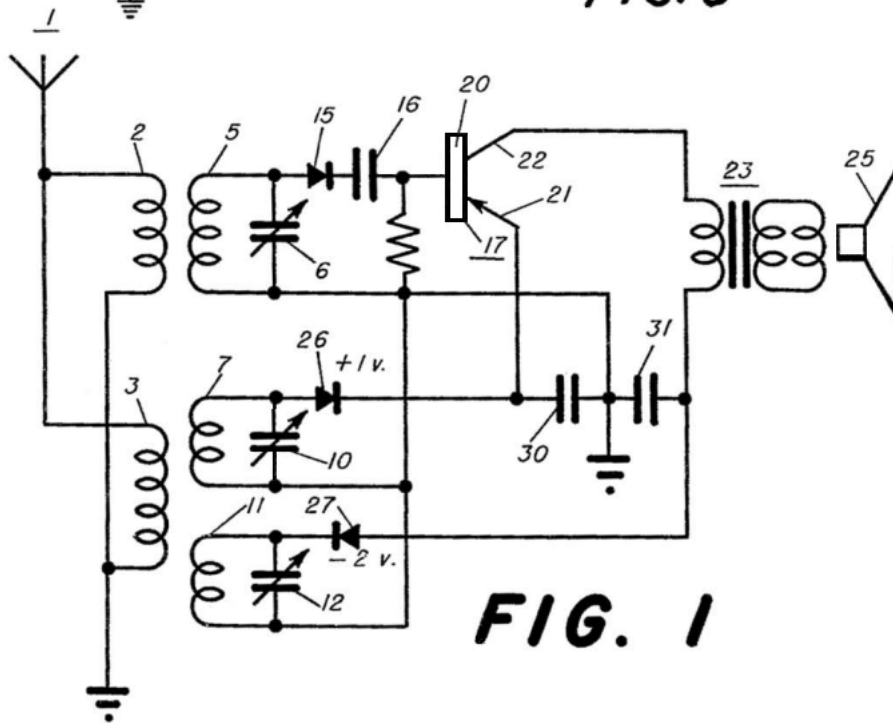


FIG. 1

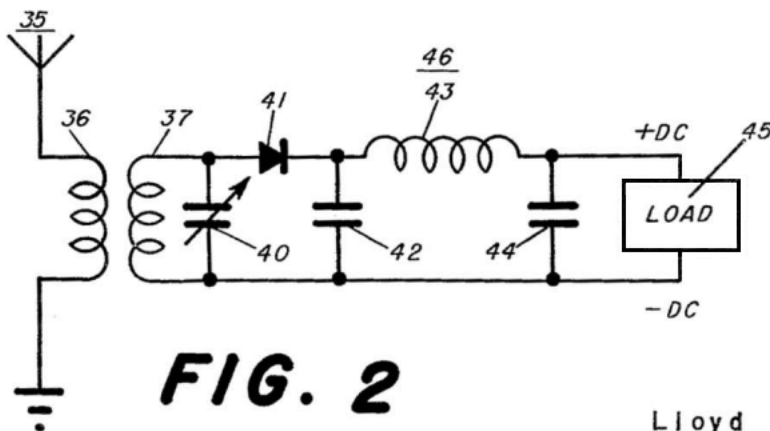


FIG. 2

INVENTOR
 Lloyd R. Crump

BY *W. E. Thibodeau + A. W. Dew*

ATTORNEYS

**POWERING ELECTRICAL DEVICES WITH ENERGY
ABSTRACTED FROM THE ATMOSPHERE**

Lloyd R. Crump, Silver Spring, Md.

Application March 12, 1954, Serial No. 415,986

1 Claim. (Cl. 321-2)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without payment to me of any royalty thereon. This invention relates to the convenient and economical provision of power for the operation of electronic circuits and devices using transistors, and of other electrical devices having modest power requirements.

A great advantage of transistors, and a major reason for their enthusiastic reception since their introduction a few years ago, is the fact that they will operate satisfactorily with very low supply voltages and currents. One milliwatt or even less is sufficient to power a transistor in many applications. Various batteries have been developed to provide, in a minimum of space, the relatively minute amounts of power needed by transistors.

My invention provides methods and means that permit transistor circuits, and also other low-powered electrical devices, to be economically and conveniently operated without any batteries whatever, and indeed without any power supply whatever as power supplies are ordinarily conceived.

The invention centers around my discovery that it is practicable to construct operative transistor circuits that are able to abstract from the atmosphere sufficient electromagnetic energy to provide all necessary supply voltages and currents for their own operation. Circuits and devices powered according to my invention will operate indefinitely without any local power source whatever.

I have successfully constructed and demonstrated such circuits. For example, I have constructed a batteryless transistor radio receiver on which I have listened to either nearby or distant broadcast stations as desired, using either headphones or a loudspeaker; this receiver has been powered entirely by electromagnetic energy abstracted from the atmosphere.

From the successful operation of this receiver, and from other experimental work, it becomes clear that, by the methods and means of the invention, a great variety of practical and useful transistor circuits can be powered entirely by energy abstracted from the atmosphere.

Furthermore, as will become apparent below, my invention is applicable to the powering of other electrical devices requiring relatively small amounts of power.

An object of the present invention is to provide methods and means for powering transistor circuits entirely from radiofrequency energy abstracted from the atmosphere.

Another object is to provide methods and means for powering remote radio receivers, low-powered radio transmitters, and other low-powered electrical devices, with energy received by radio from a master station, so that no local power supplies are needed by the devices and so that the powering or non-powering of the remote device is under the control of the master station.

A further object is to provide methods and means for powering transistor circuits and other low-powered electrical devices with radiofrequency energy received from one or more remote radio transmitters.

Other objects, aspects, uses, and advantages of the invention will become apparent from the following description and from the drawing:

Figure 1 is a schematic diagram of a transistor radio receiver in which all necessary power is supplied by energy abstracted from the atmosphere in accordance with the invention.

Figure 2 is a schematic diagram showing a general application of the invention to provide direct-current power to a load.

Figure 3 is a schematic diagram of a system for obtaining a high energy D.-C. source at a high voltage level using energy abstracted from the atmosphere.

Referring to **Figure 1**, a receiving antenna **1** is connected to antenna coupling coils **2** and **3**, the other ends of which are connected to ground. A parallel resonant circuit consisting of coil **5** and capacitor **6** is coupled to coil **2**. A second parallel resonant circuit consisting of coil **7** and capacitor **10** is coupled to coil **3**. A third parallel resonant circuit consisting of coil **11** and capacitor **12** is also coupled to coil **3**.

Coil **5** and capacitor **6** are tuned to the frequency of a radio transmitter from which it is desired to receive information—for instance, an amplitude-modulated standard broadcast station. The signal received from this transmitter need not be strong. The signal is detected by diode **15** to obtain an audio-frequency information signal. This audio signal is coupled through a capacitor **16** and is amplified by a circuit that includes a transistor **17** having a base **20**, an emitter **21**, and a collector **22**. The amplified audio output of the transistor is coupled through an audio transformer **23** to an electroacoustical transducer, preferably a permanent-magnet dynamic loudspeaker **25** as shown.

The novelty of the invention lies largely in the method and means by which the necessary direct-current power is supplied to the emitter and collector circuits of transistor **17**. This method and means will now be described.

Coil **7** and capacitor **10**, and also coil **11** and capacitor **12**, are tuned to receive radio signals of relatively high strength. It does not matter whether these signals contain information. These power signals are rectified by diodes **26** and **27** to provide direct-current power that is filtered by capacitors **30** and **31**. The D.-C. power thus obtained is utilized to power the transistor **17**.

In the circuit shown, two tuned circuits (coil **7** and capacitor **10**, and coil **11** and capacitor **12**) are tuned to power signals and the D.-C. voltages obtained from each are connected in series. The tuned power circuits may be tuned to the same or different power signals. Under certain circumstances it may be desirable to use more than two tuned power circuits and to tune them to more than two power signals; in this way power can be obtained from several signals and combined. On the other hand, if a strong power signal is available, a single tuned power circuit may suffice to give the needed D.-C. power.

Even weak information signals can be received successfully. A plurality of transistor amplifier stages can be used if desired, or other circuits such as superheterodyne circuits can be used. It is merely necessary that a sufficiently strong power signal or signals be available to provide the small amount of D.-C. needed to power the transistors.

If the information signal happens to be strong, it can be used as the power signal; all of the tuned circuits (coil **5** and capacitor **6**, coil **7** and capacitor **10**, coil **11** and capacitor **12**) are tuned to the information signal.

Engineers who have observed my invention in operation have been surprised at the unexpectedly good results obtained, even with readily available power signals of quite moderate strength. For instance, sufficient power for satisfactory operation of a loudspeaker at low volumes is readily obtained from a 5-kilowatt

standard broadcast station 5 miles away, using only an indoor antenna to pick up the power signal as well as information signals. In typical operation under these conditions a D.-C. voltage of about 2.5 to 3 volts is obtained between the emitter and the collector, at a current of about 250 microamperes; D.-C. power input to the transistor is thus of the order D.-C. power input to the transistor is thus of the order of 0.5 to 1 milliwatt. So far as I am aware, no one has ever before discovered and demonstrated the practicability of this method of powering a radio receiver.

Because existing broadcast stations within a radius of a number of miles provide adequate power signals, the invention is readily practicable with existing power signals in almost any location in or near any city in the United States.

Although I have described a transistor radio receiver powered by my invention, it will be readily apparent that the invention is applicable to the powering of any transistor circuit using one or a number of transistors, and to the powering of other devices requiring relatively small amounts of power. For instance, sensitive electromechanical, electrochemical, or electrothermal devices can be operated by the method of the invention.

Referring to Figure 2, which shows a more general embodiment of my invention, an antenna **35** picks up radiofrequency energy from the atmosphere. This energy flows through coil **36**, which is coupled to a tuned circuit consisting of coil **37** and capacitor **40**. The radiofrequency voltage across capacitor **40** is rectified by diode **41** and filtered by a low-pass filter **46** consisting of capacitors **42** and **44** and choke coil **43**. The resulting D.-C. voltage is applied to a load **45**.

In the practice of my invention, larger amounts of power can be obtained for short periods of time by storing received energy in a suitable energy storage device. Stored energy may then be withdrawn at intervals at a more rapid rate than that at which it was received and put into the storage device. In this way the invention can be used to provide short pulses of relatively very high electrical energy. This result can be readily obtained by charging a relatively large capacitor with direct current and then discharging the capacitor rapidly into a load when desired. This rapid discharge can be initiated automatically when the voltage across the capacitor reaches a certain level, or it can be initiated when a transistor radio receiver receives a certain information signal.

Higher voltages can be obtained with the invention by means of well known devices for raising D.-C. voltages as shown in Figure 3. The D.-C. voltage output from the capacitor **44** can be used to power a low frequency transistor oscillator **52** whose A.-C. output is raised to a higher voltage level by the transformer **55**. This relatively high A.-C. voltage can then be rectified by a diode **61** and fed to a capacitor **64** to provide a high energy D.-C. source at a relatively high voltage level at the terminals **69** and **70**. If desired, energy can now be withdrawn from the capacitor **64** at intervals in short pulses of high energy at a high voltage level. Pulsed radio transmission is one of the possible uses for this form of the invention. Other uses would be to provide a single relatively powerful pulse needed to actuate an electrothermal or electromechanical device.

As has been indicated above, in many locations and particularly anywhere in or near most American cities, power signals normally present in the atmosphere are readily available for the easy and convenient practice of the invention. However, the invention also has important applications in systems in which the necessary power signal is generated and transmitted specifically for the operation of the particular system. Such systems can, for example, comprise a master station transmitting all the power that is needed for hundreds or thousands of fixed or mobile transistor receivers or other remote devices over

a range of many miles. This eliminates the need for hundreds or thousands, as the case may be, of local power supplies. At the same time, such a system has the advantage that all of the remote devices can be simultaneously activated or deactivated at the will of the master station, simply by starting or stopping the transmission of the power signal. In such systems it will often be advantageous to use power signals of frequencies sufficiently high to permit the use of resonant receiving antennas of small physical dimensions for signal pickup at the remote devices. In addition to the power signal, the master station may transmit an information signal on the same or a different carrier.

Certain types of devices powered entirely by received radio waves are of course well known. The well-known "crystal set" of the early days of radio, which used a diode rectifier to demodulate an amplitude-modulated radiofrequency signal, is an outstanding example of such a device. My invention is readily distinguishable from such prior devices, however. In typical prior devices a modulated radiofrequency signal is applied to a diode to obtain unidirectional half-wave pulses whose amplitudes vary with modulation. These pulses are integrated by means of a capacitor to obtain a unidirectional signal the amplitude of which follows the audiofrequency modulation envelope. If the radiofrequency signal is received with sufficient strength the audio signal may have sufficient power to operate headphones or similar utilization device without power amplification; but the signal is utilized for its information content, rather than to supply non-information-containing power. My invention, on the other hand, entails the utilization of received radiofrequency energy to supply power to at least one pair of circuit points (across capacitor **31** in Fig. 1, for example), such circuit points requiring power solely for its power content and not for any information or modulation it may contain. In other words, my invention entails the utilization of radiofrequency energy to supply power that would otherwise have to be supplied by batteries, generator, or other local power source. It will be apparent that the embodiments shown are only exemplary and that various modifications can be made in construction and arrangement within the scope of the invention as defined in the appended claim. I claim:

An electrical device for obtaining a high energy D.-C. source at a high voltage level using energy abstracted from the atmosphere, said device comprising in combination: resonant means for receiving radio waves, first rectifier means for converting said radio waves into first direct current energy, first capacitor means for storing said first direct current energy, an oscillator powered by said direct current energy, said oscillator producing an A.-C. output, transformer means for raising said A.-C. output to an increased voltage level, second rectifier means for converting the A.-C. output of increased voltage level from said transformer into second direct current energy, and second capacitor means for storing said second direct current.

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PATENT SPECIFICATION

Application Date: Jan. 3, 1924. No. 163/24

231,247

Complete Left: Sept. 23, 1924.

Complete Accepted: April 2, 1925

PROVISIONAL SPECIFICATION

Improvements in and relating to Improved Means for Utilizing Electromagnetic Radiation and Atmospheric Electricity for Transmitting and Generating Power.

I, Serafino Orlando, O.D.C., subject of the Kingdom of great Britain, of Birchircara, Malta, do hereby declare the nature of this invention to be as follows:-

5 We were accustomed to combine the idea of electricity with that of wire conductors, and everybody knew that for the transmission of electrical energy it was necessary to make an exclusive use of metallic wires. But at the present time it is no longer thought
10 necessary to use these means for the transmission of electrical energy, so much so that both electrostatic and electromagnetic inductions are actions which are transmitted through the air, and although their fields of action are very limited, electricity can be
15 transmitted not only through wires, but also through the ether, which is to be found in the air, and, as proof of this, we may adduce the phenomenon of wireless telegraphy. It is known that this phenomenon is due to electrical current most rapidly alternated produced by apparatuses in which oscillatory
20 electrical discharges are produced.

These oscillatory discharges, which are the reciprocating motions of electricity, are not only limited to the system of the apparatuses in which they
25 are produced, but, as the electrical spark causing them explodes in the air, they are a phenomenon which occurs in the ether met with in the air, consequently, wherever the spark occurs, it produces in the ether periodical motions which get spread
30 spherically all round in all directions so far as they are not obstructed by some obstacle, and, therefore, it is inferred that the electrical waves are nothing but an electromotive force transmitted from one point to another by means of the ether. Above all, it
35 is clear that the action of these oscillations at a distance is bound to be greater, the greater the energy employed in this oscillatory motion happens to be.

We know that the quantity of electrical energy which can be communicated to a conductor or to a
40 system of conductors depends on its capacity. The smaller the conductor is, the less is its capacity, and, therefore, the smaller in the energy of the oscillations which are produced in it when, after having
45 been charged, it is discharged through the medium of the spark.

In fact the period of these electrical oscillations increases proportionately to the square root of the

capacity of the oscillatory system. 50

Consequently the above consideration warns us to use a system of conductors of great capacity in order to obtain extremely long waves, for the latter set in motion a quantity of energy greatly superior to that induced by short waves. 55

Now as these waves are propagated spherically all round in space in all directions, however much one tries to render the apparatuses powerful, it always remains true that the electrical energy transmitted in space is an electro-motive force dispersed in all directions, in a similar way to the luminous waves issuing from a lighted splinter, which spread through the ether in all directions, and in the same way as these, their intensity decreases as the distance increases, and, however great the energy sent forth by the generating station of wireless telegraphy to the receiving station may be, only a very slight fraction of the transmitted energy reaches it; first on account of the loss of intensity due to the distance from the source, and, secondly, because the electrical energy employed in these apparatuses is due to a pure phenomenon of resonances. 60 65 70

The same thing happens here as when a tuning fork, tuned to A (1a) pitch, is sounded in the vicinity of a pianoforte note having the same A sound, when the latter in its turn is caused to vibrate and emit sound. 75

Nobody, of course, refuses to recognize the great difference existing between the intensity of sound emitted by the tuning fork and that felt by vibration. 80

Therefore in order to succeed in solving the problem of wireless traction, setting aside the apparatuses in which the phenomenon of resonance are produced, it is necessary to have recourse to other contrivances, having the property of intercepting, or of better absorbing, in great quantities, the electrical energy dispersed in space, causing it to flow in a desired direction, or to flow towards a required point, which amounts to saying that it is necessary to construct an invisible conductor in space which may serve as a path to these waves, and to concentrate them at any point that may be required. The possibility of constructing such an apparatus results from the scientific proofs I am about to submit whilst unfolding my idea. 85 90 100

Rontgen rays, among other marvellous properties, possess one which is of great physical interest, that is, these rays discharge very rapidly the electrified bodies they meet with.

5 In order to prove in a simple way this fact, it will suffice to use a gold-leaf electroscope whose leaves are electrified with an ebonite rod, or with rubbed glass. As soon as the Rontgen rays are produced in its vicinity, the gold leaves at first ready to diverge and retain this position, now instantaneously fall down which is a sure proof that the air loses its insulation properties and becomes a conductor.

10 The fact that the air, traversed by these rays becomes a conductor, says Professor Gritetz, is explained by admitting that owing to them, the molecules of air split up, giving origin to very small particles, some of which are charge positively, and others negatively. It is therefore asserts that the air is ionized by these rays; the free ions in the vicinity of a charged body can become united to this electricity, and, therefore, can discharge it, and, consequently, this ionized air possesses a certain conductivity in such a way that if from any cause there is a difference of potential existing between two points in the air, an electric current is bound to pass, same as happens in a saline solution. Another property of great importance was observed when it was rendered possible to conduct to the outer side of a Crookes' tube cathodal rays, the negative electrons, which in electrolytic phenomena are inseparable from matter, are freed from the latter and subsist free; from which reason, owing to the high tension obtained in Crookes' tubes, they depart from the cathode with a velocity of about 1/3 that of light, and they act as if they carried away with them negative electricity, and, consequently, every body met with by the cathodal rays becomes electrified negatively.

40 The apparatus proposed by me to intercept, or rather absorb in great quantities, the electric waves and to profit by it in its application to electrical power generation, will consist of an assemblage of fine copper wires, in several layers, one inside the other, laid out in the form of a flat rhombus, of which one diagonal is remarkably greater than the other. The wires of the several layers, are relatively staggered. The two extremities of all these wires are placed in communication with the central main wire the latter to have such a section as to allow of a resistance which may correspond exactly to the one offered by all the wires, taken as a whole. Underneath in the centre of this apparatus, is placed a Crookes' tube capable of producing rays in great quantities. 55 The position of this tube is determined so as to allow of the copper wires being traversed by the rays throughout all their extension. The superficies of the apparatus will be proportioned to the extent to which the rays are projected, which extension will depend on the form and size of the platinum cone existing at the centre of the tube.

The above-mentioned tube if of Thomson model, would be highly suited to the predetermined

object; here the negative charge is transmitted to two diametrically opposed points, and, in the inner part, the cathodes are represented by two specular and concave aluminium, conductors, whilst in the centre of the tube is to be found the anode formed by the platinum cone receiving the positive charge. 65

When the current is discharging towards the tube, the cathodal rays strike the platinum cone at their focus respectively on each side, and thus large quantities of rays are projected in straight lines perpendicularly to the superficies of the tube. 70

The phenomena to be verified in this apparatus are the following:- 75

The rays emanating from the tube, when it is placed in the above-mentioned position, whilst they strike the surrounding air rendering it ionized and, consequently, conductive, must at the same time traverse the copper wires impregnating them with negative electricity. The extent of the layer of ionized air and the intensity of the negative charge will undoubtedly depend on the greater or lesser power of the apparatus in which the Rontgen and cathodal rays are generated. 80 85

The electric waves sent continually by the generating station with the rapidity of light in all directions, must, on their way through space, meet with the obstacle, so to say, wherever it may be, formed by the conductivity of the ionized air through the action of the Rontgen rays projected by the tube, and attracted and absorbed by this conductivity of the air, they produce in the space struck by the rays a true aerial conductor, which gets charged without interruption with electricity, for, as the air is a non-conductor, only the layer struck by the rays becomes charged with electricity, and the air which surrounds it must retain its insulating properties. With respect to electric waves absorbed by the ionized air, Professor Wimbledon Hill says: 90 95 100

Electric waves suffer the least absorption when travelling through a non-conductor medium like ether. Marconi observed in 1902 that signals that carried 1500 or more miles at night-time, would not carry for about 700 miles in the day. The action of day-light is responsible for the greater absorption; sunlight produces partial ionization of the atmosphere, and renders it conductive." 105

From what we have said before, it is inferred that the air ionized by the Rontgen rays should absorb electric waves in a greater quantity, as its conductivity is extraordinarily greater than when it is ionized through the action of solar rays. In fact it has been proved above that electrified bodies when discharged in the vicinity of the Rontgen rays, whilst this never happens through the action of solar rays, for if such a thing could occur, as the sun's rays strike all day long the atmosphere, the properties of the static electricity would not have been discovered, because we should never have been able to have a body charged with electricity. The rays projected by the tube, in lines perpendicular to the superficies of the tube, present to our sight the form and size of the invisible conductor produced by 110 115 120

the ionization of the air which attracts and absorbs continually the electric energy; this electric energy, being bound to follow the course formed in the air by the projection of the rays, must necessarily come into contact with the wires charged negatively through the action of the rays themselves, and here then takes place the meeting of the two conductors charged with two kinds of electricity, for it is laid down as a law that two different conductors have always different potentials, namely a positive and a negative potential. The difference of potential causes the negative electrons of the ionised air to be urged on towards the positive conductor, whilst the positive ions are attracted by the negative conductor. In the contact with the two conductors they give up their charges, thus originating the electric current.

The magnitude of this current will depend on the greater or lesser ionization of the air, the greater the difference of potential between the two conductors, the quicker the electrons and ions will be displaced, thus communicating for each unit of time greater charges to the two conductors.

In the apparatus, the positive or highest potential corresponding to an excess of electricity ought to be found in the invisible conductor formed by the ionized air, because the potential of a conductor is inferred from the relation between the capacity of the conductor and the quantity of electricity it possesses, and therefore it follows as a consequence that the negative or lower potential corresponding to a deficiency of electricity ought to be found in the bundle of wires.

A difference of potential between two charged conductors has a consequence that when these two conductors are put into communication a flow of electricity is produced through the bodies joining together the two points of different potential, that is, an electric current is produced, or rather, an electromotive force from the higher potential to the lower; therefore, according to this other law, the electricity found in the conducting air, which is at the highest potential, should pass over the metallic conductors of the apparatus, which are at the lower potential.

It has also been said that the current is produced through the wires uniting together the two points at different potentials. In this apparatus, owing to the nature or one of the conductors, such as the ionised air, this joining wire is not required because air by itself, as can very easily understood, supplies this defect, as the electricity which it possesses is in continuous contact with the other electricity produced continually in the wire; therefore as electricity flows with greater ease through metallic conductors, than through any other conductor, then the recombining of the two electricities, one of the ionised air, and the other of the wire, cannot occur through the medium of the air, but runs over the bundle of the metallic wires; and generates in these an electric current; the greater the difference of potentials, the greater will be also the flow of electricity from one point to the other. So long as the difference of potentials is maintained always constant,

a true electric current is produced in the conductors, as can be experimented with electrostatic machine.

In fact, through the rotation of the machine, to one of the conductors is communicated positive energy, and to the other positive electricity, that is, a difference of potential is constantly maintained between them, whence the two electricities flow continuously in the wire, or in the wires, and an electric current is produced.

In the apparatus the two electricities, namely that of the air and that of the wires, both produced without interruption, through the action of the rays projected by the tube, finding themselves in continual contact the one with the other, the difference of potential is maintained constant, and provokes, as already proved above, the passage of electricity through the wires, or else the electric current.

ATMOSPHERIC ELECTRICITY

In addition besides the electric waves, also atmospheric electricity, for the same reason, ought to take part in the phenomenon, and be absorbed by the apparatus. In fact the atmosphere is in an electric state always and everywhere, so much so that the difference of potential even between localities not very far from one another is sometimes considerable. When it is fine weather, the air is usually electrified positively, and the earth, naturally, by induction, is electrified negatively. The free electricity of the atmosphere is in greater quantity in high regions. It undergoes variations of a relative periodicity during day-time and the seasons.

With regard to what I state, what is asserted by an American scientific journal, "Science and Invention," (May, 1921), is quite to the purpose.

"It is said the Dr. Plauson, a German scientist, has successfully demonstrated that if we send up metal surfaced balloons and tap the electrical energy from the atmosphere at a level of 1000 feet or more, we shall be able to realise an average of 200 h.p. per square metre, an area equivalent to 3.28 square feet. It is even claimed that in his latest experiments, as great a quantity of electrical energy as 400 to 500 h.p. has been realised per square metre. Under normal conditions, the potential gradient, as it is called, of the atmosphere increases with comparative regularity as we rise above the surface of the ground, the atmospheric potential per foot or per metre varies also, as may be well imagined, with the season of the year, and the potential or voltage has been found to average 100 volts per metre (3.28 square feet) in the summer months, while during the cold winter seasons the potential gradient rises to as high as 300 volts per metre..."

The same scientific journal (March, 1922) makes the following remarks:-

"The amount of electrical power that resides in our atmosphere is astounding Herr Plauson found in his experiments that a single balloon sent aloft at a height of 300 yards gave a constant current of 400 volts of 1.8 amperes, or in 24 hours, over 17¼ kilowatts! By using two balloons in connexion with a special condenser battery, the power obtained was

81½ kilowatts in 24 hours! The actual current delivered was 6.8 amperes at 500 volts...”

Now it is well known that X rays are effective at a distance of almost thirty feet according to a statement by the French Academy of Arts and Sciences with the following words:-

“X rays produce electrons on their passage through the air; these electrons are definite entities, and as they leave atoms, they may traverse matter or pass through the air in a straight path, and by their coming in collision with the atoms of the air; they render it a conductor of electricity. It is true that screens of lead suffice to protect the operators from the evil effects of X rays, but operators are sometimes careless, and then the rays are effective at a distance of almost thirty feet.”

Supposing, therefore the air ionised by the rays to be five square metres, such at an altitude of 1000 feet, according to the latest experiments by Dr. Plauson, should effect a force equivalent to $5 \times 200 = 100$ up to $5 \times 500 = 2500$ h.p. Therefore, whenever the apparatus at an altitude of several metres from the ground is capable of absorbing from an area of five square metres as much electricity as is required to realise a force of 1% in comparison to that obtained at an altitude of 1000 feet from the earth, it should give a result of a force from 10 to 25 h.p.

INTENSITY OF ELECTRIC WAVES

All physicists, among whom may be included Hertz and Faraday, admit that electric and luminous waves are identical, that is, oscillations of the ether of varying length. The luminous waves acting on sight, have a length varying from 4 to 7½ ten thousandth of a millimetre, according to the various colours, whilst the longer wave of 40.50 ten thousands of millimetres show themselves only for technical properties in apparatuses suited to this object.

Electric waves are much longer, for they measure from several centimetres, to thousands of me-

tres, but the difference between these two kinds of waves is only in length.

Taking this for granted, we may state that electric waves before a very short duration of oscillation appear to us as light; while electric waves of a great duration of oscillation do not manifest themselves to us as light, but owing their effects of induction show themselves as electric waves, If all this be true; (and all consequences therefrom can be verified) it can surely be possible to obtain by means of electric waves the same phenomena as with luminous waves, and the laws ruling the latter can be applied to the former.

And this Hertz proved by experiments.

Now physics teach us that the intensity of light is inversely proportional to the square of the distance from the source, that is to say, it decreases with the square of the distance for the source that is from the distances 1, 2, 3, the intensity of light is proportional to the numbers 1, ¼, 1/9, etc., and this occurs because light gets spread in all directions over spherical surfaces of a radius increasing with the distance. Spherical surfaces with rays 1, 2, 3, etc. have a magnitude proportional to the numbers 1, 4, 9, etc., that is spherical surfaces increase with the square of the X rays.

Therefore as the intensity of the light has to be communicated to ether waves whose superficies increase at the square of the distance, each of the receives a part of the former (that is of light) whose magnitude decreases in the same measure.

Since luminous and electric waves, according to the above adduced proofs, are identical, the enunciated law of the intensity of light may be applied (taking into consideration the multiform variations of the atmosphere) to the intensity of electric waves.

Dated this 3rd day of January 1924.

SERAFINO ORLANDO,
Birchircara, Malta

80

COMPLETE SPECIFICATION

Improvements in and relating to Improved Means for Utilizing Electromagnetic Radiation and Atmospheric Electricity for Transmitting and Generating Power.

I, SERAFINO ORLANDO, of 47, Church Street, Ken-sigton, W 8, British subject, late of Birchircara, Malta, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:-

My invention relates to an improved means of absorbing electromagnetic energy from ether. The electromagnetic energy may be of the form of electromagnetic waves radiated from some radio transmitting station or from the electrostatic charge in the atmosphere.

According to my invention I provide an arrangement of metallic conductors, preferably in the form of a network beneath which I introduce a source of X rays and from this source I project the rays upwards through the conductors.

It is known that a beam of X rays causes the air penetrated by such rays to become ionised and consequently conducting for a distance dependent on the strength of the rays.

I am aware that in conjunction with the X ray emitted by the X ray tube are certain other rays

called cathodal rays which carry with them negatively charged electrons which cause all bodies they meet to become charge with negative electricity.

5 According to my invention I find that when electromagnetic waves strike the region of the ionised air enveloping the network of conductors, produced by the X rays projected into the network, the arrangement is found to be equivalent to a conductor
10 of great height, but when the source of ionisation is removed practically no absorption of energy takes place in the conductors.

The function of the ionisation being to increase the small superficial area of metal exposed for the
15 purpose of absorbing electromagnetic energy by rendering the air surrounding the conductors conducive to the passage of electromagnetic energy from a source of X rays or other rays capable of producing ionisation.

20 In this invention it is found desirable to arrange the size of network to suit the strength of the source of ionisation or conversely to arrange the strength of the source of ionisation to suit the size of network; it being desirable to fill the field of ionisation with conductors up to an intensity of ionisation
25 which may be determined by experiment.

Should it be found desirable, the cathodal ray previously referred to may be prevented from striking the network of conductors by deflecting the by
30 the aid of a magnet.

The invention is illustrated by way of an example in the accompanying drawing in which:-

Fig. (1) shows the network of conductors in plan and elevation.

35 Fig. (2) shows the electrical circuit.

In carrying my invention into effect according to the apparatus illustrated; the network of conductors shown in Fig. (1) consists of a number of fine copper wires (*a*) communicating with a central conductor (*b*). 40

In Fig. (2) a source of X rays (*c*) is shown beneath the arrangement of conductors (*a*) the details of which are shown in Fig. (1).

These conductors (*a*) may for convenience be connected to a terminal (*d*) to which apparatus to
45 be actuated may be connected through another terminal (*e*) to earth.

The magnet (*m*) may be introduced for the purpose of deflecting the cathodal rays (*f*) previously referred to. 50

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:-

1. A conductor or network of conductors which
55 has been surrounded by an ionised gas for the purpose of increasing the power of the conductor to receive electromagnetic energy.

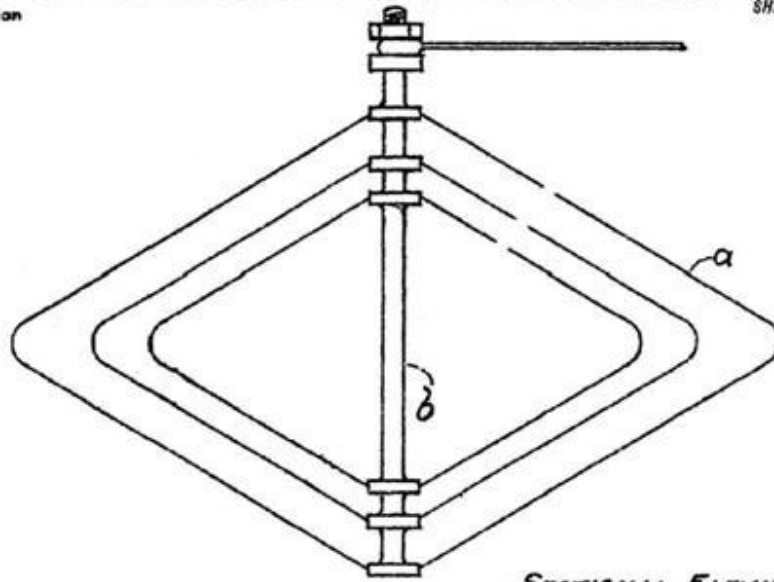
2. A conductor or network of conductors which
60 has been surrounded by an ionised gas for the purpose of increasing the power of the conductor to transmit electromagnetic energy.

3. A conductor or network of conductors which
65 has been surrounded by an ionised gas for the purpose of increasing the power of the conductor to absorb electrostatic charges from the atmosphere

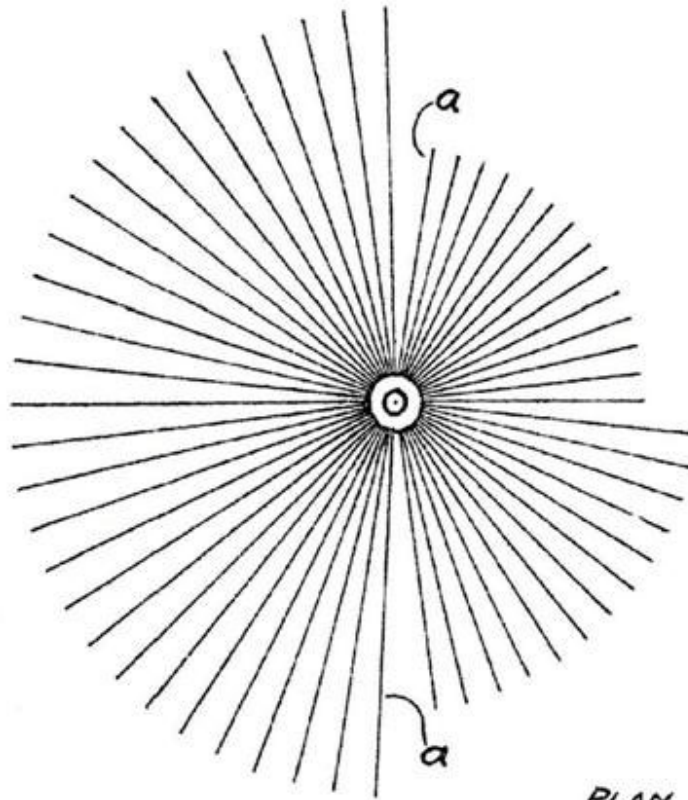
4. A system of absorbing electromagnetic energy from the ether substantially as described with reference to the drawings.

Dated 2nd day of March 1925. 70
SERAFINO ORLANDO

[This Drawing is a reproduction of the Original on a reduced scale.]



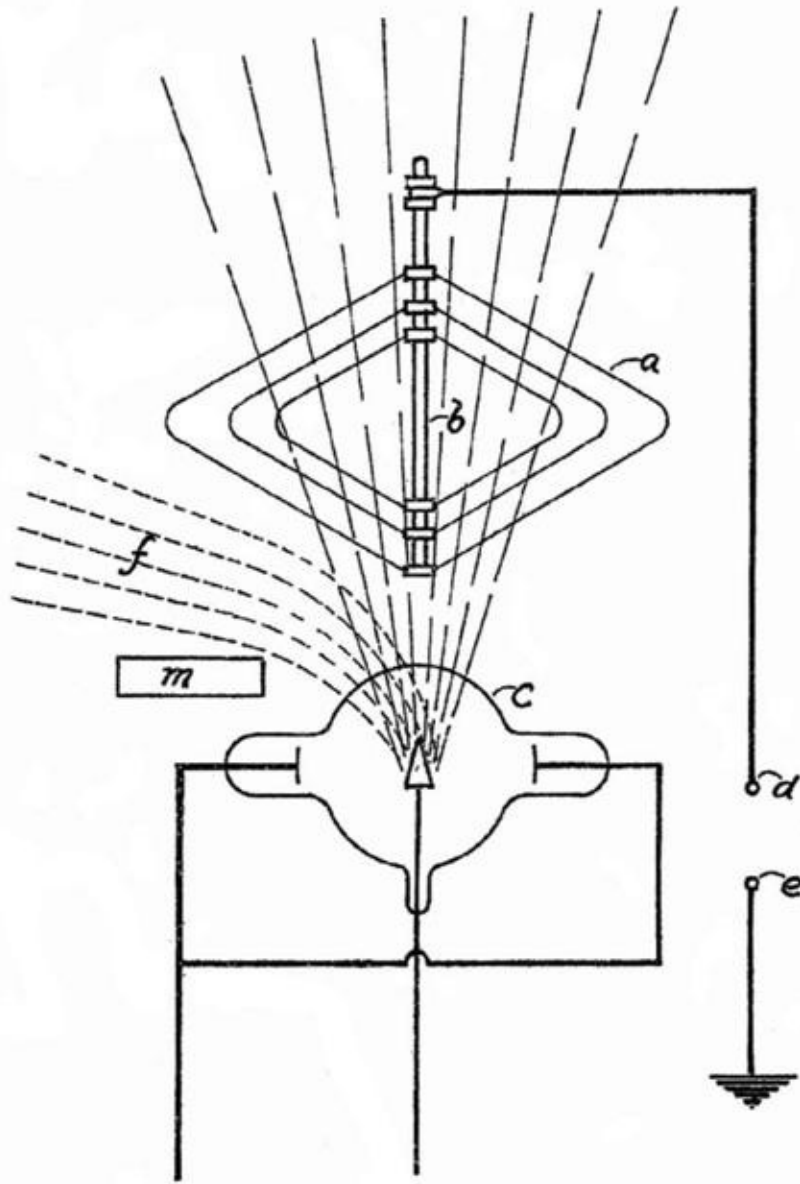
SECTIONAL ELEVATION



PLAN

FIG. 1.

SECTION



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June 9, 1925.

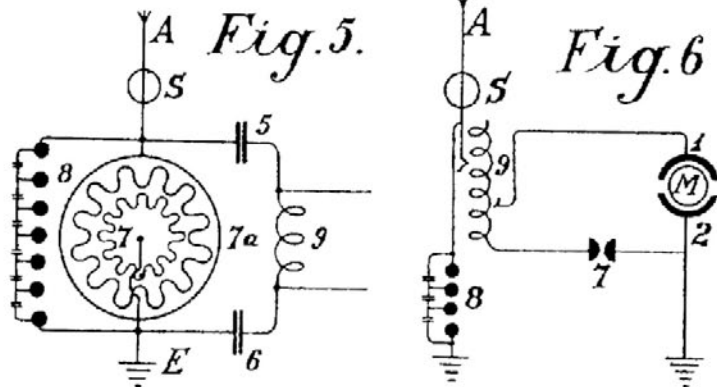
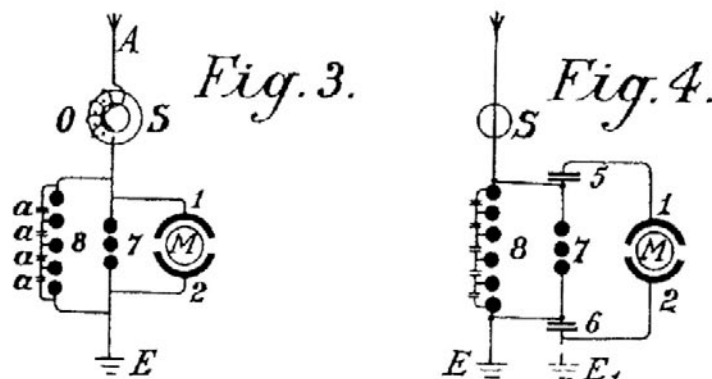
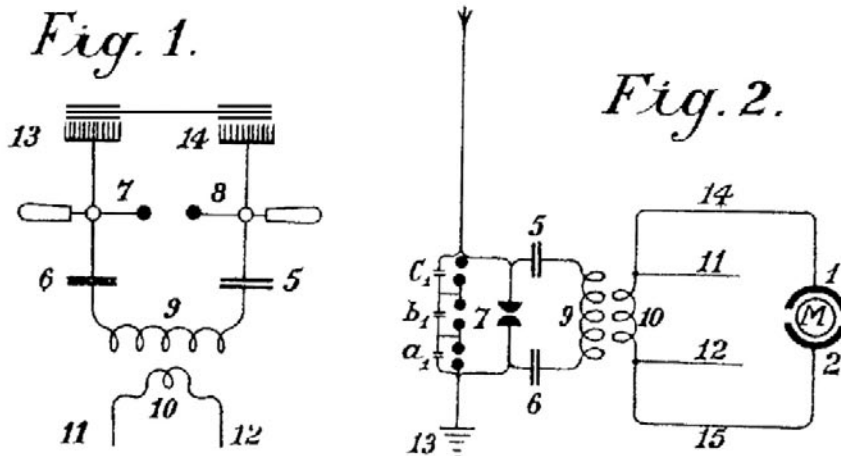
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H. PLAUSON

CONVERSION OF ATMOSPHERIC ELECTRIC ENERGY

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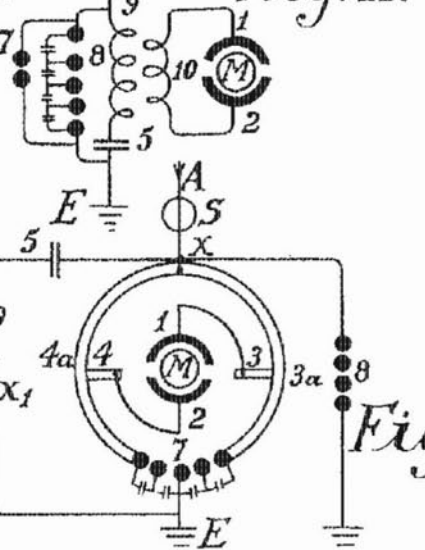
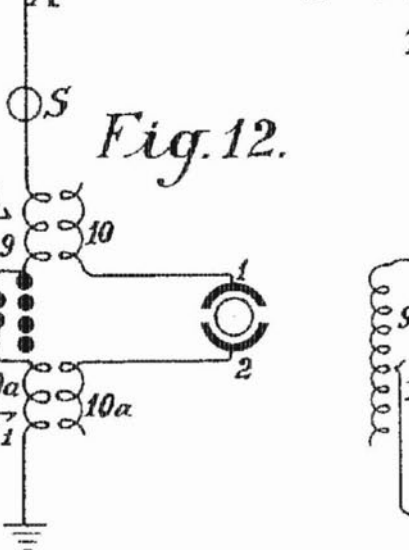
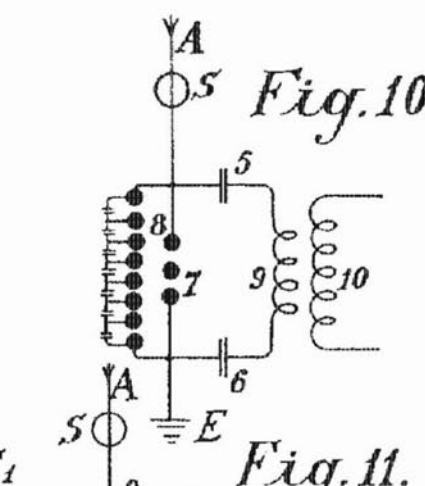
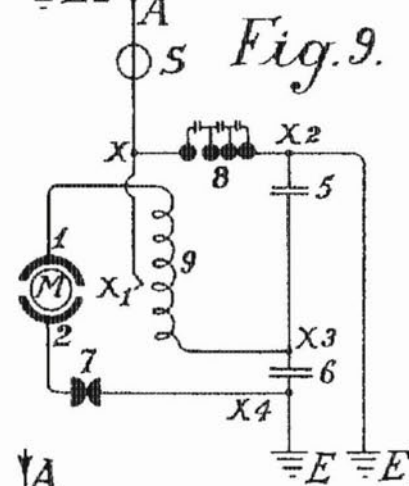
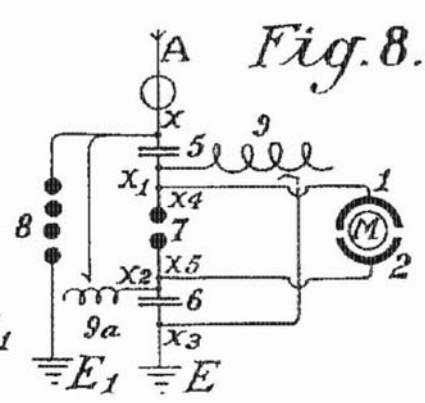
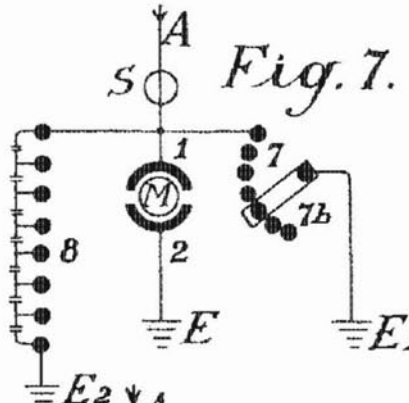
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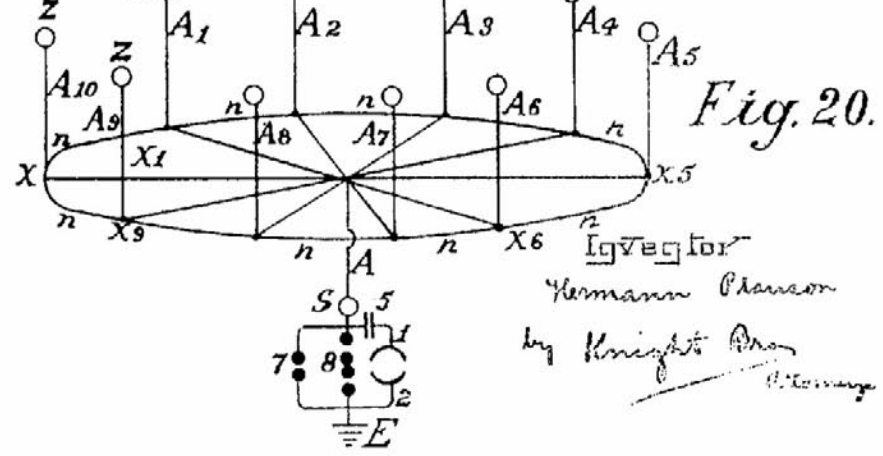
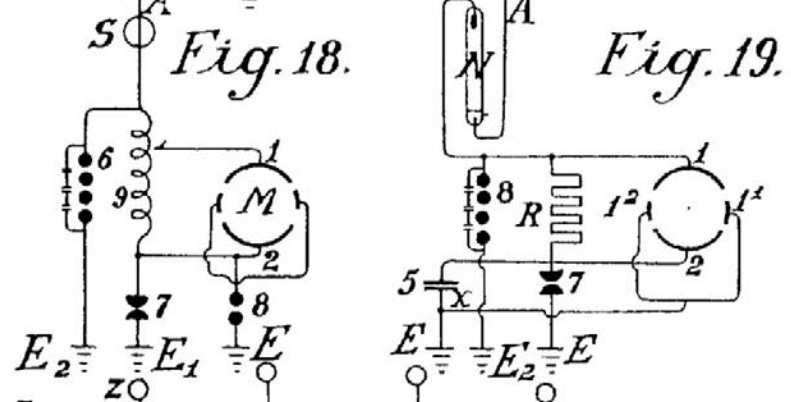
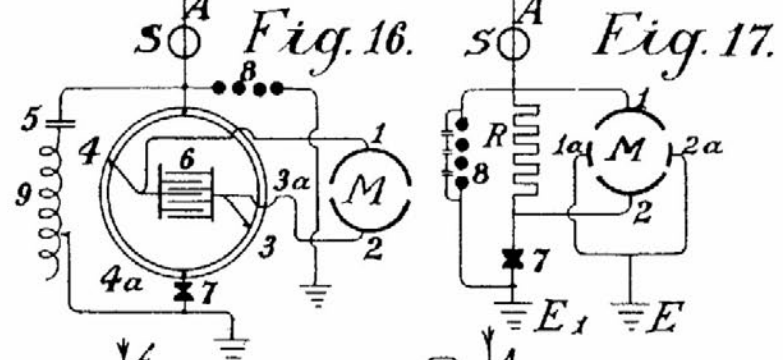
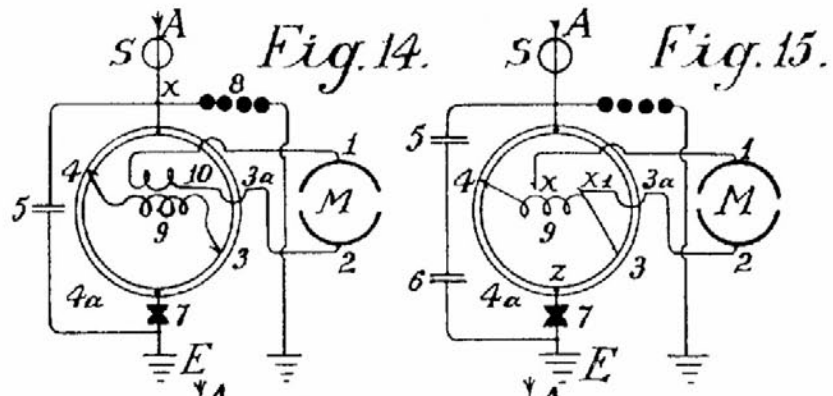
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Fig. 22.

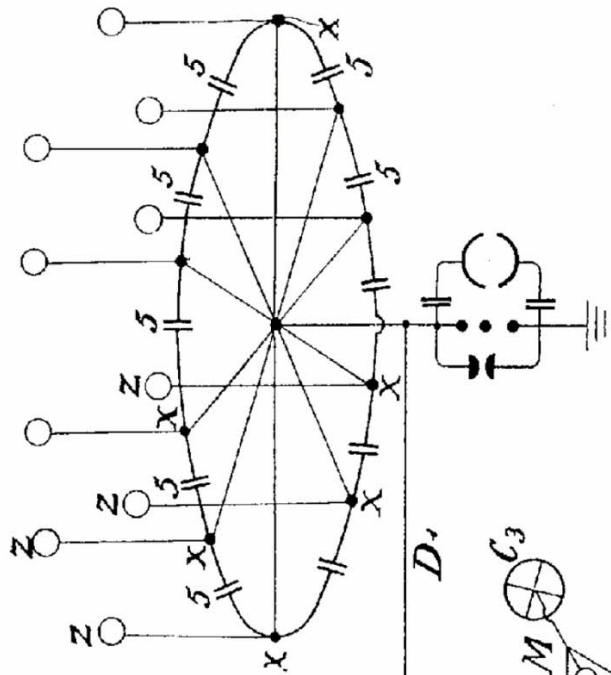


Fig. 21.

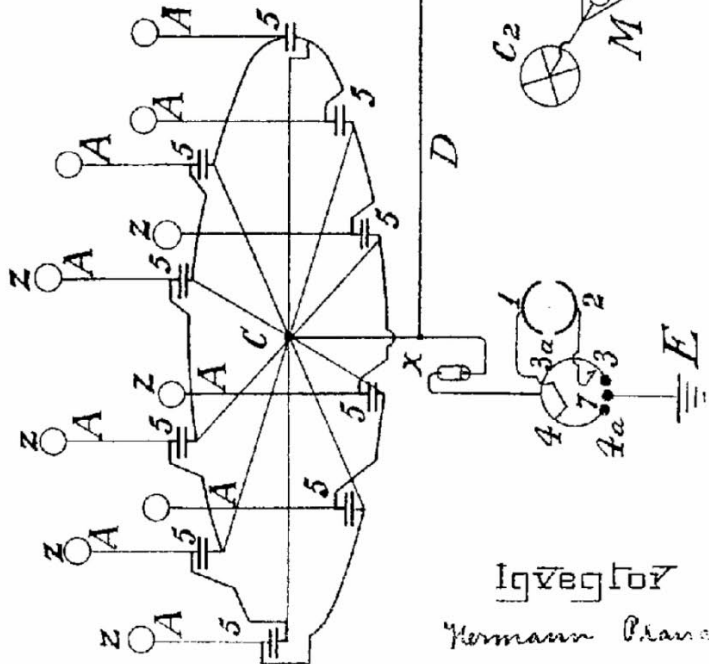
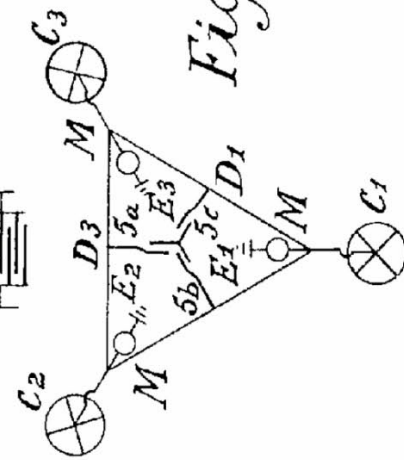


Fig. 23.



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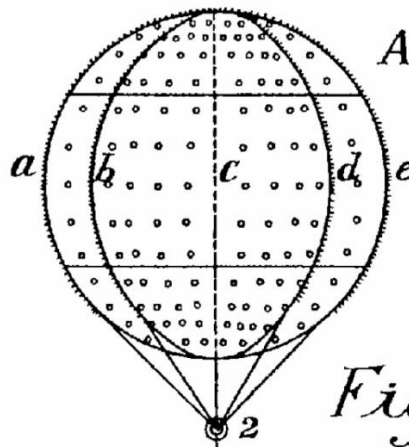
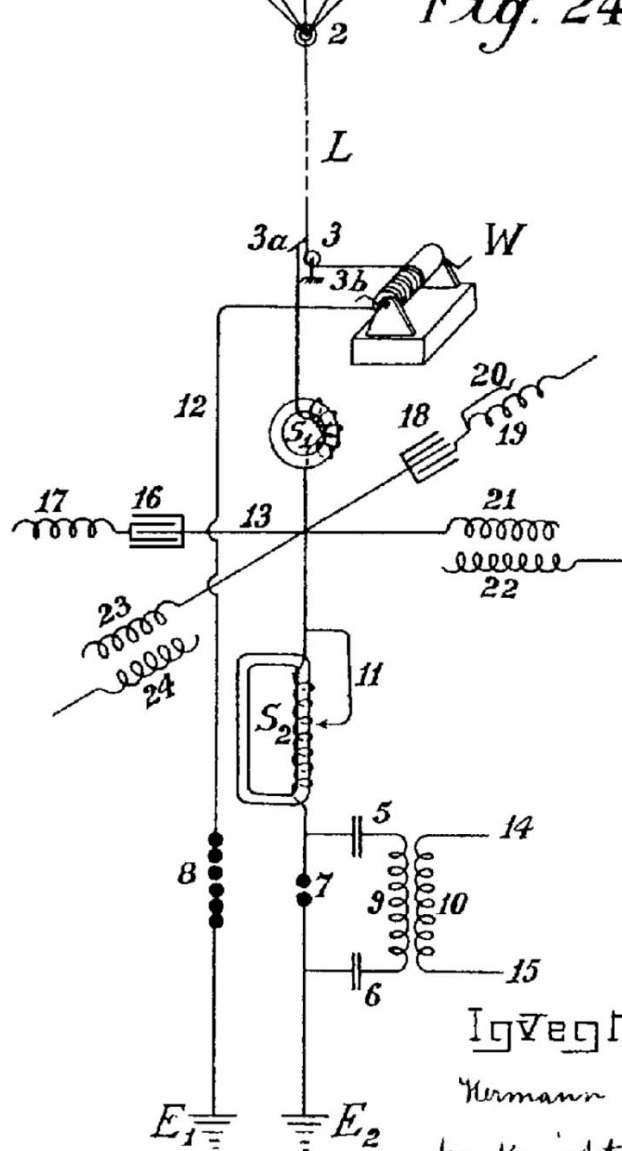


Fig. 24.



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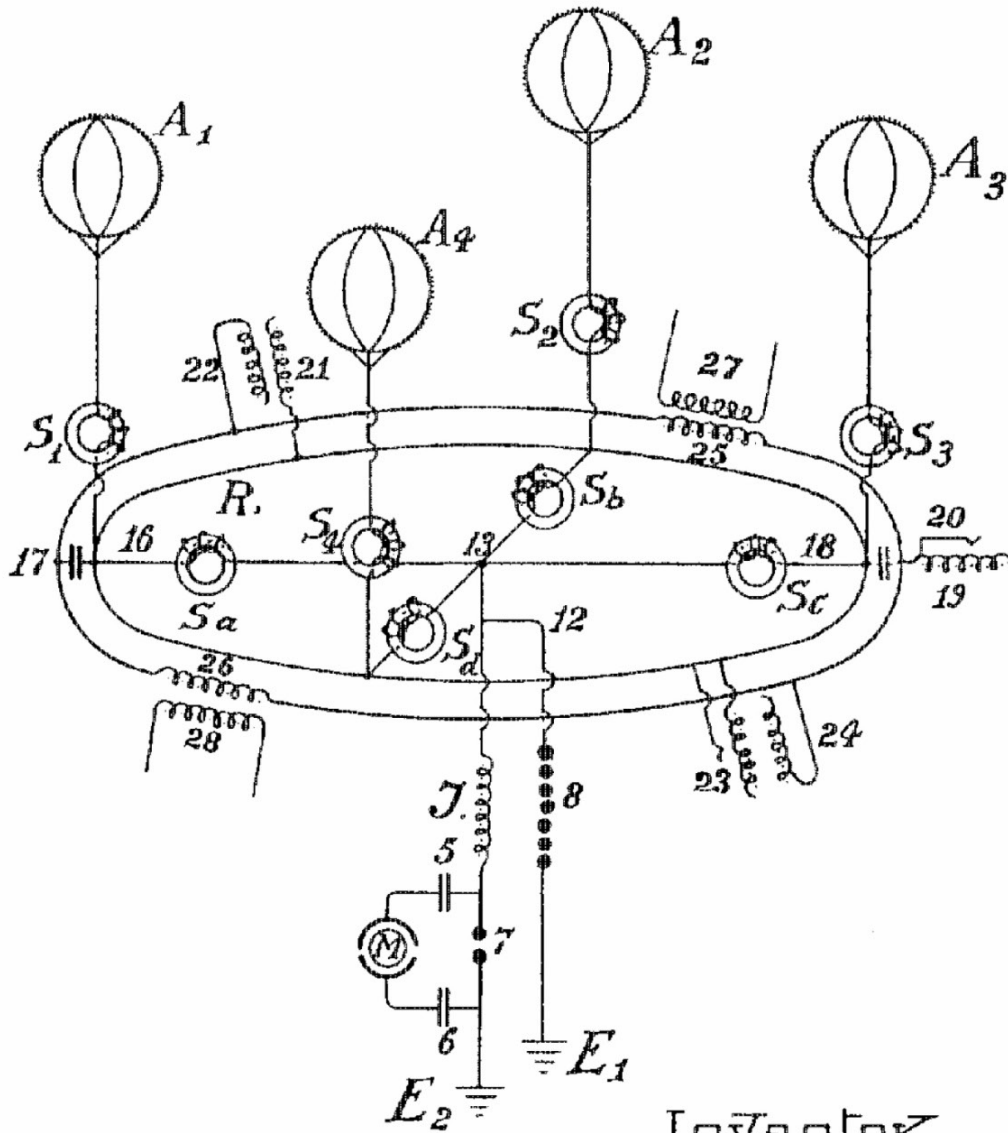
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Fig. 25.



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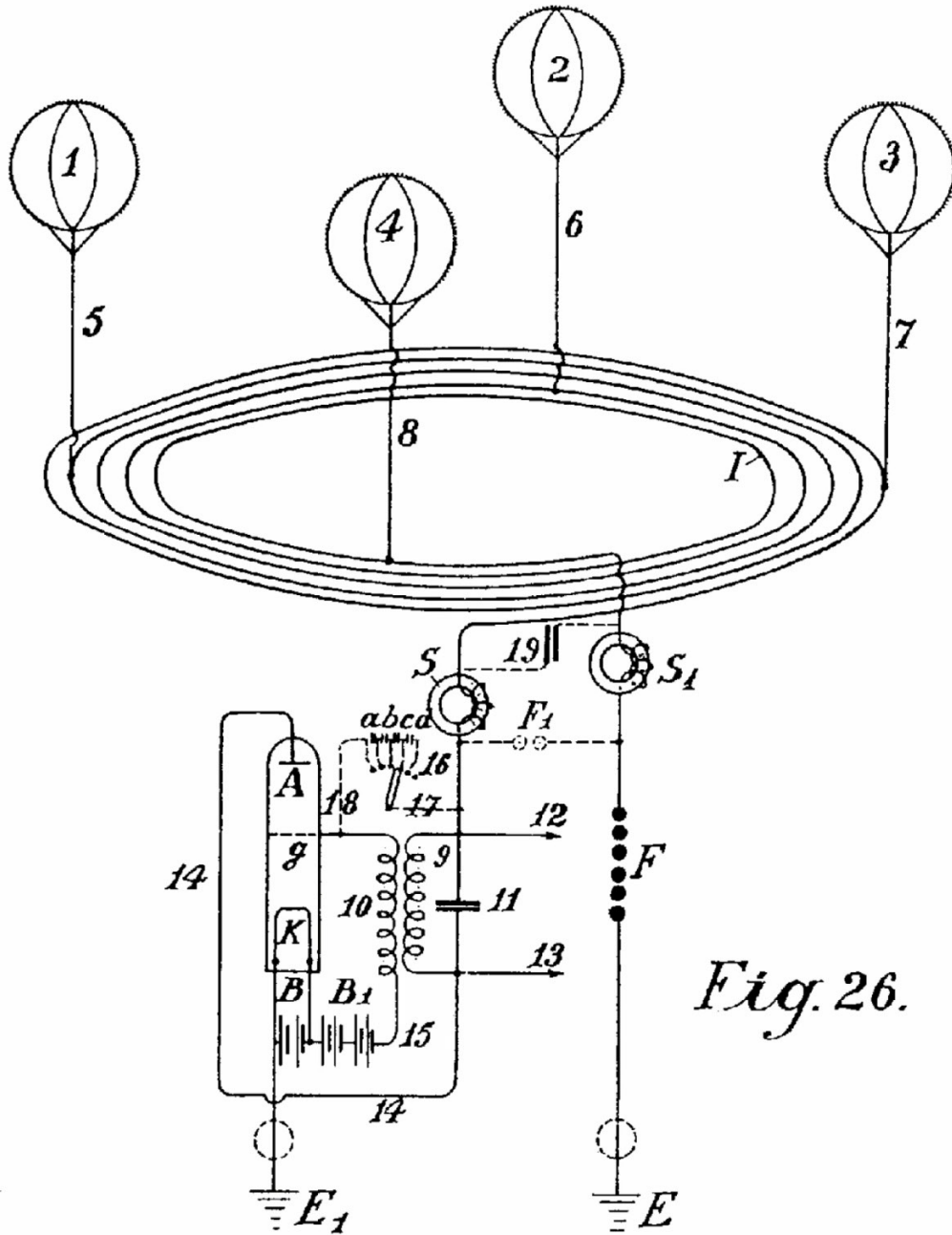


Fig. 26.

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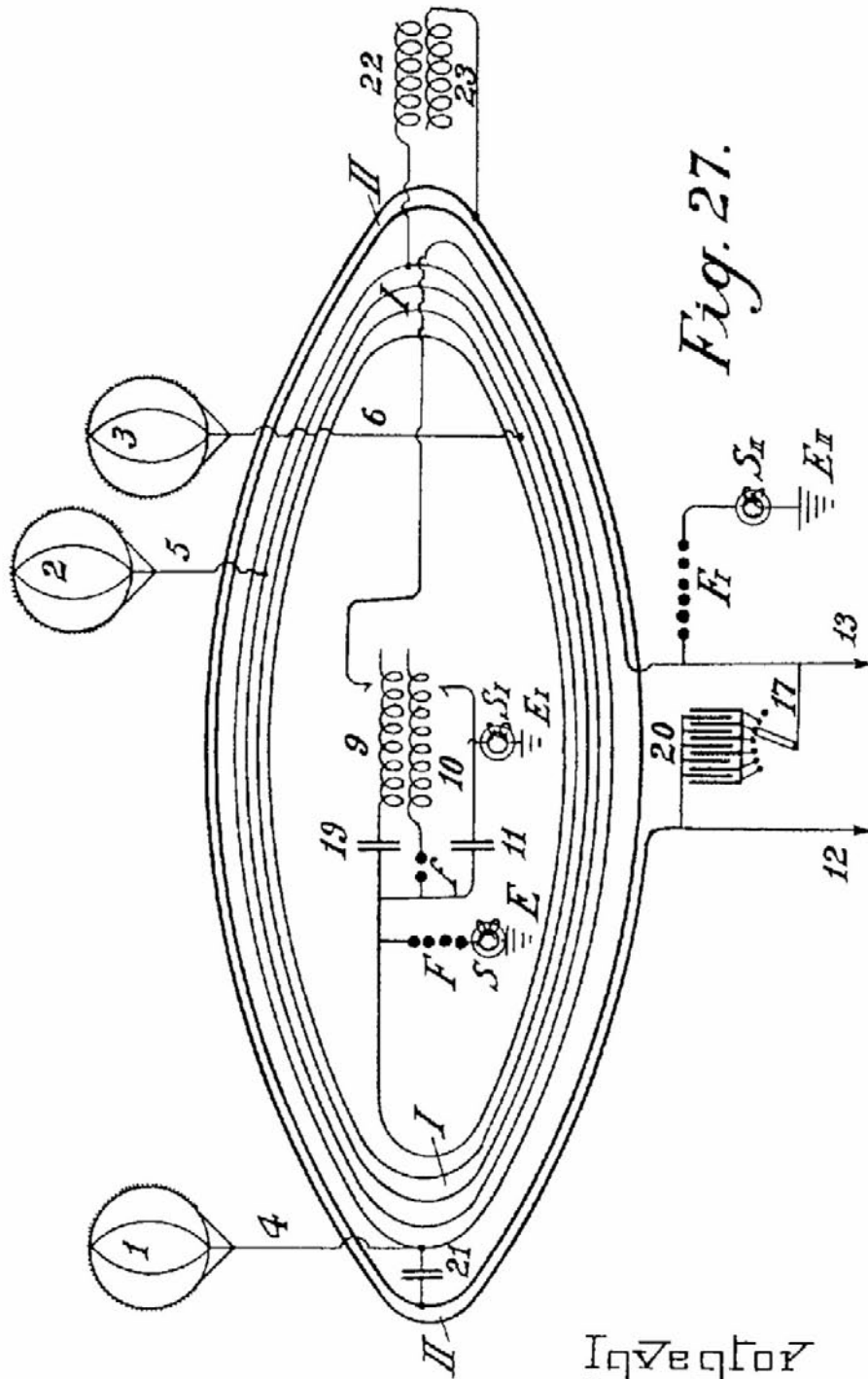
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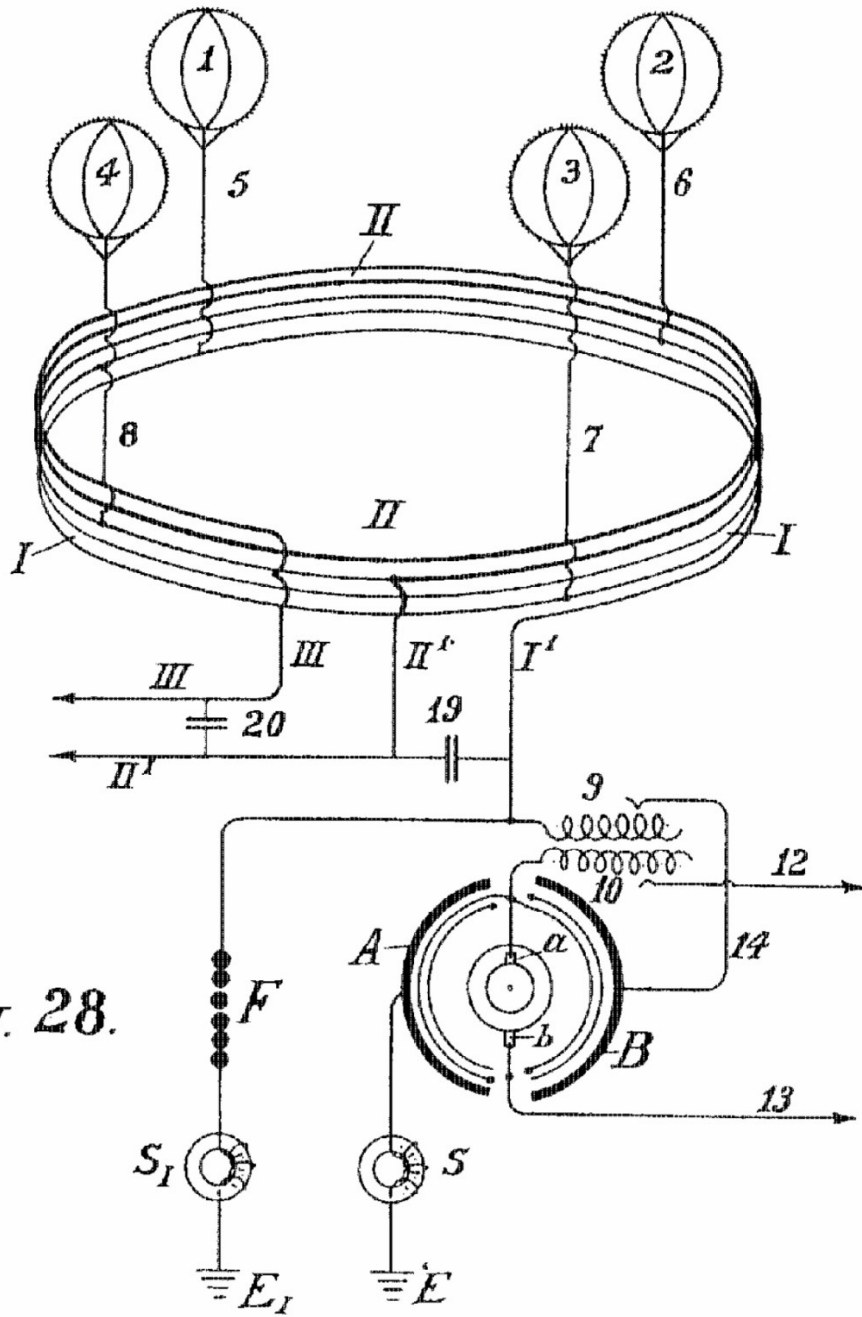


Fig. 28.

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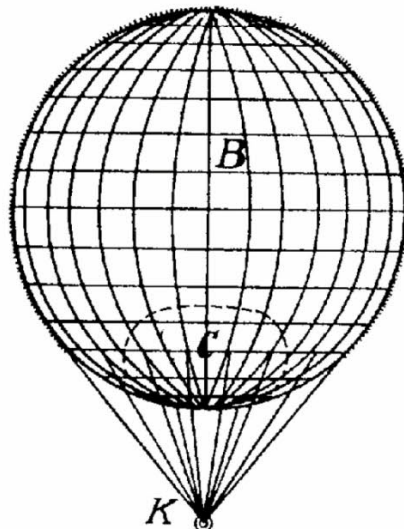


Fig. 29.

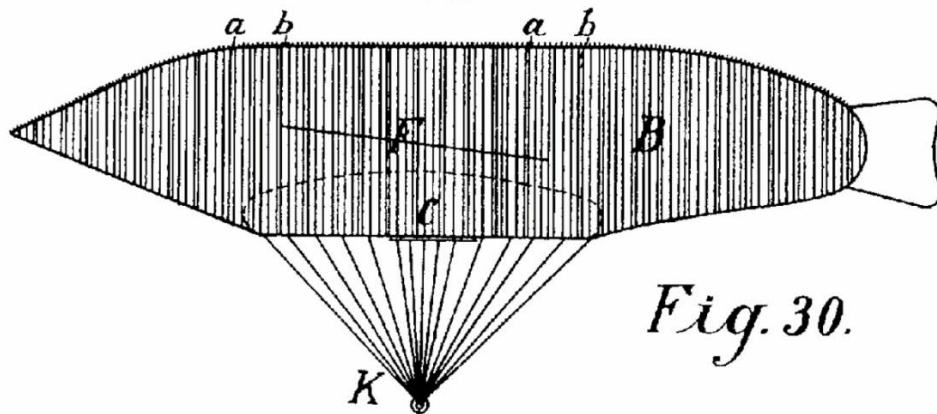
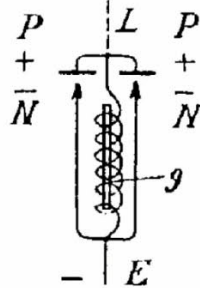
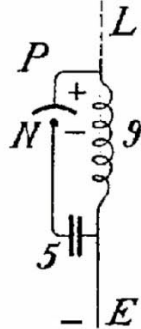


Fig. 30.



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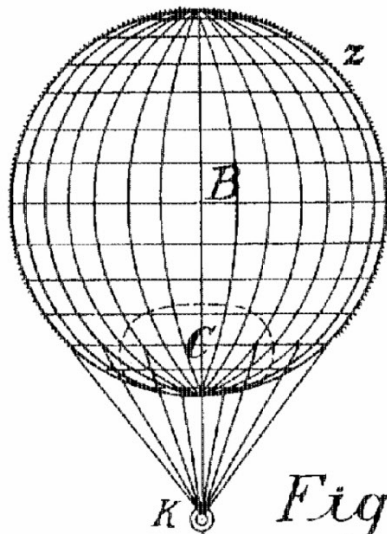


Fig. 31.

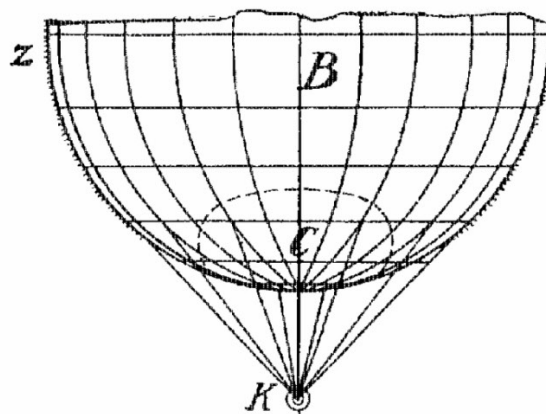
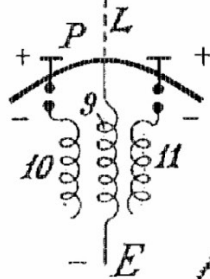


Fig. 32.

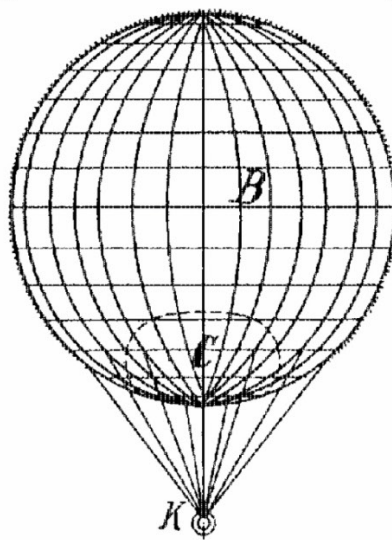
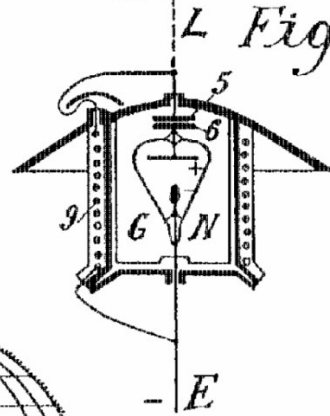
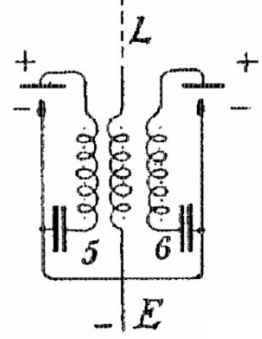


Fig. 33.



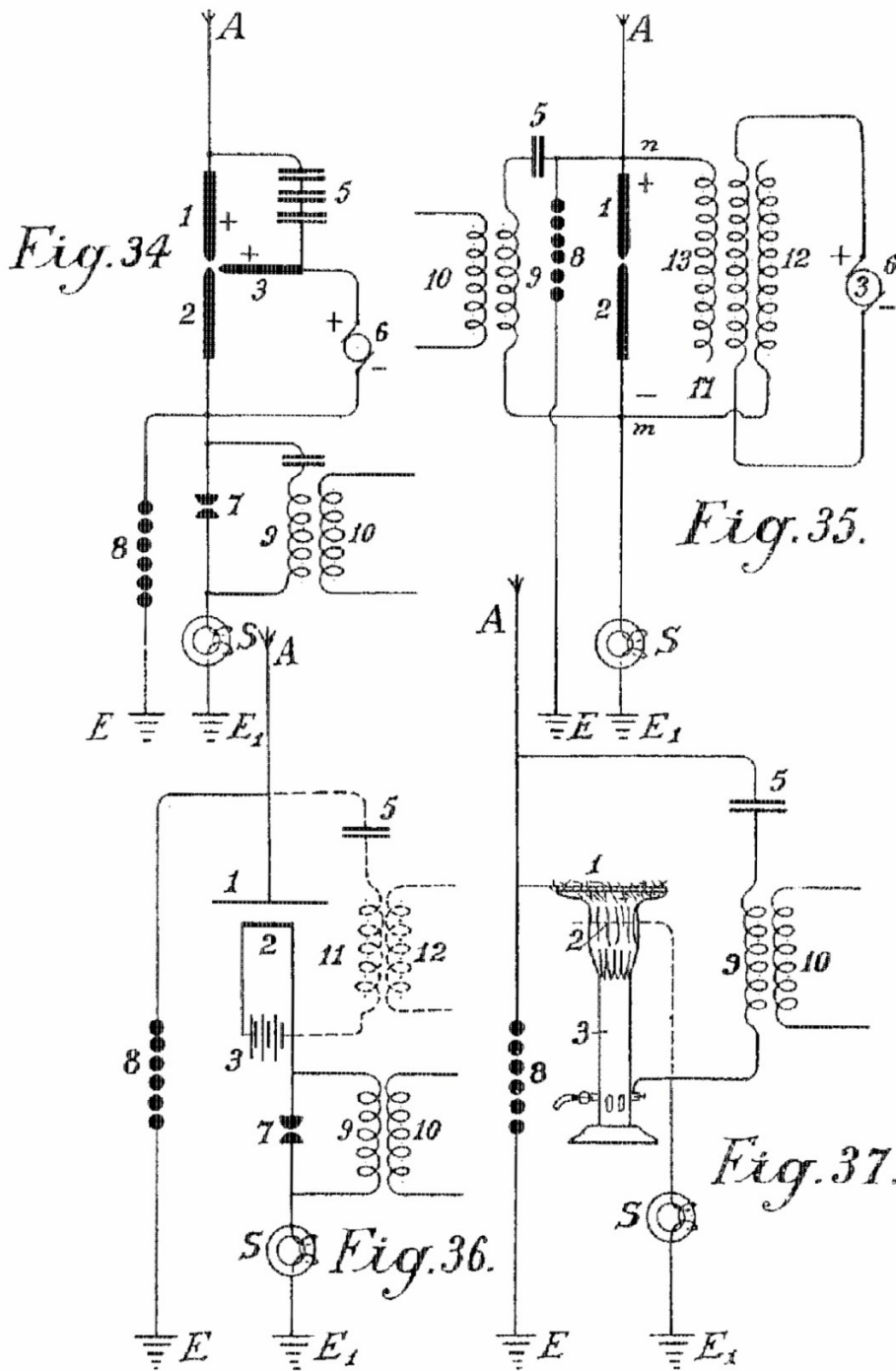
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Inventor
 Herman Plauson

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UNITED STATES PATENT OFFICE.

HERMANN PLAUSON, OF HAMBURG, GERMANY.

CONVERSION OF ATMOSPHERIC ELECTRIC ENERGY.

Application filed January 13, 1921. Serial No. 437,107

To all whom it may concern:

Be it known that I, HERMANN PLAUSON, Estonian subject, residing in Hamburg, Germany, have invented certain new and useful improvements in the Conversion of Atmospheric Electric Energy, of which the following specification.

Methods of obtaining atmospheric electricity by means of metallic nettings set with spikes which are held by means of ordinary or anchored kite balloons made of fabrics and filled with hydrogen, are in theory already known. Atmospheric electricity obtained in this way has been suggested to be used in the form of direct current for the charging of accumulators. This knowledge however is at present only theoretical as the conversion practice has hitherto been a failure. No means are known for protecting the apparatus from destruction by lightening. The balloons used for collecting the charge must also be made of a very large size in order to be able to support the weight of the metallic netting and the heavy cable connections.

Instead of using heavy metallic netting as collectors attached to single air balloons of non-conducting material which are liable to be torn and are permeable to the gas, it is proposed to use metallic balloon collectors which have to following important advantages -

(a) The metallic cases are impenetrable to helium and hydrogen; they also represent large metallic weather-proof collecting surfaces.

(b) Radio active means and the like may be easily applied internally or externally; whereby the ionisation is considerably increased and therewith also the quantity of atmospheric electricity capable of being collected.

(c) Such balloon collectors of light metal do not require to be of large size as they have to carry only their own moderate weight, and that of the conducting cable or wire.

(d) the entire system therefore offers little surface for the action of storm and wind and is resistant and stable.

(e) Each balloon can be easily raised and lowered by means of a winch so that all repairs, recharging and the like can be carried out without danger during the operation.

It is further proposed to use a collecting aerial network of several separate collectors spread out in the air above the earth, which collectors are interconnected by electrical conductors.

According to this invention charges of atmospheric electricity are not directly converted into mechanical energy, and this forms the main differences from previous inventions, but the static electricity which runs to earth through aerial conductors in the form of direct current of very high voltage and low current strength is converted into electro-dynamic energy in the form of high frequency vibrations. Many advantages are thereby obtained and disadvantages avoided.

The very high voltage of static electricity of a low current strength can be converted by this invention to voltages more suitable for technical purposes and of greater current strength. By the use of close oscillatory circuits it is possible to obtain electromagnetic waves of various amplitude and thereby to increase the degree of resonance of such current. Such resonance allows various values of inductance to be chosen whereby again the governing of the starting and stopping of machine driven thereby by simply tuning the resonance between coils of the machine and the transformer circuit forming the resonance can easily be obtained. Further, such currents have the property of being directly available for various uses, even without employing them for driving motors, of which there may be particularly mentioned, lighting, production, of heat and use in electro-chemistry.

Further, with such current a series of apparatus may be fed without direct current supply through conductors and also the electromagnetic oscillations into mechanical energy, or finally converted by special machines into alternating current of low frequency or even into direct current of high potential.

The invention is more particularly described with reference to the accompanying diagrams in which:-

Figure 1 is an explanatory figure.

Figure 2 is a diagrammatic view of the simplest form.

Figure 3 shows a method of converting atmospheric electrical energy for use with motors.

Figure 4 is a diagram showing the use of protective means.

5 Figure 5 is a diagram of an arrangement for converting large current strengths.

Figure 6 is a diagram of an arrangement including controlling means.

10 Figure 7 shows means whereby the spark gap length can be adjusted.

Figure 8 shows a unipolar connection for the motor.

Figure 9 shows a weak coupled system suitable for use with small power motors.

15 Figures 10, 11 and 12 show modified arrangements. Figure 13 shows a form of inductive coupling for the motor circuit.

Figure 14 is a modified form of Figure 13 with inductive coupling.

20 Figure 15 is an arrangement with non-conductive motor.

Figure 16 is an arrangement with coupling by condenser.

Figure 17, 18 and 19 are diagrams of further modifications.

25 Figure 20 shows a simple form in which the aerial network is combined with special collectors.

30 Figure 21 show diagrammatically an arrangement suitable for collecting large quantities of energy.

Figure 22 is a modified arrangement having two rings of collectors.

Figure 23 shows the connections for three rings of collectors.

35 Figure 24 shows a collecting balloon and diagram of its connection of condenser batteries.

Figure 25 and 26 show modified collector balloon arrangements.

40 Figure 27 shows a second method of connecting conductor for the balloon aeriels.

Figure 28 shows an auto-transformer method of connection.

Figure 29 shows the simplest form of construction with incandescent cathode.

45 Figure 30 shows a form with cigar shape balloon.

Figure 31 is a modified arrangement.

Figure 32 shows a form with cathode and electrode enclosed in vacuum chamber.

Figure 33 is a modified form of Figure 32.

50 Figure 34 shows an arc light collector

Figure 35 shows such an arrangement for alternating current.

Figure 36 shows incandescent collector with Nernst lamp.

55 Figure 37 shows a form with a gas flame.

Figure 1 illustrates a simple diagram for converting static electricity into dynamic energy of a high number of oscillations. For the sake of clearness in the drawings an influence machine is assumed to be employed

and not an aerial antenna. 13 and 14 are combs for collecting the static electricity of the influence machine. 7 and 8 are spark discharging electrodes, 6 and 5 condensers, 9 an inductive primary coil, 10 secondary coil, 11 and 12 ends of conductors of the secondary coil 10. When the disc of the static influence machine is rotated by mechanical means, the combs collect the electric charges one the positive and the other the negative, and charge the condensers 5 and 6 until such a high potential is formed across the spark gap 7-8, that the spark gap is jumped. As the spark gap 7-8 forms a closed circuit with condensers 6 and 5, and inductive resistance 9, as is well known, waves of high frequency electromagnetic oscillations will pass in this circuit.

The high frequency of the oscillations produced in this primary circuit induces waves of the same periodicity in the second circuit. Thus in the primary circuit electromagnetic oscillations are formed by the passage of the spark over the spark gap and these waves are maintained by fresh charges of static electricity.

80 By suitably selecting the ratio between the number of coils in the primary and secondary circuits with regard to a correct application of the co-efficients of resonance (capacity, inductance, and resistance) the high voltage of the primary circuit may be suitably converted into low voltage and high current strength.

When the oscillatory discharges in the primary circuit becomes weaker or entirely cease, the condensers are charged again by the static electricity until the accumulated charge again breaks down the spark gap. All this is repeated as long as electricity is produced by the static machine by employing mechanical energy.

95 An elementary form of the invention is shown in Figure 2 in which two spark gaps in parallel are used one of which may be termed the working gap 7 in Figure 2, whilst the second serves as a safety device for excess voltage and consists of a large number of spark gaps than the working section, which gaps are arranged in series and are bridged by very small capacities as is illustrated in a₁, b₁, c₁, Figure 2 which allow of uniform sparking in the safety section.

100 In Figure 2 A is the aerial antenna for collecting charges of atmospheric electricity. 13 is the earth connection of the second part of the spark gap, 5 and 6 are condensers, 9 a primary coil. Now when through the aerial A the positive atmospheric electricity seeks to combine with the negative charge to earth, this is prevented by (the air gap between) the spark gaps. The resistance of the spark gap 7 is, as shown in the drawings, lower than that of the other safety section which consists of the three spark gaps connected in

series, and consequently a three times greater air resistance is offered by the latter.

5 So long therefore, as the resistance of the spark gap 7 is not overloaded, so that the other spark gaps have an equal resistance with it the discharg-
 10 ers take place only over spark gap 7. Should however the voltage be increased by any influences so it might dangerous for charging the condensers 5 and 6 or for the coils insulation 9 and 10 in conse-
 15 quence of break down, by a correct regulation of this spark gap the second spark gap can discharge free from inductive effects direct to earth without endangering the machine.

Without this second spark gap, arranged in parallel having a higher resistance than the working spark gap it is impossible to collect and render available large quantities of electrical energy.

20 The action of this closed oscillation circuit consisting of spark gap 7, two condensers 5 and 6, primary coil 9, and also secondary coil 10 is exactly the same as the one described in Figure 1 with the arrangement of the static induction machine with the only difference that here the sec-
 25 ond spark gap is provided. The electromagnetic high frequency alternating current obtained can be tapped off from the conductors 11 and 12 for lighting and heating purposes. Special kinds of motors adapted for working with these peculiar
 30 electrical charges may be connected at 14 and 15 which can work with static electricity charges or with high frequency oscillations.

In addition to the use of spark gaps in parallel a second measure of security is also necessary for
 35 taking off the current. This precaution consists according to this invention, in the introduction of and method of connecting certain protective electromagnets or choking coils in the aerial circuit as show by S in Figure 3.

40 A single electromagnet only having a core of the thinnest possible separate laminations is connected with the aerial.

In the case of high voltages in the aerial network or at places where there are frequent thunder storms, several such magnets may however
 45 be connected in series.

In the case or large units or plants several electromagnets can be employed in parallel or in series parallel.

50 The windings of these electromagnets maybe simply connected in series with the aerials. In this case the winding preferably consists of several thin parallel wires, which make up together the necessary section.

55 The winding may be made of primary and secondary windings in the form of a transformer. The primary winding will be then connected in

series with the aerial network, and the secondary winding more or less short circuited over a regul-
 60 ating resistance or an induction coil. In the latter case it is possible to regulate to a certain extent the effect of the choking coils. In the further description of the connecting and constructional diagrams the aerial electromagnetic choke coil is indicated by a simple ring S.

65 Figure 3 shows the simplest way of converting atmospheric electricity into electromagnetic wave energy by the use of special motors adapted for high oscillatory currents or static charges of electrical energy. Recent improvements in
 70 motors for working with static charges and motors working by resonance, that is to say having groups of tuned electromagnetic cooperating circuits render this possible but such do not form part of the present invention.

75 A motor adapted to operate with static charges will for the sake of simplicity be diagrammatically indicated by two semi-circles 1 and 2 and the rotor of the motor by a ring M. (Figure 3) A is a vertical aerial or aerial network. S the safety
 80 choke or electromagnet with coil O as may be seen is connected with the aerial A. Adjacent the electromagnet S the aerial conductor is divided into three circuits, the circuit 8 giving safety spark gap, the circuit 7 with the working spark
 85 gap and then a circuit including the stator terminal 1, the rotor and stator terminal 2 at which a connection is made to the earth wire. The two spark gaps are also connected metallicly with the earth wire. The method of working these di-
 90 agrams are as follows:

The positive atmospheric electric charge collected tends to combine with the negative elec-
 95 tricity (or earth electricity) connected with the earth wire. It travels along the aerial A through the electromagnet S without being checked as it flows in the same direction as the direct current. Further, its progress is arrested by two sparks
 100 gaps placed in the way and the stator condenser surfaces. The stator condenser surfaces are charged until the charge is greater than the resistance of the spark gap 7 and an oscillatory charge is obtained as by means of motor M, stator surfaces 1 and 2, and spark gap 7, a closed
 105 oscillation circuit is obtained for producing the electromagnetic oscillations. The motor here form the capacity and the necessary inductance and resistance, which, as is well know, are necessary for converting static electricity into electro-
 110 magnet wave energy.

The discharges formed are converted into
 110 mechanical energy in special motors and can not reach the aerial network by reason of the electro-magnet or choke. If, however, when a spark springs over the spark gap 7 a greater quantity of atmospheric electricity tends to flow to earth, a counter voltage is

induced in the electro-magnet, which is greater the more rapidly and strongly the flow of current direct to earth is. By the formation of this opposing voltage a sufficiently high resistance is offered to the flow of atmospheric electricity direct to earth to prevent a short circuit with the earth.

The circuit containing spark gap 8 having a different wave length which is not in resonance with the nature frequency of the motor, does not endanger the motor and serves as security against excess voltage, which, as practical experiments have shown, may still arise in certain cases but can be conducted direct to earth through this spark gap.

In the diagram illustrated in Figure 4 the spark gap 7 is shunted across condensers 5 and 6 from the motor M. This construction affords mainly a better insulation of the motor against excess voltage and a uniform excitation through the spark gap 7.

In Figure 5 a diagram is illustrated for transforming large current strengths which may be employed direct without motors, for example, for lighting or heating purposes. The main difference is that here the spark gap consists of a star shaped disc 7 which can rotate on its own axis and is rotated by a motor opposite similarly fitted electrodes 7^a. When separate points of stars face one another, discharging takes place, thus forming an oscillation circuit over condensers 5 and 6 and inductance 9 for oscillatory discharges. It is evident that a motor may also be directly connected to the ends of the spiral 9.

The construction of the diagram shown in Figure 6 permits of the oscillation circuit of the motor being connected with an induction coil. Here a regulating inductive resistance is introduced for counter-acting excess voltages in the motor. By cutting the separate coils 9 (coupled inductively to the aerial) in or out the inductive action on the oscillation circuit.

In Figure 7 the oscillation circuit is closed through the earth (E an E₁). Then spark gap 7 may be prolonged or shortened by more or fewer spark gaps being successively connected by means of a contact arm 7^b.

Diagram 8 shows a unipolar connection of the motor with the aerial network. Here two oscillation circuits are closed through the same motor. The first oscillation circuit passes from aerial A through electromagnet S, point x, inductance 9^a to the earth condenser 6 and further, over spark gap 7 to aerial condenser 5 and to x. The second oscillation circuit starts from the aerial condenser 5 at the point x¹ over the inductance 9 to earth condenser 6 at the point x³ and through the condenser 6 over the spark gap 7 back to x¹. The motor itself

is inserted between two points of the spark gap 7. From this arrangement slightly damped oscillation wave currents are produced.

In the diagram illustrated in Figure 9 a loosely coupled system of connections is illustrated which is assumed to be for small motors for measuring purposes. A indicates the aerial conductor, S the electromagnet in the aerial conductor, 9 the inductance, 7 the spark gap, 5 and 6 condensers, E the earth, M the motor, and 1 and 2 stator connections of the motor. The motor is directly metallically connected with the oscillation circuit.

In Figure 10 a purely inductive coupling is employed for the motor circuit. the motor is connected with the secondary wire 10 as can be seen in Figure 11 in a somewhat modified diagram connection. The same applies to the diagram of figure 12.

The diagrams hitherto described preferably allow of motors of small and medium strength to be operated. For large aggregates, however, they are too inconvenient as the construction of two or more oscillation circuits for large amounts of energy is difficult; the governing is still more difficult and the danger in switching on or off is greater.

A means of overcoming such difficulties is shown in Figure 13. The oscillation circuit here runs starting from the point x over condenser 5, variable inductance 9, spark gap 7 and the two segments (3^a and 4^a) forming arms of a Wheatstone bridge, back to x. If the motor is connected by brushes 3 and 4 transversely to the two arms of the bridge as shown in the drawings, electromagnetic oscillations of equal sign are induced in the stator surfaces 1 and 2 and the motor does not revolve. If however, the brushes 3 and 4 are moved in common with the conducting wire 1 and 2 which connect the brushes with the stator poles a certain alteration or displacement of the polarity is obtained and the motor commences to revolve.

The maximum action will result if one brush 3 comes onto the central sparking contact 7 and the other brush 4 on the part x. They are however, usually in practice not brought on to the central contact 7 but only held in the path of the bridge segments 4^a and 3^a in order not to connect the spark gaps with the motor oscillation circuit.

As however, the entire oscillation energy can thereby not act on the motor it is better to carry out the same system according to the diagram Figure 14. The diagram 14 differs from the foregoing only by the motor not being directly metallically connected with segments of the communicator, but only a primary coil 9 which induces in a secondary coil 10, current which feeds the motor M and takes the place of the rotor. By this

arrangement a good transforming action is obtained, a loose coupling and also an oscillation circuit without spark gap.

5 In Figure 15 the motor is not purely inductive as in 14, but directly metallicly branched off from the primary coil (at x and x^1) after the principle of the auto-transformer.

10 In Figure 16 instead of an inductance a condenser 6 is in similar manner, and for the same object inserted between segments 3^a and 4^a. This has the advantage that the segments 3^a and 4^a need not be made of solid metal but may consist of spiral coils whereby a more exact regulation is possible and further motors of high inductance
15 may be employed.

The arrangement of Figure 17, 18 and 19 may be employed for use with resonance and particularly with induction condenser motors; between the large stator induction condenser surfaces
20 small reversing pole condensers are connected, which, as may be seen from Figure 17, 18 and 19 are led together to earth. Such reversing poles have the advantage that with large quantities of electrical energy the spark formation between
25 the separate oscillation circuits ceases.

Figure 19 shows a further method which prevents electromagnetic oscillations of high number of alterations formed in the oscillation circuit striking back to the aerial conductor. It is based
30 on the well known principle that a mercury lamp, one electrode of which is formed of mercury, the other of solid metal such as steel allows an electric charge to pass in only one direction from the mercury to the steel and not visa versa.
35 The mercury electrode of the vacuum tube N is therefore connected with the aerial conductor and the steel electrode with the oscillation circuit cannot pass to the aerial conductor.

40 In practice these vacuum tubes must be connected behind the electromagnet as the latter alone affords no protection against the danger of lightening.

45 As regards the use of spark gaps, all arrangements as used for wireless telegraphy may be used. Of course the spark gaps in large machines must have a sufficiently large surface. In very large stations they are cooled in liquid carbonic acid or better still in liquid nitrogen or hydrogen; in most cases the cooling
50 may also take place by means of liquefied low homologues of the metal series or by means of hydrocarbons the freezing point of which lies at between -90° C and -40° C. The spark gap casing must also be insulated and be of sufficient strength to be able to resist any pressure

55 which may arise. Any undesirable excess super-pressure which may be formed must be automatically let off. I have employed with very good results mercury electrodes which were frozen in liquid carbonic acid, the cooling being maintained during the operation from the outside through
60 the walls.

Figure 20 is one of the simplest forms of construction of an aerial network in combination with collectors, transformers and the like illustrated diagrammatically. E is here the earth wire, 8 the
65 safety spark gap, 7 the working spark gap, 1 and 2 the stator surfaces of the motor, 5 a condenser battery, S the protective magnet which is connected with the coil in the aerial conductor, A¹ to A¹⁰ aerial antenna with collecting balloons, N horizontal
70 collecting or connecting wires from which, to the centre a number of connections run.

The actual collectors consist of metal sheaths preferably made of an aluminium magnesium alloy, and are filled with hydrogen or helium and are
75 attached to copper plated steel wires. The size of the balloon is selected so that the actual weight of the balloon and the weight of the conducting wire is supported thereby. On the top of the balloon and the weight of the conducting wire is
80 supported thereby. On the top of the balloon aluminium spikes, made and gilded in a special manner hereinafter described, are arranged in order to produce a conductor action. Small quantities
85 of radium preparations, more particularly polonium-ionium or mesothorium preparations considerably increase the ionisation, and therewith the action of these collectors.

In addition to metal balloon, fabric balloons which are superficially metal coated according to
90 Schoop's metal spraying process, may however also be employed. A metallic surface may also be produced by lacquering with metal bronzes, preferably according to Schoop's metal spraying process or lacquering with metallic bronze powders
95 in two electrical series of widely different metals, because thereby the collecting effect is considerably increased.

100 Instead of the ordinary round balloons, elongated cigar shaped ones may be employed. In order also to utilise the frictional energy of the wind, patches or strips of non-conducting substances which produce electricity by friction may be attached to the metallised balloon surfaces. The wind will impart a portion of its energy in the
105 form of frictional electricity, to the balloon using, and thereby the collecting effect is substantially increased.

In practice however, very high towers (up to 300 metres is fully admissible) may be employed as antenna. In these towers copper tubes rise freely further above the top of the tower. A gas lamp secured

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against the wind is then lit at the point of the copper tube and a netting is secured to the copper tube over the flame of this lamp to form a collector. The gas is conveyed through the interior of the tube up to the summit the copper tube must be absolutely protected from moisture at the place at which it enters the tower and also rain must be prevented running down the walls of the tower which may lead to a bad catastrophe. This is done by bell shaped enlargements which expand downwards, being arranged in the tower in the form of high voltage insulators of Siamese pagodas.

Special attention must be devoted to the foundations of such towers. They must be well insulated from the ground, which may be obtained by first embedding a layer of concrete in a box form to a sufficient depth in the ground and inserting in this an asphalt lining and then glass bricks cash about 1 or 2 metres in thickness. Over this in turn there is a ferro-concrete layer in which alone the metal foot of the tube is secured. This concrete block must be at least 2 metres from the ground and be fully protected at the sides by a wooden covering, from moisture. In the lower part of the tower a or glass house for the large condenser batteries or for the motors may be constructed. In order to lead the earth connection to the ground water, a well insulated pit constructed of vitreous bricks must be provided. Several such towers are erected at equal distances apart and connected with a horizontal conductor. The horizontal connecting wires may either run directly from tower to tower or be carried on bell shaped insulators similar to those in use for high voltage conductors. The width of the network may be of any suitable size and the connection of the motors can take place at any suitable places.

In order to collect large quantities of electricity with few aerials it is well to provide the aerial conductor with batteries of condensers as shown in two methods of construction in Figures 21 and 22. In Figure 21 the batteries of condensers 5 are connected on the one hand with the aerial collectors Z by the aerial conductor A, and the other hand interconnected in series with an annular conductor from which horizontal conductors run to the connecting points C to which the earth wire is connected.

Figure 22 shows a similar arrangement. Should two such series of antenna rings be shown by a voltmeter to have a large difference of potential (for example, one in the mountains and one in the plain) or even of different polarity these differences may be compensated for by connecting sufficiently large condenser batteries (5, 5^a, 5^b) by means of Maji star conductors D and D¹, In Figure

23 a connection of three such rings of collectors to form a triangle with central condenser battery is illustrated.

The condenser batteries of such large insulations must be embedded in liquefied gases or in liquids freezing at very low temperatures. In such cases a portion of the atmospheric energy must be employed for liquefying these gases. It is also preferable to employ pressure. By this means the condenser surfaces may be de diminished, and still allow for large quantities of energy to be stored, secure against breakdown. For smaller installations the immersing of the condensers in well insulated oil or the like, suffices. Solid substances on the other hand cannot be employed as insulators.

The arrangements in the diagrams hitherto described was always such that the condenser batteries were connected with both poles directly to the aerial conductor. An improved diagram of the connections for obtaining atmospheric electricity for the condenser batteries has however, been found to be very advantageous, this arrangement consists in that they are connected by only one pole (unipolar) to the collecting network. Such a method of arrangement is very important, as by means of it a constant current and an increase of the normal working pressure or voltage is obtained. If for example a collecting balloon aerial which is allowed to rise to a height of 300 metres, shows 40,000 volts above earth voltage, in practice it has been found that the working voltage (with a withdrawal of the power according to the method hereinbefore described by means of oscillation spark gaps and the like) is only about 400 volts. If however, the capacity of the condenser surface be increased, which capacity in the above mentioned case was equal to that of the collecting surface of the balloon aerials, to double the amount, by connecting the condenser batteries with only one pole, the voltage rises under an equal withdrawal of current up to and beyond 500 volts. This can only be ascribed to the favourable action of the connection method.

In addition to this substantial improvement it has also been found preferable to insert double inductances with electromagnets. It has also been found that the useful action of such condensers can be further increased if an induction coil be connected as inductive resistance to the unconnected pole of the condenser, or still better if the condenser itself be made as an induction condenser. Such a condenser may be compared with a spring which when compressed carries in itself accumulated force, which it again gives off when released. In charging a charge with reversed sign is formed at the

other free condenser pole, and if through the spark gap a short circuit results, the accumulated energy is again given back since now new quantities of energy are induced at the condenser pole connected with the conductor network, which in fact charges with opposite signs to that at the free condenser pole. The new induced charges have of course the same sign as the collector network. The whole voltage energy in the aerial is thereby however increased. In the same space of time larger quantities of energy are accumulated than is the case without such inserted condenser batteries.

In Figures 24 and 25 two different diagrams of connections are more exactly illustrated. Figure 24 show a collecting balloon and the diagram of the connections to earth. Figure 25 four collecting balloons and the parallel connection of the condenser batteries belonging thereto.

A is the collecting balloon made of an aluminium magnesium alloy (electron metal, magnalium) of a specific gravity of 1.8 and in thickness of plate 0.1 to 0.2 mm. Inside there are eight strong vertical ribs of T shaped section about 10 to 20 mm in height and about 3 mm in thickness with the projecting part directed inwards (indicated by a, b, c, d and so forth); they are riveted together to form a firm skeleton and are stiffened in a horizontal direction by two cross ribs. The ribs are further connected with one another internally and transversely by means of thin steel wires, whereby the balloon obtains great power of resistance and elasticity. Rolled plates of 0.1 to 0.2 mm in thickness made of magnalium alloy are then either soldered or riveted on this skeleton so that fully metallic casing with smooth external surface is obtained. Well silvered or coppered aluminium plated steel wires run from each rib to the fastening ring 2. Further, the coppered steel hawser L preferably twisted out of separate thin wires (shown in dotted lines in Figure 24) and which must be long enough to allow the balloon to rise in the desired height, leads to a metal roller or pulley 3 and from thence a winch W, well insulated from the earth. By means of this winch, the balloon, which is filed with hydrogen, or helium, can be allowed to rise to suitable height (300 to 5,000 metres) and brought to the ground for recharging or repairs.

The actual current is taken directly through a friction contact from the metal roller 3 or from the wire, or even from the winch or simultaneously from all thereby means of brush (3, 3^a and 3^b). Beyond the brushes the conductor is divided, the paths being:- firstly over 2 to the safety spark gap 8, from thence to the earth conductor E¹, and secondly over electromagnet S¹, point 13, to a second loose electromagnet

having and adjustable coil S², then to the spark gap 7 and to the second earth conductor E². The actual working circuit is formed through spark gap 7, condensers 5 and 6, and through the primary coil 9; here the static electricity formed by oscillatory discharges is accumulated and converted into high frequency electromagnet oscillations. Between the electromagnets S¹ and S² at the crossing point 13, four condenser batteries are introduced which are only indicated diagrammatically in the drawings each by one condenser. Two of these batteries (16 and 18) are made as plate condensers and prolonged by regulating induction coils or spiral 17 and 19 while the two other (21 and 23) are induction condensers. As may be seen from the drawings each of the four condenser batteries 16, 18, 21 and 23 is connected only by one pole to the aerial or to the collector conductor. The second poles 17, 19, 22 and 24 are open. In the case of plate condensers having no inductive resistance and induction coil is inserted. The object of such a spiral or coil is the displacement of phase of the induction current by $\frac{1}{4}$ periods, whilst the charging current of the condenser poles which lie free in the air, works back to the collector aerial. The consequence of this is that in discharges in the collector aerial the back inductive action of the free pole allows a higher voltage to be maintained in the aerial collecting conductor than would otherwise be the case. It has also been found that such a back action has an extremely favourable effect on the wear of the contacts. Of course the inductive effect may be regulated at will within the limits of the size of the induction coil, the length of the coil in action being adjustable by means of wire connection without induction (see Fig. 24, No. 20).

S¹ and S² may also be provided with such regulating devices in the case of S² (illustrated by 11). If excess voltage be formed it is conducted to earth through the wire 12 and spark gap 8 or through any other suitable apparatus, since this formation would be dangerous for the other apparatus.

The action of these condenser batteries has already been hereinbefore described.

The small circles on the collector balloon indicate places at which zinc amalgam or gold amalgam or other photoelectric acting metals in the form of small patches in extremely thin layers (.01 to .05 mm in thickness) are applied to the balloon casing of light metal. Such metallic patches may also be applied to the entire balloon as well as in greater thickness to the conducting network. the capacity of the collector is thereby considerably strengthened at the surface. The greatest possible effect in collecting may be obtained by polonium amalgams and the like. On the surface of the

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collector balloon metal points or spikes are also fixed along the ribs, which spikes serve particularly for collecting the collector charge. Since it is well known that the resistance of the spikes is less the sharper the spike is, for this purpose it is therefore extremely important to employ as sharp spikes as possible. Experiments made as regards these have shown that the formation of the body of the spike or point also plays a large part for example spikes made of bars or rollers with smooth surfaces, have many times greater point resistance as collector accumulator spikes than those with rough surfaces. Various kinds of spike bodies have been experimental with for the collector balloons hereinbefore mentioned. The best results were given by spikes which were made in the following way. Fine points made of steel, copper, nickel, or copper and nickel alloys, were fastened together in bundles and then placed as anode with the points in a suitable electrolyte (preferably in hydrochloric acid or muriate of iron solutions) and so treated with weak current at 2 and 3 volts pressure. After 2 to 3 hours according to the thickness of the spikes or pins the points become extremely sharp and the bodies of the spikes have rough surface. The bundle can then be removed and the acid washed off with water. The spikes are then placed as cathode in a bath consisting of solution of gold, platinum, iridium, paladium or wolfram salts or their compounds and coated at the cathode galvanically with a thin layer of precious metal, which must however be sufficiently firm to protect them from atmospheric oxidation.

Such spikes act at a 20 fold lower voltage almost as well as the best and finest points made by mechanical means. Still better results are obtained if polonium or radium salts are added to the galvanic bath when forming the protective layer or coating. Such pins have a low resistance at their points and even at one volt and still lower pressures have an excellent collector action.

In Figure 24 the three unconnected poles are not connected with one another in parallel. That is quite possible in practice without altering the principle of the free pole. It is also preferable to interconnect in parallel to a common collector network, a series of collecting aerials.

Figure 25 shows a diagram for such an installation. A^1, A^2, A^3, A^4 are four metal collector balloons with gold or platinum coated spikes which electromagnetically made in the presence of polonium emanations or radium salts, which spikes or needles are connected over four electromagnets S^1, S^2, S^3, S^4 , through an annular conductor R. From this annular conductor four wires run over four further electromagnets $S^5,$

S^b, S^c, S^d , to the connecting point 13. There the conductor is divided, one branch passing over 12 and the safety spark gap 8 to the earth at E^1 , the other over inductive resistance J and working spark gap 7 to the earth at E^2 . The working circuit, consisting of the condenser 5 and 6 and the resonance motor or condenser motor M, such as hereinbefore described, is connected in proximity round the parking gap section 7.

Instead of directly connecting the condenser motor of course the primary circuit for high frequency oscillatory current may also be inserted.

The condenser batteries are connected by one pole to the annular conductor R and can be either inductionless (16 and 18) or made as induction condensers as shown by 21 and 23. The free poles of the inductionless condensers are indicated by 17 and 19, those of the induction condensers by 22 and 24. As may be seen from the drawings all these pole 17, 22, 19, 24 may be interconnected in parallel through a second annular conductor without fear that thereby the principle of the free pole connection will be injured. In addition to the advantages already set forth the parallel connection also allows of an equalisation of the working pressure in the entire collector network. Suitably constructed and calculated induction coils 25 and 26 may also be inserted in the annular conductor of the free poles, by means of which a circuit may be formed in the secondary coils 27 and 28 which allows current produced in this annular conductor by fluctuations of the charges or the like appearances to be measured or otherwise utilised.

According to what has been hereinbefore stated separate collector balloons may be connected at equidistant stations distributed over the entire country, either connected directly with one another metallically or by means of intermediate suitably connected condenser batteries through high voltage conductors insulated from earth. The static electricity is converted through a spark gap into dynamic energy of a high number of oscillations and may in such form be coupled as a source of energy by means of a suitable method of connecting, various precautions being observed, and special regulations. The wires leading from the collector balloons have hitherto been connected through an annular conductor without this endless connection, which can be regarded as an endless induction coil, being able to exert any action on the whole conductor system.

It has now been found that if the network conductor connecting the aerial collector balloons with one another is not made as a simple annular conductor but preferably short circuited in the form of coils of a

condenser battery or spark gap or through thermionic tubes or valves or audions, then the total collecting network exhibits quite new properties. The collection of atmospheric electricity is thereby not only increased but an alternating field may be easily produced in the collector network. Further, the atmospheric electrical forces showing themselves in the higher regions may also be directly obtained by induction. In Figure 26 and 28 a form of construction is shown on the basis of which the further foundation of the method will be more particularly explained.

In Figure 26 1, 2, 3, 4 are metallic collector balloons 5, 6, 7, 8 their metallic aerial conductors and I the actual collector network. This consists of five coils and is mounted on high voltage insulators in the air, on high voltage insulators in the air, on high voltage masts (or with suitable construction cable embedded in the earth). One coil has a diameter of 1 to 100 km or more. S and S' are two protective electromagnets. F the second safety section against excess voltage, E the earth conductor and E' the earth conductor of the working section. When an absorption of static atmospheric electricity is effected through the four balloon collectors, the current in order to reach the earth connection E1 must flow spirally through the collector network over the electromagnet S, primary induction coil 9, conductor 14, anode A of the audion tube, incandescent cathode K, as the way over the electromagnet and safety spark gap F offers considerably greater resistance. Owing to the fact that the accumulated current flows in one direction, an electromagnetic alternating field is produced in the interior of the collector network coil, whereby the whole free electrons are directed more or less into the interior of the coil. An increased ionisation of the atmosphere is therefore produced. In consequence of this the points mounted on the collector balloon show a considerably reduced resistance and therefore increased static charges between the points on the balloon and the surrounding atmosphere are produced. The result of this is a considerably increased collector effect.

A second effect which could not be obtained otherwise is obtained by the electromagnetic alternating field which running parallel to the earth surface, act more or less with a diminishing or increasing effect on the earth magnetic field, whereby in the case of fluctuations in the current a return induction current of reversed sign is always is always produced in the collector coil by earth magnetism. Now if, however, a constantly pulsating continuous alternating field is produced as stated in the above collector network I, an alternating current of the same periodicity is produced also in the collecting

network coil. As the same alternating field is further transmitted to the aerial balloon, the resistance of its points is thereby considerably reduced, whilst the collector action is considerably increased. A further advantage is that positive electrons which collect on the metal surfaces during the conversion into dynamic current produce a so called drop potential of the collector area. As an alternating field is present, the negative ions surrounding the collector surfaces, when discharge of the collector surfaces takes place produce by the law of induction, an induction of reversed sign on the collector surface and so forth (that is to say again a positive charge). In addition to the advantages hereinbefore set forth, the construction of connecting conductors in coil form when sufficiently large diameter, allows of a utilisation of energy arising in higher regions also in the simplest way. As is well known electric discharges frequently take place at very great elevations which may be observed, such as St. Elmo's fires or northern lights. These energy quantities have not been able to be utilised up to now. By this invention all these kinds of energy, as they are of an electromagnetic nature and the directions of the axis of the collector coils stands at right angles to the earth's surface, can be more or less absorbed in the same way as a receiver in wireless telegraphy absorbs waves coming from a far distance. With a large diameter of the spiral it is possible to connect large surfaces and thereby to take up also large quantities of energy.

It is well known that large wireless stations in the summer months, and also in the tropics are very frequently unable to receive the signals in consequence of interruptions which are caused by atmospheric electricity and this takes place with vertical coils of only 40 to 100 m diameter. If on the contrary horizontal coils of 1 to 100 km diameter be employed very strong currents may be obtained through discharges which are constantly taking place in the atmosphere. Particularly in the tropics or still better in the polar regions where the northern lights are constantly present, large quantities of energy may probably be obtained in this way. A coil with several windings should act the best. In similar manner any alteration of the earth magnetism should act inductively on such a coil.

It is not at all unlikely that earthquakes and spots on the sun will also produce an induction in such collector coils of sufficient size. In similar manner this collector conductor will react on earth currents more particularly when they are near the surface of the earth or even embedded in the earth. By combining the previous kind of current collectors so far as they are adopted for

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improved system with the improved possibilities of obtaining current the quantities of free natural energy which are to be obtained in the form of electricity are considerably increased.

5 In order to produce in the improved collector coil uniform current oscillations of an undamped nature so-called audion high vacuum or thermionic tubes of suitable connection are employed instead of the previously know spark gaps (Fig. 10 26, Nos.9-18). The main aerial current flows through electromagnet S (which in the case of a high number of alterations is not connected here but in the earth conductor E¹) and may be conveyed over the primary coils in the induction 15 winding through wire 14 to the anode A of the high vacuum grid tube. Parallel with the induction resistance 9 a regulating capacity of suitable size, such as condenser 11 is inserted. In the lower part of the vacuum grid tube is arranged 20 the incandescent filament or cathode K which is fed through a battery B. From the battery B two branches run, one to the earth conductor E¹ and the other through battery B¹ and secondary coil 10 to the grid anode g in the vacuum tube. By 25 the method of connections shown in dotted lines, a desired voltage at the grid electrode g may also be produced through the wire 17 which is branched off from the main current conductor through switches 16 and some small condensers 30 (a, b, c, d) connected in series, and conductor 18, without the battery B¹ being required.

The action of the entire system is somewhat as follows:-

35 On the connecting conductor of the aerial collector network being short circuited to earth, the condenser pole 11 is charged and slightly damped oscillations are formed in the short circuited existing oscillation circuit formed of the condenser 11 and self inductance 9. In consequence of the coupling through coil 10, fluctuations of voltage take place in the grid circuit 40 with the same frequency, which, fluctuations in turn influence the strength of the electrode current passing through the high vacuum amplifying tube and thus produce current fluctuations of the same frequency in the anode circuit. A permanent supply of energy to the oscillation circuits 9 and 10 consequently takes place, until a condition of balance is set up, in which the 45 consumed oscillation energy is equal to that absorbed. Thereby constant undamped oscillations are now produced in the oscillation circuits 9-11.

55 For regular working of such oscillation producers high vacuum strengthening tubes are necessary and it is also necessary that the grid and anode voltages shall have a phase difference of 180° so that if the grid is negatively charged, then the anode is positively charged and vice versa. This necessary difference of phase may be obtained by most varied connections, for example, by placing the oscillation circuit in the grid circuit or by separating the oscillation circuit and inductive coupling from the anodes and the grid

circuit and so forth.

A second important factor in this way of converting static atmospheric electricity into undamped oscillations is that care must be taken 60 that the grid and anode voltages have a certain relation to one another; the latter may be obtained by altering the coupling and a suitable selection of the self induction in the grid circuit, or as shown by dotted lines 18, 17, 16 by means 65 of a larger or smaller number of condensers of suitable size connected in series; in this case the battery B¹ may be omitted. With a suitable selection of the grid potential a glow discharge takes place between the grid g and the anode 70 A, and accordingly at the grid there is a cathode drop and a dark space is formed. The size of this cathode drop is influenced by the ions which are emitted in the lower space in consequence of shock ionization of the incandescent cathodes 75 K and pass through the grid in the upper space. On the other hand the number of the ions passing through the grid is dependent on the voltage between the grid and the cathode. Thus if the grid voltage undergoes periodic fluctuations 80 (as in the present case) the amount of the cathode drop at the grid fluctuates and consequently the internal resistance of the tube correspondingly fluctuates, so that when a back coupling of the feed circuit with the grid circuit takes place, 85 the necessary means are afforded for producing undamped oscillations and of taking current, according to requirements from the collecting conductor.

90 The frequency of the undamped oscillations produced is with a suitably loose coupling equal to the self frequency of the oscillation circuits 9 and 10. By a suitable selection of the self induction of the coil 9 and capacity 11 it is possible to extend from frequencies which produce electromagnetic oscillations of only a few metres wave 95 length down to the lowest practical alternating current frequency. For large installations a suitable number of frequency producing tubes in the form of the well known high vacuum transmission tubes of .5 to 2kw. in size may be connected 100 in parallel so that in this respect no difficulty exists.

105 The use of such tubes for producing undamped oscillations, and also the construction and method of inserting such transmission tubes in an accumulator or dynamo circuit is known and also that such oscillation producing tubes only work well at voltages of 1,000 up to 4,000 volts, so 110 that on the contrary their use at lower voltages is

considerably more difficult. By use of high voltage static electricity this method of producing undamped oscillations as captured with that through spark gaps must be regarded as an ideal solution particularly for small installations of outputs of from 1 to 100 kw.

By the application of safety spark gaps, with interpolation of electromagnets, not only is short circuiting avoided by also the taking up of current is regulated. Oscillation producers inserted in the above way form a constantly acting electromagnetic alternating field in the collector coil, whereby as already stated, a considerable accumulated affect takes place. The withdrawal wire is connected at 12 and 13, but current may be taken by means of a secondary coil which is firmly or movably mounted in any suitable way inside the large collector coil, i.e. in its electromagnetic alternating field, so long as the direction of its axis runs parallel with that of the main current collecting coil.

In producing undamped oscillations of a high frequency (50,000 per second and more) in the oscillation circuits 9 and 11, electromagnets S and S¹ must be inserted if the high frequency oscillations are not to penetrate the collector coil. In all other cases they are connected shortly before earthing (as in Figs 27 and 28).

Figure 27 a second method of construction of the connecting conductor I another annular conductor II is inserted parallel to the former on the high voltage mast in the air (or embedded as a cable in the earth) but both in the form of a coil. The connecting wire of the balloon aerials is indicated as a primary conductor and also as a current producing network; the other is the consumption network and is not in the unipolar connection with current producing network.

In Figure 27 the current producing network I is shown with three balloon collectors 1, 2, 3 and aerial conductors 4, 5, 6; it is short circuited through condenser 19 and inductance 9. The oscillation forming circuit consists in this diagram of spark gap f, inductance 10, and condenser 11; the earth wire E, is connected to earth over electromagnet S¹. F is safety spark gap which is also connected to earth through a second electromagnet S and E. On connecting up the condenser circuit 11 this is charged over the spark gap f whereby an oscillatory discharge formed. This discharging current act through inductance 10 on the inductively coupled secondary 9, whereby in the producing network a modification of the potential of the condenser is produced. The

consequence of this is that oscillations arise in the coil shaped producer network. These oscillations induce a current in the secondary circuit II, which has a smaller number of windings and a less resistance, the voltage of which, according to the proportion of the number of windings and of the ohmic resistance, is considerably lower whilst the current strength is greater.

In order to convert the current thus obtained into current of an undamped character, and to time its wave lengths, a sufficiently large regulatable capacity 20 is inserted between the ends 12 and 13 of the secondary conductor II. Here also current may be taken without an earth conductor, but it is advisable to insert a safety spark gap E¹ and to connect this with the earth over electromagnet S².

The producer network may be connected with the working network II over an inductionless condenser 21 or over an induction condenser 22, 23. In this case the secondary conductor is unipolarly connected with the energy conductor.

In Figure 28 the connecting conductor between the separate accumulator balloons is carried out according to the autotransformer principle. The collecting coil connects four aerial balloons 1, 2, 3, 4, the windings of which are not made side by side but one above the other. In Figure 28 the collector coil I is shown with a thin line, the metallicly connected prolongation coils II with a thick line. Between the ends I¹ and II¹ of the energy network I a regulating capacity 19 is inserted. The wire I¹ is connected with the output wire and with the spark gap F.

As transformer of the atmospheric electricity an arrangement is employed which consists in using rotary pair of condenser in which the one stator surface B is connected with the main current, whilst the other A is connected with the earth pole. Between these pairs of short circuited condensers are caused to rotate from which the converted current can be taken by means of two collector rings and brushes, in the form of an alternating current, the frequency of which is dependent on the number of balloons and the revolutions of the rotor. As the alternating current formed in the rotor can act, in this improved method of connection described in this invention, through coils 10 on the inductance 9, an increase or diminution of the feed current in I can be obtained according to the direction of the current by back induction. Current oscillations of uniform rhythm thereby result in the coil shaped winding of the producer network. As the ends of this conductor are short circuited

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through the regulatable condenser 19 these rhythms short circuited undamped oscillations in the energy conductor, the periodicity and wave lengths of which oscillations can be adjusted according to desire by alternating the capacity 19 to a given wave length and therewith also to a given frequency. These currents may also be employed in this form directly as working current through conductors II¹ and III. By inserting the condenser 20 a connection between these conductors may also be made, whereby harmonic oscillations of desired wave length are formed. By this means quite new effects as regards current distribution are obtained. The withdrawal of current can even take place without direct wire connection if, at a suitable point in the interior of the producing network (quite immaterially whether this has a diameter of 1 or 100 km) a coil tuned to these wave lengths and of the desired capacity is firmly or movably mounted in the aerial conductor in such a way that is axial direction is in parallel with that of the collector coil. In this case a current is induced in the producing network, the size of which is dependent on the total capacity and resistance and also on the periodicity employed. A possibility is thereby afforded in future, of taking energy form the producer network by wireless means. As thereby in addition to atmospheric electricity also magnetic earth currents and the energy from the higher atmosphere (at least partially) may be simultaneously obtained, this last system for collecting the atmospheric energy is of particular importance for the future.

Of course everywhere instead of spark gaps suitable grid vacuum tubes may be employed as producers for undamped oscillations. The separate coils of the producer network with large diameters may be connected with one another through separate conductors all in parallel or all in series or in groups in series. By regulating the number of oscillations and also the extent of the voltage more or less large collector coils of this kind may be employed. The coils may also be divided spirally over the entire section. The coils may be carried out in annular form or also in triangular, quadrangular, hexagonal or octagonal form.

Of course wires may be carried from a suitable place to the centre or also laterally which serve the currents waves as guides. This is necessary when the currents have to be conducted over mountains and valleys and so forth. In all these cases the current must be converted into a current of suitable periodicity.

As already hereinbefore mentioned separate collecting balloons may be directly metallicly interconnected at equidistant stations

distributed over the entire country or may be connected by interpolation of suitable condenser batteries by means of high voltage conductors. The static electricity is converted through a spark gap into dynamic energy of a high number of oscillations, and could then in such form, with a suitable arrangement of the connections, observing various measures of precaution, be employed as source of energy after separate or special regulation

According to this invention in order to increase the collecting effect of the balloon in the aerial collector conductor or in the earth wire, radiating collectors are employed. These consist either of incandescent metal or oxide electrodes in the form of vacuum grid tubes, or electric arcs (mercury and the like electrodes) Nernst lamps or finally flames of various kinds may be simply connected with the respective conductor.

It is well known that energy can be drawn off from a cathode consisting of an incandescent body opposite an anode charged with positive electricity (vacuum grid tube). Hitherto however, a cathode was always first directly placed opposite an anode, and secondly the system always consisted of closed circuit.

Now if we dispense with the ordinary ideas in forming light or flame arcs in which a cathode must always stand directly opposite an anode, and if we place an incandescent cathode opposite an anode charged to a high potential or another body freely floating in the air, or regard the incandescent cathode only as a source of unipolar discharge (which represent group and point discharges in electrostatic machines similar to unipolar discharges), it may be ascertained that incandescent cathodes and less perfectly all incandescent radiators, flames and the like admit of relatively large current densities and allow large quantities of electric energy to radiate into the open space in the form of electron streams as transmitters.

The object of this invention is as described below, if such incandescent radiators or flames are not freely suspended in space but connected metallicly with the earth so that they can be charged with negative terrestrial electricity, these radiators possess the property of absorbing the free positive electrical charges contained in the air space surrounding them (that is to say of collecting them and conducting them to earth). They can therefore, serve as collectors and have, in comparison to the action of the spikes, or points, a very large radius of action R ; the effective capacity of these collectors is much greater than the geometrical capacity (R_0) calculated in an electrostatic sense.

Now as our earth is surrounded as is well known,

with an electrostatic field and the difference of potential

$$\frac{\delta V}{\delta h}$$

5 of the earth field according to the latest investigations, is in summer about 60 to 100 volts and in winter 300 to 500 volts per metre of difference in height (δh), a simple calculation gives the result that when such a radiation collector or flame collector is arranged for example on the ground, and a second one is mounted vertically over it at a distance of 2,000 metres and both are connected by a conducting cable, there is a difference of potential in summer of about 2,000,000 volts and in winter 6,000,000 volt or more.

10 According to Stefan Boltzmann's law of radiation, the quantity of energy which an incandescent surface (temperature T) of 1 sq cm radiates in a unit of time into the open air (Temperature T_0) is expressed by the following formula:

$$S = \delta (T^4 - T_0^4) \text{ watt/sq cm}$$

15 and the universal radiation constant δ is according to the latest researches of Ferry (Annales de Chimie et de physique 17 page 267 (1909)) equals to 6.30×10^{-22} watt/sq cm.

20 Now if an incandescent surface of 1 sq cm shows, as compared with the surrounding space a periodic fall of potential δV it radiates (independent of the current direction, that is to say of the sign) in accordance with the above formula, for example at a temperature of 3725°C an energy of 1.6 kw per sq cm per second. As for the radiation the same value can be calculated for the collection of energy, but reversed. Now as carbon electrodes at the temperature at the temperature of the electric arc support on the current basis density up to from 60 to 65 amperes per sq cm no difficulties will result in the direction in employing radiating collectors as accumulators.

25 If the earth be regarded as a cosmically insulated condenser in the sense of geometrical electrostatics x there results from the geometric (compare Ewald Rasch, "das elcktrische Bogenlicht" (The electric arc light) page 169) capacity of the earth according to Chwolson:

For negative charging 1.3×10^5 Coulomb.

30 For negative potential $V = 10 \times 10^8$ volts. From this there results however, $EJ \cong 24.710^{24}$ watt/Sec. Now if it is desired to make a theoretic short circuit through an earthed flame collector this would represent an electric total work of about $79,500 \cdot 10^{10}$ kilowatt years as the earth must be regarded as a rotating mechanism which is thermo-dynamically, electromagnetically, and also kinematically coupled with the sun and stars by cosmic radiations and

gravitation a diminution of the electric energy of the earth field is not to be feared. The energies which the incandescent collectors would withdraw from the earth field can only cause by the withdrawal of motor work a lowering of the earth temperature (temperature $T_e = 300$) and reduce this to that of the world space ($T=0$) by using the entire energy. This is however not the case as the earth does not represent a cosmically entirely insulated system. On the contrary there is conveyed to the same according to the recent value corrected by Ferry for the solar constants through the radiation from the sun an energy of $18,500 \times 10^{10}$ kw. Accordingly any lowering of the earth temperature (T_e) without simultaneous lowering of the sun's temperature (T_s) would contradict Stefan Boltzmann's law of radiation.

$$S = \delta (T_s^4 - T_e^4).$$

60 From this it must be concluded that if the earth temperature (T_e) sinks, the total radiation S absorbed by the earth increases, and further also that the secular speed of cooling of the earth is directly dependant on that of the sun and the other radiators cosmically coupled with the sun and is connected most closely with these.

65 The incandescent radiation collectors may, according to this invention, be employed for collecting atmospheric electricity if they (1) are charged with the negative earth electricity (that is to say when they are directly connected by means of a metallic conductor with earth) and (2) if large capacities (metal surfaces) charged with electricity are mounted opposite them as positive poles in the air. This is regarded as the main feature of the present invention as without these inventive ideas it would not be possible to collect with an incandescent collector, sufficiently large quantities of the electrical charges contained in the atmosphere as technology requires; the radius action of the flame collectors would also be too small, especially if it be considered that the very small surface density (energy density) (δ about $= 2 \times 7 \cdot 10^9$ St. E per sq cm) does not allow of large quantities of charge being absorbed from the atmosphere.

70 x) Calculated according to Poisson's calculation;

$\Delta V = -4\pi\delta$; as here the alteration of potential or potential gradients only takes place in the direction of the normal, this calculation assumes the simple form

$$\delta \cong \frac{1}{4\pi} \times \frac{\delta^2 V}{\delta n^3}$$

75 It has indeed already been proposed to employ flame collectors for collecting atmospheric electricity and it is known that

their collecting effect is substantially greater opposite the points. It is however, not known that the quantities of current which could hitherto be obtained are too small for technical purposes. According to my experiments the reason for this is to be found in the too small capacities of the collector conductor poles. If such flame or radiating collectors have no or only small positive surfaces, their radius of action for large technical purposes is too small. If the incandescent collectors be constantly kept in movement in the air they may collect more according to the speed of the movement, but this again not capable of being carried out in practice.

By this invention the collector effect is considerably increased by a body charged with a positive potential and of the best possible capacity being also held floating (without direct earth connection) opposite such an incandescent collector which is held floating in the air at a desired height. if for example, a collecting balloon of sheet metal or metallized balloon fabric be caused to mount to 300 up to 3000 metres in the air and as positive pole it is brought opposite such a radiating collector connected by a conductor to earth, quite different results are obtained.

The metallic balloon shell (with a large surface) is charged to a high potential by the atmospheric electricity. This potential is greater the higher the collecting balloon is above the incandescent collector. The positive electricity acts concentratedly on the anode floating in the air as it is attracted through the radiation shock ionization, proceeding from the incandescent cathode. The consequence of this is that the radius of action of the incandescent cathode collector is considerably increased and thereby also the collecting effect of the collecting balloon surface. Further the large capacity of the anode floating in the air plays therefore an important part because it allows of the taking of large charges, and thereby a more uniform current is obtained even when there is a large consumption; this cannot be the case with small surfaces.

In the present case the metallic collecting balloon is a positive anode floating in the air and the end of the earth conductor of this balloon serves as positive pole surface opposite the surface of the radiating incandescent cathode, which in turn is charged with negative earth electricity being conductingly connected to earth

The process may be carried out by two such contacts (negative incandescent cathode and anode end of a capacity floating in the air) a condenser and an inductive resistance being switched on in parallel, whereby simultaneously undamped oscillations may be formed.

In very large installations it is advisable to connect two such radiating collectors in series. Thus an are light incandescent cathode may be placed below on the open ground and an incandescent cathode which is heated by special electromagnetic currents be located high in the air. Of course for this the special vacuum Liebig tubes with or without grids may also be employed. An ordinary lamp with oxide electrodes may be introduced on the ground and the positive pole is not directly connected with the collecting balloon, but through the upper incandescent cathode or over a condenser. The method of connecting the incandescent cathode floating in the air may be seen in Fis. 29-33.

B is the air balloon, K a Cardan ring (connection with the hawser) C the balloon L a good conducting cable. P a positive pole, N negative incandescent cathode, and E earth conductor.

Fig. 29 represents the simplest form of construction. If electric oscillations are produced below on the ground by means of a carbon lamp or in other suitable way a considerably greater electric resistance is opposed to that in the direct way by inserting an electrical inductive resistance 9. Consequently between P and N a voltage is formed and as, over N and P only an inductionless ohmic resistance is present, a spark will spring over so long as the separate induction co-efficients and the like are correctly calculated. The consequence of this is that the oxide electrode (carbon or the like) is rendered incandescent and then shows as incandescent cathode an increased collecting effect. The positive poles must be substantially larger than the negative in order that they may not also become incandescent. As they are further connected with the large balloon area which has a large capacity and is charged at high voltage, an incandescent body which is held floating in the air and a positive pole which can collect large capacities is thereby obtained in the simplest way. The incandescent cathode is first caused to become incandescent by means of separate energy produced on the earth, and then maintained by the energy collected from the atmosphere.

Fig. 30 only shows the difference that instead of n round balloon a cigar shaped one (of metal or metalized fabric) may be employed and also a condenser 5 is inserted between the incandescent cathode and the earth conductor so that a short circuited oscillation circuit P. N 5 and 9 is obtained. This has the advantage that quite small quantities of electricity cause the cathode to become incandescent and much larger cathode bodies may be rendered incandescent.

In this form of construction both the in-

candescent cathode and also the positive electrode may be enclosed in a vacuum chamber as may be seen in Fig 32. A cable L is carried well insulated through the cover of a vessel and ends in a condenser disc 5. The cover is arched in order to keep off the rain. The vessel is entirely or partially made of magnetic metal and well insulated inside and outside. Opposite the metallic positive pole of the vacuum tube g with the incandescent cathode (oxide electrode) N is arranged. The negative electrode is on the one hand connected with the earth conductor E, and on the other hand with the inductive resistance 9 which is also connected with the cable L with the positive pole and wound round the vessel in coils. The action is exactly the same as that in Fig. 29 only instead of an open incandescent cathode one enclosed on vacuo is employed. As in such collectors only small bodies can be brought to incandescence in large installations a plurality of such vacuum tubes must be inserted in proximity to one another. According to the previous constructions Figs. 31 and 33 are quite self evident without further explanations

Figs 34-37 represent further diagrams of connections over radiating the flame collectors, and in fact, how they are to be arranged on the ground.

Fig. 34 shows n arc light collector with oxide electrodes for direct current and its connection;

Fig. 35 a similar one for alternating current,

Fig. 36 an incandescent collector with a Nernst lamp and Fig. 37 a similar one with a gas flame.

The positive pole 1 of the radiating collectors is always directly connected to the aerial collecting conductor A. In Fig. 34 this is further connected over the condenser battery 5 with a second positive electrode 3. The direct current dynamo b produces current which flows over between the electrodes 3 and 2 as an arc light. On the formation of arc the negative incandescent electrode 2 absorbs electricity from the positive poles standing opposite it and highly charged with atmospheric electricity and conveys the same to the working circuit. The spark gap 7, inductive resistance 9 and induction coil 10 are like the ones previously described. The protective electromagnet 5 guards the installation against earth circuiting, the safely spark gap 8 from excess voltage and overcharging.

In Fig. 35 the connection is so far altered that the alternating current dynamo feeds the exciting coil 11 of the induction condenser. 12 is its negative and 13 its positive pole; if the coil 3 on the magnet core of the dynamo is correctly calculated and the periodicity of the alternating current is sufficiently high an arc light can be formed between

the two pole 1 and 2. As the cathode 2 is connected with the negatively charged earth, and therefore always acts as a negative pole, a form of rectification of the alternating current produced by the dynamo 3 is obtained, the second half of the period is always suppressed. The working circuit may be carried out in the same way as Fig. 34; the working spark gap 7 may however be dispensed with, and instead thereof between the points n and m a condenser 5 and a induction resistance 9 may be inserted from which the current is taken inductively.

Fig. 36 represents a form of construction similar to Fig. 34 only that here instead of an arc lamp a Nernst incandescent body is employed. The Nernst lamp is fed through the battery 3. the working section is connected with the negative pole, the safety spark gap with the + poles. The working spark gap 7 may also be dispensed with the current for it taken at 12 over the oscillation circuit 5, 11 (shown in dotted lines).

Flame collectors (Fig. 37) may also be employed according to this invention. The wire network 1 is connected with the aerial collector conductor A and the burner with the earth. At the upper end of the latter, long points are provided which project the flame. The positive electrode is connected with the negative over a condenser 5 and the induction coil 9 with the earth.

The novelty in this invention is firstly the use of incandescent cathodes opposite positive poles which are connected with large metallic capacities as automatic collecting surfaces, (2) the connection to the incandescent cathodes with the earth whereby, in addition to the electricity conveyed to them from the battery or machine which causes the incandescing, also the negative charge of the earth potential is conveyed, and (3) the connection of the positive and negative poles of the radiating collectors over a condenser circuit alone or with the introduction of a suitable inductive resistance, whereby simultaneously an oscillatory oscillation circuit by obtained. The collecting effect is by these methods quite considerably increased.

I declare that what I claim is:-

1. An electrical generating system, comprising a conducting surface for static charges, means to support same at a distance above the earth, a conductor leading to the earth level, n spark gap associated with said conductor to convert electrostatic charges into electromagnetic high frequency oscillations means to supply said electromagnetic energy to a net work, and a spark gap of greatly increased relative resistance in parallel therewith.

2. An electrical energy generating system

16

comprising a conductor, means to support same above the earth level, an inductance therein, a spark gap associated with said conductor, a second spark gap of much higher relative resistance in parallel therewith and an energy receiving circuit coupled with the spark gap of lesser resistance.

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3. An electrical generating system comprising a collecting surface, means to support same above the earth level, a conductor connecting said connecting surfaces with the earth level, a choke in said conductor, an electromagnetic resistance converting electrostatic energy to electromagnetic energy, a safety higher resistance in parallel therewith and a net work coupled with the conversion resistance of lesser value,

4. An electrical energy generating system comprising electric conductors spaced above the earth to form electromagnetic oscillating circuits, conductors connecting to earth level, electrostatic to electromagnetic energy conversion means therein, a safety high electrostatic resistance in parallel therewith and means to alter the electromagnetic characteristics of the circuits

5. An electrical energy generating system comprising in combination a static collecting surface arranged above the earth, conductors connecting to earth level, a pair of spark gaps in parallel

of different electrostatic resistance, a utilization net work shunted across the spark gap of lesser resistance and an electromagnetic choke in said conductors. 30

6. An electrical energy generating system comprising an open circuit energy collecting aerial, a pair sparking gaps in parallel of widely different resistance, connected thereto and a closed electric oscillation circuit in shunt across the gap of lesser resistance. 35

7. An electrical energy generating system comprising an open circuit energy collecting aerial, a pair of sparking gaps in parallel of widely different resistance connected thereto, a closed electric oscillation circuit in shunt across the gap of lesser resistance, a plurality of electrostatic collecting surfaces, means to connect said collecting surfaces in parallel in groups and means to connect said groups symmetrically with said aerial. 40 45

In witness whereof, I have hereunto signed my name this 30 day of Dec., 1920, in the presence to two subscribing witnesses. 50

HERMAN PLAUSON.

Witnesses:

H.F. ARMSTRONG

55

No. 685,958

Patented Nov. 5, 1901

N. T. SELSA

METHOD OF UTILISING RADIANT ENERGY.
(Application filed Mar. 21, 1901.)

(No Model.)

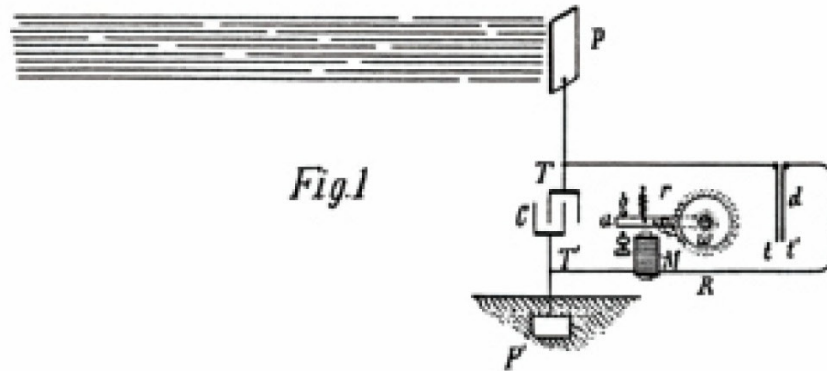


Fig. 1

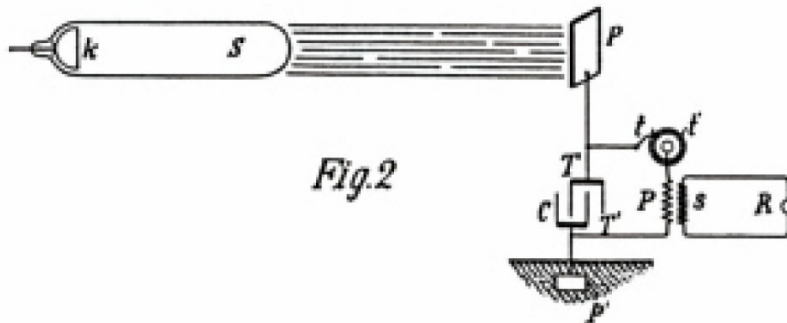


Fig. 2

Witnesses:

Raphael letter
M. Lamson Syer

Nikola Tesla, Inventor

by New. Page & Cooper
Attys

UNITED STATES PATENT OFFICE.

NIKOLA TELSA, OF NEW YORK, N. Y.

METHOD OF UTILIZING RADIANT ENERGY

SPECIFICATION forming part of letter patent No. 685,958, dated November 5, 1901.

To all whom it may concern:

5 Be it known that I, Nikola Tesla, a citizen of the United States, residing at the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful improvements in Methods of Utilizing Radiant energy, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

10 It is well known that certain radiations - such as those of ultra-violet light, cathodic, Roentgen rays, or the like - possess the property of charging and discharging conductors of electricity, the discharge being particularly noticeable when the
15 conductor upon which the rays impinge is negatively electrified. These radiations are generally considered to be either vibrations of extremely small wave lengths, and in explanation of the phenomena noted it has been assumed by some authorities that they ionize or render conducting the
20 atmosphere through which they are propagated. My own experiments and observations, however, lead me to conclusions more in accord with the theory heretofore advanced by me that sources of
25 such radiant energy throw off the great velocity minute particles of matter which are strongly electrified, and therefore capable of charging an electrical conductor, or even if not so may at any rate
30 discharge an electrified conductor either carrying off bodily its charge or otherwise.

35 My present application is based upon a discovery which I have made that when rays or radiations of the above kind are permitted to fall upon an insulated conducting body connected to one of the terminals of a condenser, while the other terminal of the same is made by independent means to receive or to carry away electricity, a current flows
40 into the condenser so long as the insulated body is exposed to the rays, and under the conditions herein after specified an indefinite accumulation of electrical energy in the condenser takes place. This energy after a suitable time interval, during which
45 the rays are allowed to act, may manifest itself in a powerful discharge, which may be utilized for the operation or control of mechanical or electrical devices or rendered useful in many other ways.

In applying my discovery I provide a condenser, preferably of considerable electrostatic capacity, and connect one of its terminals to an insulated metal plate or other conducting body exposed to the rays or streams of radiant matter. It is very important, particularly in view of the fact that electrical energy is generally supplied at a very slow rate to the condenser, to construct the same with the greatest care. I use by preference the best quality of mica as dielectric, taking every possible precaution in insulating the armatures, so that the instrument may withstand great electrical pressure without leaking and may leave no perceptible electrification when discharging instantaneously. In practice I have found that the best results are obtained with condensers treated in the manner described in a patent granted to me February 23, 1897, No. 577,671. Obviously the above precautions should be the more rigorously observed the slower the rate of charging and the smaller the time interval during which the energy is allowed to accumulate in the condenser. The insulated plate or conducting body should present as large a surface as practicable to the rays or streams of matter, I having ascertained that the amount of energy conveyed to it per unit of time is under otherwise identical conditions proportionate to the area exposed, or nearly so. Furthermore, the surface should be clean and preferably highly polished or amalgamated. The second terminal or armature of the condenser may be connected to one of the poles of a battery or other source of electricity or to any conducting body or object whatever of such properties or so conditioned that by its means electricity of the required sign will be supplied to the terminal. A simple way of supplying positive or negative electricity to the terminal is to connect the same either to an insulated conductor, supported at some height in the atmosphere, or to a grounded conductor, the former, as is well know, furnishing positive and the latter negative electricity. As the rays or supposed streams of the first condenser-terminal, which is connected to the plate or conductor above mentioned, I usually connect the second terminal of the condenser to the ground, this being the most convenient way of obtaining negative electricity, dispensing with

the necessity of providing an artificial source. In order to utilize for any useful purpose the energy accumulated in the condenser, I furthermore connect to the terminals of the same a circuit including an instrument or apparatus which it is desired to operate and another instrument or device for alternately closing and opening the circuit. This latter may be any form of circuit-controller, with fixed or movable parts or electrodes, which may be actuated either by the stored energy or by independent means.

The rays or radiations which are to be utilized for the operation of the apparatus above described in general terms may be derived from a natural source, as the sun, or may be artificially produced by such means, for example, as an arc-lamp, a Roentgen tube, and the like, and they may be employed for a great variety of useful purposes.

My discovery will be more fully understood from the following detailed description and annexed drawings, to which reference is now made, and in which-

Figure 1 is a diagram showing typical forms of the devices or elements as arranged and connected in applying the method for the operation of a mechanical contrivance or instrument solely by the energy stored; and Fig. 2 is a diagrammatical representation of a modified arrangement suitable for special purposes, with a circuit-controller actuated by independent means.

Referring to Fig. 1, C is the condenser, P the insulated plate or conducting body, which is exposed to the rays, and P' another plate or conductor, all being joined in series, as shown. The terminals T T' of the condenser are also connected to a circuit including a receiver R, which is to be operated, and a circuit-controlling device *d*, which in this case is composed of two very thin conducting-plates *t t'*, placed in close proximity and very mobile, either by reason of extreme flexibility or owing to the character of their support. To improve their action, they should be enclosed in a receptacle from which the air may be exhausted. The receiver R is shown as consisting of an electromagnet M, a movable armature *a*, a retractile spring *b*, and a ratchet-wheel *w*, provided with a spring-pawl *r*, which is pivoted to armature *a*, as illustrated. The apparatus being arranged as shown, it will be found that when the radiations of the sun or of any other source capable of producing the effects before described fall upon the plate P an accumulation of electrical energy in the condenser C will result. This phenomenon, I believe, is best explained as follows: The sun as well as other sources of radiant energy throw off minute particles of matter positively electrified, which, impinging upon the plate P, communicate an electrical charge to the same. The opposite terminal

of the condenser being connected to the ground, which may be considered as a vast reservoir of negative electricity, a feeble current flows continuously into the condenser, and inasmuch as these supposed particles are of an inconceivably small radius or curvature, and consequently charged to a relatively very high potential, this charging of the condenser may continue, as I have found in practice, almost indefinitely, even to the point of rupturing the dielectric. Obviously whatever circuit-controller be employed it should operate to close the circuit in which it is included when the potential in the condenser has reached the desired magnitude. Thus in Fig. 1 when the electrical pressure at the terminals T T' rises to a certain predetermined value the plates *t t'*, attracting each other, close the circuit connected to the terminals. This permits a flow of current which energizes the magnet M, causing it to draw down the armature *a* and impart a partial rotation to the ratchet-wheel *w*. As the current ceases the armature is retracted by the spring *b* without, however, moving the wheel *w*. With the stoppage of the current the plates *t t'* cease to be attracted and separate, thus restoring the circuit to its original condition.

Many useful applications of this method of utilizing the radiations emanating from the sun or other source and many ways of carrying out the same will at once suggest themselves from the above description. By way of illustration a modified arrangement is shown in Fig. 2, in which the source S of radiant energy is a special form of Roentgen tube devised by me having but one terminal *k*, generally of aluminum, in the form of half a sphere with a plain polished surface on the front side, from which the streams are thrown off. It may be excited by attaching it to one of the terminals of any generator of sufficiently-high electromotive force; but whatever apparatus be used it is important that the tube be exhausted to a high degree, as otherwise it might prove entirely ineffective. The working or discharge circuit connected to the terminals T T' of the condenser includes in this case the primary *p* of a transformer and a circuit-controller comprising a fixed terminal or brush *t* and a movable terminal *t'* in the shape of a wheel with conducting and insulating segments which may be rotated at an arbitrary speed by any suitable means. In inductive relation to the primary wire or coil *p* is a secondary *s*, usually of a much greater number of turns, to the ends of which is connected a receiver R. The terminals of the condenser being connected as indicated, one to an insulated plate P and the other to a grounded plate P', when the tube S is excited rays or streams of matter are emitted from the same, which convey a positive charge to the plate P and condenser-terminal T, while terminal T' is continuously receiving negative electricity from the plate

P'. This, as before explained, results in an accumulation of electrical energy in the condenser, which goes on as long as the circuit including the primary p is interrupted. Whenever the circuit

5 is closed, owing to the rotation of the terminal t' , the stored energy is discharged through the primary p , this giving rise in the secondary s to induced currents which operate the receiver R.

10 It is clear from what has been stated above that if the terminal T' is connected to a plate supplying positive instead of negative electricity the rays should convey negative electricity to plate P. The source S may be any form of Roentgen or

15 Lenard tube; but it is obvious from the theory of action that in order to be very effective the electrical impulses exciting it should be wholly or at least preponderatingly of one sign. If ordinary symmetrical alternating currents are employed,

20 provision should be made for allowing the rays to fall upon the plate P only during those periods when they are productive of the desired result. Evidently if the radiations of the source be stopped or intercepted or their intensity varied

25 in any manner, as by periodically interrupting or rhythmically varying the current exciting the source, there will be corresponding changes in the action upon the receiver R, and thus signals may be transmitted and many other useful effects produced. Furthermore, it will be understood that

30 any form of circuit-closer which will respond to or be set in operation when a predetermined amount of energy is stored in the condenser may be used in lieu of the device specifically described

35 with reference to Fig. 1, and also that the special details of construction and arrangement of the several parts of the apparatus may be very greatly varied without departure from the invention.

Having described my invention, what I claim is—

40 1. The method of utilizing radiant energy,

which consists in charging one of the armatures of a condenser by rays or radiations, and the other armature by independent means, and discharging the condenser through a suitable receiver, as set forth. 45

2. The method of utilizing radiant energy, which consists in simultaneously charging a condenser by means of rays or radiations and an independent source of electrical energy, and discharging the condenser through a suitable receiver, as set forth. 50

3. The method of utilizing radiant energy, which consists in charging one of the armatures of a condenser by rays or radiations, and the other by independent means, controlling the action or effect of said rays or radiations and discharging the condenser through a suitable receiver, as set forth. 55

4. The method of utilizing radiant energy, which consists in charging one of the armatures of a condenser by rays or radiations and the other by independent means, varying the intensity of the said 60 rays or radiations and periodically discharging the condenser through a suitable receiver, as set forth.

5. The method of utilizing radiant energy, which consists in directing upon an elevated conductor, connected to one of the armatures of a condenser, rays or radiations capable of positively electrifying the same, carrying off electricity from the other armature by connecting the same with the ground, and discharging the accumulated energy through a suitable receiver, as set forth. 70

6. The method of utilizing radiant energy, which consists in charging one of the armatures of a condenser by rays or radiations, and the other by independent means, and effecting by the automatic discharge of the accumulated energy the operation or control of a suitable receiver, as set forth. 80

NIKOLA TESLA.

Witnesses:

M. LAWSON DYER,
RICHARD DONOVAN.

85

UNITED STATES PATENT OFFICE.

MAHLON LOOMIS, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVEMENT IN TELEGRAPHING

Specification forming part of letter patent No. 129,971, dated July 30, 1872.

To all whom it may concern:

Be it known that I, MAHLON LOOMIS, dentist, of Washington, District of Columbia, have invented or discovered a new and improved Mode of Telegraphing and of Generating Light, Heat, and Motive-Power; and I do hereby declare that the following is a full description thereof.

The nature of my invention or discovery consists, in general terms, of utilizing natural electricity and establishing an electrical current or circuit for telegraphic and other purposes without the aid of wires, artificial batteries, or cables to form such electrical circuit, and yet communicate from one continent of the globe to another.

To enable others skilled in electrical science to make use of my discovery, I will proceed to describe the arrangements and mode of operation.

As in dispensing with the double wire, (which was first used in telegraphing,) and making use of but one, substituting the earth instead of a wire to form one-half the circuit, so I now dispense with both wires, using the earth as one-half the circuit and the continuous electrical element far above the earth's surface for the other part of the circuit. I also dispense with all artificial batteries, but use the free electricity of the atmosphere, co-operating with that of the earth, to supply the electrical dynamic force or current for telegraphing and for other useful purposes, such as light, heat, and motive power.

As atmospheric electricity is found more and more abundant when moisture, clouds, heated currents of air, and other dissipating influences are left below and a greater altitude attained, my plan is to seek as high an elevation as practicable on the tops of high mountains, and thus penetrate or establish electrical connection with

the atmospheric stratum or ocean overlying local disturbances. Upon these mountaintops I erect suitable towers and apparatus to attract the electricity, or, in other words, to disturb the electrical equilibrium, and thus obtain a current of electricity, or shocks or pulsations, which traverse or disturb the positive electrical body of the atmosphere above and between two given points by communicating it to the negative electrical body in the earth below, to form the electrical circuit.

I deem it expedient to use an insulated wire or conductor as forming a part of the local apparatus and for conducting the electricity down to the foot of the mountain, or as far away as may be convenient for a telegraph-office, or to utilize it for other purposes.

I do not claim any new key-board nor any new alphabet or signals; I do not claim any new register or recording instrument; but

What I claim as my invention or discovery, and desire to secure by Letters Patent, is –

The utilization of natural electricity from elevated points by connecting the opposite polarity of the celestial and terrestrial bodies of electricity at different points by suitable conductors, and, for telegraphic purposes, relying upon the disturbance produced in the two electro-opposite bodies (of the earth and atmosphere) by an interruption of the continuity of one of the conductors from the electrical body being indicated upon its opposite or corresponding terminus, and thus producing a circuit or communication between the two without an artificial battery or the further use of wires or cables to connect the co-operating stations.

MAHLON LOOMIS

Witnesses:

BOYD ELIOT,
C. C. WILSON.

UNCOMMON PARTS LIST



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