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(54) Titre : METHODE ET APPAREILLAGE DE PROPULSION D'ENGIN SPATIAL AVEC BLINDAGE
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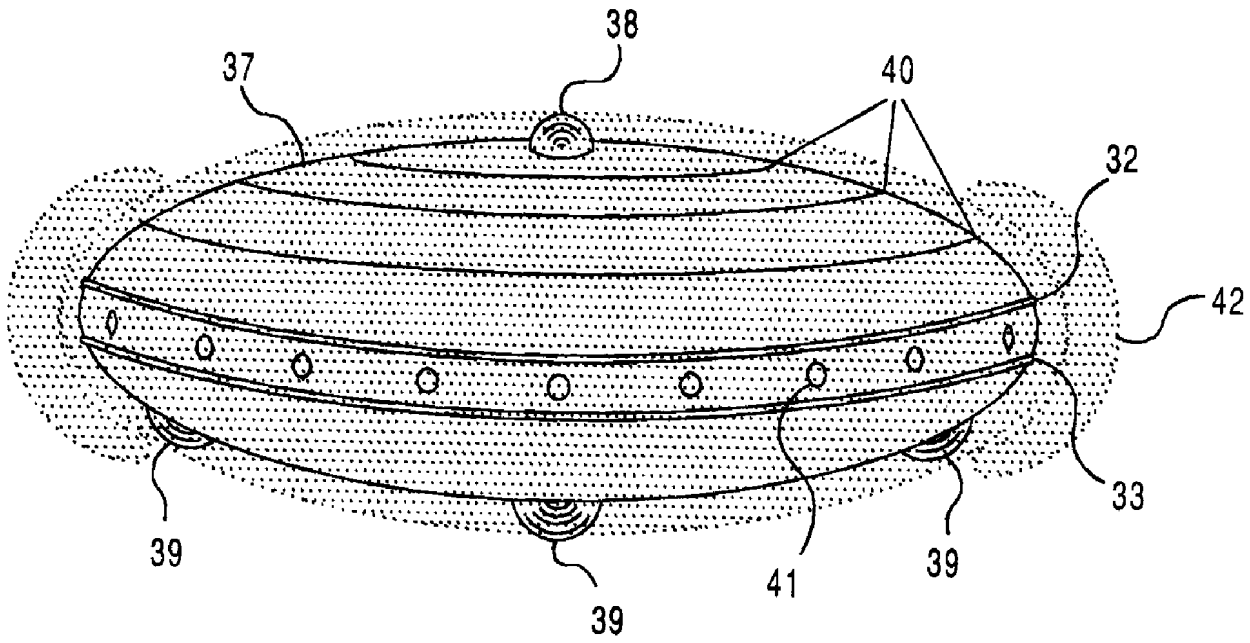

(57) Abrégé/Abstract:
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Method and apparatus for spacecraft propulsion with a field shield protection

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Abstract

The propulsion method is based on a gravito-inertial phenomenon predicted by the Basic Structures of Matter – Supergavitation Unified Theory (BSM-SG), the practical demonstration of which is called a Stimulated Anomalous Reaction to the Gravity (SARG) effect. The SARG effect is a unidirectional change of the gravito-inertial mass of an object by modulation the parameters of the physical vacuum. The suggested technique employs an asymmetrical envelope of EM activated neutral plasma. The result is a unique force field distinguished from the reactive jet propulsion by lack of throwing mass and effect of reduced gravito-inertial mass of the spacecraft and the surrounding gas molecules. This means a less power for acceleration and less turbulence when moving in a planetary atmosphere. A small scale SARG effect is verified by laboratory experiments. A unique field shield protection against micrometeorites, also predicted by BSM-SG theory, can be achieved by emission of properly space and time correlated EM field packets and superluminal waves, known also as X-waves.

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BACKGROUND OF THE INVENTION

The present invention relates to a method and apparatus for creating a propulsion effect and a field shield protection in order to be used by a spacecraft preferably in a deep space. The goal is to create a force field and a protective field shield without throwing or emission of mass particles that means using only electric, magnetic and electro-magnetic fields in a proper combination. In the prior art literature such kind of propulsion system is referred as massless space drive or propulsion.

The main disadvantage of the massless propulsion methods described in the prior art is that they don't rely on understandable physical mechanism. They are usually a product of experimentally discovered anomalous behavior without understandable physics. In most cases the inventors or authors suggest explanations contradicting to the known laws of physics or in the best way they propose empirical models without touching the contradictions to known physical laws. In both cases the phenomenon could not be scaled and optimized for practical application, due to lack of understanding the physical mechanism.

One of the massless propulsion methods, known as Biefield-Brown effect is described initially in US patents 3,018,394 (1962) and 3,022,430 (1962). In the prior art literature this effect is known also as electrogravity. The effect is a week propulsion force in the direction of the positive electrode of a capacitor-like actuator charged with a DC high voltage. The observable

force field is possible only at high voltages above tens of thousand. For practical applications voltages in order of hundred thousands and even millions are required, while a parasite arc discharge must be avoided. This puts severe constraints for designing of a spacecraft that must operate at different atmospheric pressure and in deep space. It is still disputable that the effect might be a result of ion wind, since the polarity of the electrodes is constant.

Woodward et al. in US patent 6,098,924 describe an accelerator based on a piezoelectric devices attached to resonant mechanical structures. The method lacks a physical explanation and only a small-scale effect is reported.

Podkletnov and Modanese [arXiv:physics/0108005v2, 2001] reported small effect from impulse gravity generator based on a charged Yba CuO superconductor. The major disadvantages are cryogenically cooled environment (about -196 C), a high vacuum and very small reported efficiency 1-2%. NASA spent $600,000 for attempts to replicate this experiment without success. The final attempt to replicate the experiment by G. Hathaway with a 50 times higher accuracy and consulted by Podkletnov through the experiment shows that the effect is illusive [G. Hathaway, Physica C, 385, 2003, p.488-500].

J. Reece Roth et al. in US patent 6,200,539B1 (2001) titled "Paraelectric Gas Flow Accelerator" describes an accelerator consisting of two sets of parallel metal stripes from both sides of an insulating plate properly displaced. The stripes of each set are connected together. When a high AC voltage is applied in the kilohertz frequency range a specific glow discharge appears between the electrodes and one observes a weak acceleration effect in respect to the surrounding gas atmosphere. Since the glowing plasma is obtained at normal atmospheric pressure, the method is called One Atmospheric Pressure Glow Discharge (OAPGD). The activated plasma emits a broad band RF spectrum in the range of 1 to 250 Mhz. According to Roth, the observed small acceleration effect is a result of Lorentzian collisions of ions and electrons with the neutral molecules, atoms and radicals. This explanation is not satisfactory from a physical point of view because the plasma is excited at each half cycle of the AC filed, so the electrodes polarity changes alternatively, while the acceleration is unidirectional. For this reason many researchers who investigate this type of accelerators express the idea that the effect is unknown. The effect exhibits also a small turbulence reduction, for which there is not any physical explanation in the prior art.

Roth and other researchers consider that the thrust force is a kind of reaction of the surrounding. In such aspect they do not envision a possible operation in a deep space and does not offer provisions for such applications. Since the physics of the observed phenomenon is not understood, they could not provide effective recommendations for design and optimization of the efficiency of their accelerators. There are two major disadvantages if trying to use the Roth's OAPGD method in a deep space. The first one is that with the proposed method of plasma activation the propulsion effect is very weak. The second one is that a small fraction of the power supplied to the accelerator, which behaves as a capacitor load, contributes to the force filed, so the power efficiency is quite low. The suggested by Roth passive network adapter only slightly reduces the useless reactive power. Such adaptor also could not be used at different environment pressure, which means working at different heights above the ground.

Another researcher and inventor S. Roy suggests a Wingless Electromagnetic Air Vehicle (WEAV) based on his research on the Dielectric Barrier Discharge. He does not goes further that J. Roth about the physics of the phenomenon, proposing only empirical models for his particular model and does not propose means for use in deep space including a protective field shield against micrometerorites.

In the recent 15 years the research in a field known as Electrohydrodynamics is intensified in USA, Europe and Russia. Despite of this a possible existance of a gravito-inertial effect has not been envisioned in the prior art.

For a spacecraft moving with very high velocity it becomes very necessary to have a protective filed shield against micrometerorites in a deep space and dust particles in atmosphere. There is not provision for such kind of protection in the prior art.

SUMMARY OF THE INVENTION

It is an object of the invention to propose a method and apparatus for propulsion of spacecraft with a field shield protection, in which the propulsion is a result of unidirectional change of the gravito-inertial mass of the spacecraft, while the spacecraft is surrounded by a field shield that protect it from micrometeorites.

It is another object of the invention to provide design considerations for the shape of the spacecraft with positions of the functional members of the propulsion system.

It is another object of the invention to improve the prior art plasma thrust accelerators in order to be used in a spacecraft operating in a planetary atmosphere and in deep space.

It is another object of the present invention to increase the efficiency of the prior art plasma thrust accelerators by applying simultaneously AC and DC high voltage fields.

It is another object of the present invention to propose a circuit that prevents returning the reactive power from the capacitive type of plasma thrust actuator back to the AC high voltage power supply in order to increase the power efficiency of the force field.

The physics of the propulsion method and the field shield is provided by the Basic Structures of Matter – Supergravitation Unified theory (BSM-SG), published as a monograph by the author of this invention. The proposed propulsion method is based on the effect called Stimulated Anomalous Reaction to the Gravity (SARG). A small scale of SARG effect is experimentally demonstrated in a laboratory. The protective field shield, the physics of which is also explainable by BSM-SG theory, relies on combination of EM field and superluminal waves, known as X-waves or Evanescent mode, emitted by means with properly selected parameters.

The invention, the theoretical bases and the experiments demonstrating its validity are described further below with the reference to the accompanied drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 illustrate the helical trace and the magnetic field of an electron bound to a moving single ionized atom, forming an ion-electron pair

Fig. 2 shows a simple thrust actuator for demonstration of the SARG effect.

Fig. 3 shows electrical means for activating the simple plasma thrust actuator demonstrated SARG effect

Fig. 4 shows the waveform measured by antenna at 1.5 m distance from the plasma actuator

Fig. 5 shows a dual-section plasma thrust actuator activated by AC High Voltage circuitry with increased power efficiency

Fig. 6 shows a basic electrode configuration for creation of protective field shield

Fig. 7 shows the timing diagram of emitted signals for creation of a protective field shield

Fig. 8 shows the main functional blocks of a disc-shape spacecraft for a close range interplanetary flight
Fig. 9.a, b shows an overall shape of a spaceship for a long range travel with allocated positions of propulsion devices based on the SARG effect
Fig. 10. shows one preferable embodiment of a high voltage AC+DC circuits for the disc-shaped spacecraft

DETAILED DESCRIPTION

The propulsion method is based on a gravito-inertial phenomenon predicted by the Basic Structures of Matter – Supergavitation Unified Theory (BSM-SG) [1,2,3,4,5], developed and published as a monograph by the author of this invention. According to this phenomenon, the gravito-inertial mass of an object could be changed unidirectionally by proper modulation the parameters of the physical vacuum. The experimental demonstration of this phenomenon is called a Stimulated Anomalous Reaction to Gravity (SARG) effect [11]. The application of the SARG effect in a spacecraft suggests the use of a neutral plasma, partially or fully surrounding the spacecraft and activated by electromagnetic and electrical fields. The result is a unique force field distinguished from the reactive propulsion by a lack of throwing mass, a reduced or eliminated reaction for the acceleration and reduced turbulence in atmosphere.

The suggested propulsion method has not been envisioned by the Modern Physics, since the concept of the physical vacuum adopted at the beginning of 20 century does not correspond to reality. After Albert Einstein developed his famous theory in General Relativity, he realized that the Ether is nessesary. In his monograph ***Sidelights on Relativity*** (1921) [1] Einstein says: "*Recapitulating, we may say that according to the general theory of relativity space is endowed with physical qualities; in this sense, therefore, there exists an ether. According to the general theory of relativity space without ether is unthinkable; for in such space there not only would be no propagation of light, but also no possibility of existance for standards of space and tiem. (measured-rods and clocks), nor therefore any space intervals in the physical sense*".

The only argument of Einstein against the material Ether in 1921 is that the physicists failed to build a working model based on Maxwell assumption. Now it is known that the Michelson-Morley experiment is inconclusive due to a methodological error, namely: The Effect of Doppler shift is compensated by the effect of relativistic clock rate change. Both effects affect the wavelength so the expected interferometric fringe shift is nullified. (The effect of clock rate change has been unknown at the time when Michelson-Morley experiment was done). Michelson himself highly doughted the result and suggested experiments with counter propagated light packets (Fig. 4 of Michelson-Morley paper [2], having a right intuition that the result will be quite different. Such experiment was not funded during his life. Original experiments based on interrupted counter propagated light packets were firstly realized by Prof. Stefan Marinov. In the period 1972-1982 he made 3 different laboratory experiments [3,4,5]. He not only successfully detected our absolute motion in the Ether medium, but derived the magnitude and the direction of the velocity vector:

magnitude: 360 +/- 40 km/s

direction: $l = 313^0 \quad \gamma = 39^0$ - in galactic coordinates

Number of other modern ether-drift experiments confirm our absolute motion through some existing space medium – Ether.

The BSM-SG theory [6,7,8,9,10] suggest that at the bottom level of all matter are two indestructible fundamental particles (FP) of different intrinsic matter with parameters associated to the Planck's scale of the frequency and distance. In a pure empty space these two particles interact by Supergravitational (SG) forces, which are distinguished by the Newtonian gravitation that they are proportional to the cube of the distance.

$$F_{SG} = G_O \frac{m_{01} m_{02}}{r^3} \qquad (1)$$

where: m_{01} and m_{02} – SG masses; r –distance; G_0 – SG constant that is different for FPs of a same and a different intrinsic matter

Under SG law and pure geometrical restrictions the two fundamental particles congregate in geometrical formations following a unique crystallization process (see BSM-SG theory Chapters 2 and 12). This process leads to crystallization of two prism-like sub-elementary particles with internal twisted structure, so they are called twisted prisms. They build both, the underlying structure of the space (physical vacuum) and the material structure of the elementary particles.

The underlying structure of the space is called a Cosmic Lattice (CL) and it provides the known physical and quantum mechanical properties of the physical vacuum. The individual CL node is formed by 4 twisted prisms of the same type hold together by (SG) forces. If considering an isolated CL node the 4 prisms are at mutual angles of ~ 109.5^0 corresponding to the axes in a tetrahedron. The CL space is formed from the two alternative types CL nodes arranged like the atoms in a diamond. The SG forces between the opposite CL nodes also may change the sign from their mutual distance, since they depend on the common super-high proper frequency. This gives the possibility for spatial gaps between the CL nodes and consequently a vibrational freedom. The same sub-elementary particles (twisted prisms) are embedded also into the material structures of the elementary particles. In the CL space environment (physical vacuum) the SG forces are strongf at atomic scale distance, so they hold the protons and neutrons in the atomic nuclei. They correspond to the well known strong nuclear forces. One type of Wan Der Wall forces between the closely spaced atoms and molecules are also a signature of the SG forces. Another signature is the observed Casimir force between two closely spaced polished surfaces. SG forces are observed also in the nanotechnology. The Suggested physical model works quite well in all fields of Physics: Particle physics, Quantum Mechanics, Newtonian gravity and inertia, Special and General Relativity, atoms, molecules, and Cosmology. The existence of the physical substance of the space, denoted in BSM-SG theory as a CL space, is confirmed by the modern light velocity experiments performed in a laboratory and detecting our absolute motion through the space with a velocity vector of magnitude about 360 km/s [3,4,5].

The flexible CL node has two axes of symmetry: one set of four axes denoted as *abcd* aligned with the axial axes of the twisted prisms and thee orthogonal axes denoted as *xyz* axes. Both sets of axes define a unilateral tetrahedron. Each CL node from one type subelementary particles has four neighboring CL nodes from the other type subelementary particles. The two sets of axes of the neighboring CL nodes are aligned, while their oscillations only slightly affect their mutual distances and alignment. Investigating the dynamics of the CL node under SG law and more specifically the return forces along the two sets of axes, provided a new understanding of the relation between the electric, magnetic and EM fields from one side and the Newtonian gravity from the other. The oscillations along xyz axes involve SG forces which are thousands times

weaker than oscillations along the *abcd* axes. The EM field and light propagation involves mainly oscillations in a narrow angle along *xyz* axes, while the Newtonian gravity appears as SG gravity propagated along the *abcd* axes.

The BSM-SG unveils the material structure of the stable elementary particles, such as proton, neutron, electron and positron built by the same subelelemntary particles (twisted prisms) but arranged in helical structures with hierarchical order. The internal space volume of the helical structures contain internal space occupied by a lattice build by the same subelementary particles (twisted prisms but much denser than the CL structure, so the latter exercises a pressure on that volume. Using the unveiled structure of the electron and its quantum interaction with the CL space (Physics Essays, 16, No2, 180-195, (2003)), the suggested model permitted to express important physical constants by the CL space parameters (BSM-SG, Chapter 3):

- **Static CL pressure,** P_S - (a pressure exercised on impenetrative volume of the elementary particle structure, defining the Newtonian mass of the elementary pareticle).
- $P_S = m_e c^2 / V_e = 1.3736 \times 10^{26} (N/m^2)$ (2)

where: P_S - is the static CL pressure, m_e – mass of electron, c – speed of light, V_e – inpenetralble volume of the electron structure

- **Dynamic CL pressure,** P_D ~ (related to the Zero Point Energy of Dynamic type and responsible for the electrical and magnetic fields and the quantum behavior of the elementary particles):

$$P_D = h\nu_c / (cS_e) = 2025.8(N/(m^2 Hz)) \quad (3)$$

where: h – Planck constant, ν_C - Compton frequency, Se – impenetrable surface of the electron structure

- **Partial CL pressure,** P_P – related to the confined motion of the electron with one of its quantum velocities υ, in which the signature of the fundamental Fine Structure Constant α plays a role. This influences the motion of the atoms, molecules and solids.

$$P_P = P_S \alpha \upsilon / c \quad (4)$$

For $\upsilon = \alpha c$ one obtains: $P_P / P_S = \alpha^2 (1-\alpha)^{-\frac{1}{2}}$

The Dynamic CL pressure is related to the Zero Point Energy envisioned by Quantum Mechanics. The Static CL pressure is related to a hidden Zero Point Energy, envisioned by the BSM- SG theory. For this pressure the Einstein Equation $E = mc^2$ is valid. Using the Static CL pressure the mass equation (5) of a stable elementary particles is derived (BSM-SG, Chapter 3).

$$m = \frac{4h\nu_C^4 (1-\alpha^2)}{\pi \alpha^2 c^5} V_{ep} \quad (5)$$

where: V_{ep} – is the impenetrable volume of the elementary particle, h – is the Planck constant

The Complex CL node dynamics is characterized by two identifiable cycles – one with a proper resonance frequency $\nu_R = 1.093 \times 10^{29}$ Hz (defining light velocity as one cycle per one CL node distance) and the Compton's time with a frequency $\nu_C = 1.236 \times 10^{20}$ Hz, defining the permittivity and permeability of the physical vacuum (BSM-SG, Chapter 2). The Compton cycle involves a lot of number of whole resonance cycles.

Since the neighboring nodes are interconnected by SG forces, the following unveiled features of the CL node are quite important for understanding the properties of the physical vacuum:

- SG forces are based on frequency higher than the proper resonance frequency of the CL node, while their propagation hrough CL structure as a Newtonian gravity depends on the mutual phases of the oscillating CL nodes.
- The mutual interaction between the oscillating CL nodes causes a **selfsynchronization** at the Compton's frequency of the CL node.
- The effect of selfsynchronization appears as permanently existed and recombining **zeropoint waves.** They are responsible for the constant value of ε_0 and μ_0 defining the constant light velocity according to the expression

$$c = (\varepsilon_0 \mu_0)^{1/2} \qquad (6)$$

In Chapter 10 of BSM-SG, it was shown that the inertia of a solid object is related to the integral inertial momentum of displaced and folded CL nodes, which is expressed by the **force moment vector**, $\mathbf{E_{IFM}}$. This vector, defining the inertial properties, is able to describe any kind of motion: uniform, rotational or accelerated. For a single particle with mass m it is:

$$E_{IFM} = c\alpha m\upsilon \qquad (7)$$

where: c – speed of light, α - fine structure constant, m – particle mass, υ - velocity.

Eq. (6) shows that the E_{IFM} vector will get a directional velocity if c is affected asymmetrically by selfsynchronization disturbance.

The validity of the mass Equation (5) and the inertial property Equation (7) propagates to atoms, molecules and also to a solid object. The latter is regarded as integral entity of stable elementary particles.

Conclusion: Asymmetrical disturbance of the sefsynchronization around an elementary particle, a neutral atom, a molecule or a solid object will cause a change of its gravito-inertial mass according to Eq. (5) and a unidirectional non-inertial displacement according to Eq. (7). From both Equations it is evident that the common parameter c – speed of light should be affected if achieving an interaction with the Compton frequency $\nu_C = 1.236 \times 10^{20}$ Hz, which is one of the basic parameters of the physical vacuum.

Now the question is how this super-high frequency could be reached. The answer comes from the unveiled structure and oscillating properties of the electron. It is shown in BSM-SG, Chapter 3 (also in Physics Essays, 16, No. 2, 180-195, (2003)) that the electron possesses a material structure of a cut toroid as a single turn coil with a radius – the known Compton radius and a small helical step responsible for its anomalous magnetic moment. Then the electron's material structure appears as a three body oscillating system exhibiting a screw-like motion with oscillation property characterized by two proper frequencies. The First proper frequency of the electron is the known Compton's frequency, while according to BSM-SG theory the CL node possesses the same Compton's frequency. The second electron proper frequency is 3 times the Compton's frequency and plays a role for the electron's spin. In such aspect the moving and oscillating electron has a preferable screw-like motion velocities defined by its Quantum Mechanical interaction with the physical vacuum. This QM interaction is the strongest at electron velocity $\alpha c = 2.188 \times 10^6$ m/s corresponding to energy of 13.6 eV. At this velocity the oscillating phase of the moving electron matches the CL node phase propagated with the speed of light. Other Quantum velocities are $(\alpha c/2)$ - corresponding to energy 3.41 eV, $(\alpha c/4)$ corresponding to energy of 1.51 eV and so on. The oscillating model of the electron explains quite well all known

properties of the electron including its anomalous magnetic moment, spin, gyromagnetic factor and the way it creates quantum orbits in atoms and molecules.

For accessing the Compton frequency a technical approach called a **Heterodyne method** is suggested. According to this method the Super-high Compton frequency of the CL node $\nu_C = 1.236 \times 10^{20}$ Hz, which is a basic element of the underlying structure of the Physical vacuum, can be reached by the oscillating electrons, each one bound to a single ionized atom.

The physical mechanism of Heterodyne method is illustrated by Fig. 1, where 1 – is the trajectory of the single ionized atom, 2 – is the helical trajectory of the bound electron, 3 is the magnetic filed line of the electron moving in a helical trajectory, 4a and 4b are electrodes on which AC high voltage is applied. Considering a moving ion with a trajectory 1, the bound electron will make a helical trace 2. If the positive ion motion is reversible, the bound electron will also make a reversible helical motion. Since the helical step of the electron's structure mentioned above is much smaller than the electron's Compton radius the confined motion velocity of the electron moving on the helix 2 will be much greater than the ion velocity. This allows the electron to move in a helical trajectory with one of his quantum velocities corresponding to energies of 13. 6 eV or 3.41 eV, while the velocity of the ion can be much smaller. It is well known that the magnetic moment of the electron is 658 times greater than the magnetic moment of the proton and 981 time greater than the magnetic moment of the neutron. Then the magnetic field of the bound system of single ion-electron will be predominated by the magnetic field created only by the electron. The magnetic field from the electron moving in a helix is additionally many times stronger than if moving with the same velocity in a straight line. Additionally the magnetic fields of the neighboring ion-electron pairs interact constructively. As a result, a large number of ion-electron pairs move in a cluster.

The described mechanism is achievable for actuator containing two electrodes separated by a proper gap and operated in a gaseous atmosphere with conditions for ionization. Then one may create an alternative electrical field by applying an AC high voltage in the accessible RF range so that the ion moves reversibly, while the bound electron moves in a helix with one of its most probable quantum velocity corresponding to energies of 13. 6 eV or 3.41 eV. The reversible motion of the electron under the apply AC field causing a flipping of the electron spin. From a point of view of the unveiled electron structure [8] the spin flipping is a change of the phase of the oscillating electron at Compton's frequency with 180 deg in respect to the Compton's frequencies of the CL nodes. At this particular moment a strong energy interactions takes place between the electron and the physical vacuum.

The practical realization of such process is a creation of neutral plasma around a properly design actuator. The physical process is characterized by the following consecutive phases:

- ionization of neutral atoms or molecules
- ions get acceleration
- build up of ion-electron pairs, each one formed by a single-charge ionized atom and a free electron
- the ion-electron pairs are initially accelerated by the applied electrical field acting initially on the positive ions and after that guided by the common magnetic field created by the bound electrons
- the acceleration and motion of the electron-ion pairs is reversible in every half cycle of the applied AC electrical field

The following considerations are dictated from the time duration and efficiency of such type of plasma:

- The reversible motion of the ion-electron pairs can be disturbed by collision, so the process needs reactivation
- The process is more effective for ions that contain lower number of protons and neutrons since the ratio of the electron to proton (neutron) magnetic moment ratio is greater.
- The frequency of the applied AC field must assure that the ions are trapped between the electrodes.
- An external magnetic filed properly oriented in respect to the magnetic field of bound electrons might increase the efficiency.

The Heterodyne method is achievable in EM activated neutral plasma excited by AC high voltage or other means. A signature of positive ion-electron pairs is found in the analysis of a large number of experiments involving an EM activated neutral plasma. It is apparent in experiments using different gases and at different pressure range – from a vacuum to a normal atmospheric pressure and even overpressure. In many published experiments the researchers point out that the average electron velocity is in the range 3-10 eV, which is much lower than the expected one and they did not have an adequate explanation for this. In fact this is in a good agreement with the predictions of the Heterodyne model, since the estimated average electron velocity in fact is an average value of the electron velocities involved in the ion-electron pairs (energies of 13.6 eV and 3.41 eV) and some free electrons. The formation of ion-electron pairs must be done frequently due to unwanted collisions of ion-electron pairs with neutral molecules and other ions. In such aspect it is convenient to apply an AC HV filed which can be in the kHz frequency range.

Practically, the Heterodyne method can operate in wide range of pressure from a few tors to atmospheric and even above atmospheric pressure. The formation of ion-electron pair clusters helps to increase the effective free path. Nevertheless the effect strength is reduced in the normal atmospheric pressure due to losses from collisions and presence of negative oxygen ions. The efficiency is strongly dependent on the average free path between collisions. The collisions contribute to the significant fraction of the broad band high frequency spectrum, which is unwanted EMI noise. Only single ionized positive ion can participate in the working ion-electron pairs. Some negative ions significantly disturb the process. The selection of working gas is also important, as this is evident from the mentioned above considerations. Massines et al. [12] investigated an atmospheric glow discharge with different gases. Their experimental results completely agree with the mentioned above considerations for selection of the working gas and plasma reactivation. Some lab experiments also indicate that the efficiency could be increased if using a selected working gas with a lower ionization potential with a buffer gas having a higher ionization potential.

One additional important feature for increasing the efficiency of the SARG effect was predicted by the inventor when analyzing the dynamical and static behavior of the CL node as an element of the physical vacuum structure according to BSM-SG (Chapter 2). The applied AC field causes much larger CL node oscillation along the xyz axes than the oscillations responsible for a normal Zero-point energy. When a CL node is in a DC electrical field created by a large number of charge particles, its averaged central position is slightly displaced. If a DC and AC fields are simultaneously applied, they cause a CL node displacement plus dynamic oscillations. Since the displacement has a limit the combination of AC + DC field causes a nonlinear effect, which does not exists in a normal CL node oscillation. The nonlinear effect leads to increased efficiency of SARG effect, which means the synchronization disturbance that leads to creation of mentioned

above force filed is more effective. The inventor experimentally verified this feature, not envisioned so far in the prior art research.

Fig. 2 shows a simple plasma thrust actuator for demonstration of the SARG effect, comprised of a conductive body 5 covered with an isolation layer 6, a teflon cap 7, a first electrode 8, a second electrode 9, and floating electrodes 10. The activated plasma is observed as an envelope 11 that may not have a uniform thickness. The thrust force is in direction 12. At normal air pressure the actuator is supplied by a high voltage AC field in order of 25 kV and adjustable frequency in the range 2 – 5 kHz, combined with a DC field. In order to eliminate the possible effect of ion wind the actuator was enclosed in a transparent plastic cylinder and hanged up on two thin wires, which connect the electrodes 8 and 9 to the HV AC+DC power supply. In order to exclude a possible effect from asymmetrical radiation pressure due to emitted FM radiation, the cylinder was additionally enclosed in a metal shield, not shown in the figure. The thrust force was always in the direction 12. It is defined by the asymmetry of the plasma envelope 11. Since the AC frequency depends on number of design parameters including the type of the gas and its pressure, it must be adjusted until hearing a specific noise like a wind blow.

Fig. 3 shows the block diagram of the electrical circuit used for test of the plasma thrust actuator illustrated in Fig. 2. It is comprised of AC high voltage generator 14, a capacitor 15, a resistor 16, and a high voltage rectifier 17 containing a number of diodes shunted with high ohm resistors and connected in series. By setting a proper value of the resistor 15 this circuit assures that the necessary DC high voltage is always proportional to the magnitude of the AC high voltage.

Fig. 4 shows the signal measured by antenna at 1.5 m distance from the plasma thrust actuator, where 18 is the AC HV frequency signal and 19 is the packet signal containing a RF frequency in a range from a few MHz to about 200 MHz. The RF signal is a result of collisions between ion-electron clusters with the free ions, atoms and molecules. For uniform plasma discharge the RF packet has duration much smaller than the half of the sinusoid. The experiment is also accompanied with a clear audible signal of a pure sinusoidal component corresponding to the AC frequency and a noise like from a wind blowing through an obstacle. The blowing wind-like sound is from the collisions between the reversible moving ion-electron clusters and the air molecules.

The observed SARG effect in this laboratory experiment is weak due to the following reasons, predicted theoretically and confirmed experimentally:

- The atmospheric air is not the optimal gas mixture for the Heterodyne method. Lower atomic mass gas as Helium is much more effective, but it has a lower dielectric strength. The solution is to use lower atomic mass gas with a buffer gas having a higher dielectric strength
- The SARG effect has a nonlinear dependence on the applied electrical field and has a bottom threshold limit. The applied field for the experimented test bed is about 20 – 25 kV. Higher voltages require special laboratory environments.
- From the analysis of the CL node dynamics (BSM-SG, Chapter 2) in case of applied electrical field it becomes apparent that the force field should be proportional to the HV in the order of U^2 to U^3. Different researchers of plasma actuators with AC activation also report a similar range.
- From energetic point of view, the plasma activation by a sinusoidal AC high voltage is highly inefficient, because the actuator behaves as a capacitor load with a negligible DC current discharge. As a result, a large reactive power returns to the power supply and dissipates as heat.

The theoretical predictions of the Heterodyne method, verified by experiments, indicates that instead of a full AC sinusoid only the initial activation slop of the AC high voltage with a finite time duration is necessary for creation of oscillating ion-electron pairs. The finite time duration

depends on the working pressure. While the AC field provides this condition every half cycle, it is obvious that the unwanted reactive power could be more effectively rejected if a feedback cut-off is implemented at exact phase point of the activating AC voltage. One possible way to provide such cut-off is an AC HV source based on a Tesla coil, which incorporates a spark gap in the primary coil. The spark gap plays a role of a plasma switch that may cut-off the unwanted parasite feedback at required phase point of the AC cycle. Another option is using of a Marx-bank circuitry. Other AC HV circuits based on tyratrons or tyristors also could be used with some compromise on the power efficiency.

Fig. 5 illustrates another option of plasma actuator comprised of a conductive body 20, isolator caps 21 and 22, end side electrodes 23a and 23b, and a medium electrode 24 connected to the conductive body 20, which may optionally have an isolating cover like the actuator in Fig. 2. The actuator has two opposite plasma sections between the two opposite electrodes 23a and 23b and the medium electrode 24. In this case the middle of a HV transformer 25 is connected to the electrode 24. The diodes 26 and 27 assure alternative operation of the opposite plasma sections, while the reactive energy from each one section will be transferred to the other one by the circuits 28 and 29 consisting of an inductance, capacitor and diode connected in series. This transfer must occur at proper point of the sinusoid of the activating AC voltage, so it puts more severe constraints to the activating AC frequency, which depends on the working gas and the atmospheric pressure. The means assuring simultaneous DC high voltages to both sections are not shown in Fig. 5, but they can be obtained in a similar way as shown in Fig 3. This type of plasma actuator must assure higher power efficiency in comparison with the actuator shown in Fig. 2 supplied by the circuit shown in Fig. 3.

The creation of a protective field shield around a spacecraft is envisioned from the analysis of the dynamical behavior of the CL nodes in applied electrical magnetic and EM fields, according to the BSM-SG theory. The CL space model of the physical vacuum predicts also an existence of compress-like waves, different than the known EM waves. A number of theoreticians derive such waves by using the original Maxwell equation based on quaternions [13,14]. Such waves are confirmed also experimentally and they are known in the prior art as scalar or longitudinal waves [15]. They are able to carry much greater energy than the ordinary EM waves. The pioneer of generating longitudinal waves is Nikola Tesla, who provided means for their generation in tens of patents and lectures in the period from 1893-1913 [16]. The longitudinal waves obtains clear physical explanation from a point of view of BSM-SG theory: The EM waves involve oscillations along *xyz* axes of the CL nodes, while the longitudinal waves involve oscillations along *abcd* axes. The stiffness along *abcd* axes is thousands times stronger than the stiffness along the *xyz* axes, so the longitudinal waves may carry much larger momentum than the EM waves. One additional feature of the longitudinal waves, also envisioned by BSM-SG theory, is that they may propagate much faster than the speed of light if the CL nodes in their path are synchronized. From the analysis in BSM-SG theory (Chapter 2, section 2.10.4) it becomes evident that within the photon wavetrain the CL nodes are synchronized. This means that within the wavetrain one can propagate information and energy much faster than the velocity of light. This is confirmed by some experiments called "quantum teleportation" which demonstrate transfer of information much faster that the speed of light. The analysis of the methods for producing of femtosecond laser pulses from a point of view of the BSM-SG also unveils a superluminal effect of squeezing the extending beam path with a finite length into a strong femtosecond pulse. In the case of EM wave propagation the CL node dynamics is similar like in the photon wavetrain with the difference that there is not a transverse boundary limit as in the wavetrain of the photon.

The experiments of N. A. Kozirev, provided in the period 1977-1982 [17,18] and later repeated by other Russian scientists [19] are known in Russian literature as Kozirev's effect. In fact Kozirev experiments exhibit two major phenomena. One is a reduction of the gravitational mass of solid object by a small fraction after some mechanical (vibrational) or electrical treatment. He also found that the weight restoration takes a finite time in order of minutes. The other phenomenon found by Kozirev is a determination of an instant positions of some distant stars by detection of non EM wave from them traveling billion times the speed of light. This superluminal velocity is detected also by Gregory Hodowanec during a moon eclipse [20]. Kozirev found also that superluminal non-EM waves exhibit a gravitational effect – they affect the position of a supersensitive weight balance used as a detector [17]. Finally numbers of experiments published recent years in peer-reviewed journals demonstrate a superluminal propagation of waves known as X-waves in a closed ranged field of a few wavelengths. D. Mugnai, A. Ranfagni and R. Ruggery [21] demonstrated superluminal propagation of microwave packets at 8.6 Ghz (wavelength of 3.48 cm) up to a distance about 1 m with average superluminal velocity greater than the light velocity by 5.3%. The authors express the idea that there is not a theoretical limit for superluminal propagation at longer wavelengths

Based on of the prior art experiments and observation of some phenomena analyzed from the point of view of BSM-SG, I came to the following conclusion:

It is possible to create an artificial boundary on the propagated EM wave with unique properties of protective field shield. I suggest the following technique:

- Emission of EM wave packets of stable frequency in the RF or microwave spectral range
- Emission of a delayed strong short EM pulse with a large dU/dt and the same aperiodic frequency but with higher order odd harmonics with the same phase
- The EM wave packet and the strong EM pulse must be emitted from one and a same location and from a common or a separate circular dipole antennas with length equal to one or multiple wavelengths.

Fig. 6 illustrates the timing diagrams requirements, where 30 is the EM wave packet with a duration t_{EM} and 31 is the strong EM pulse emitted at time t_d after the front end of the wave packet 33. The shown waveforms must be repeated with a period larger than t_{EM}. When emitted by a proper selected means and during the EM wavepacket, the strong EM pulse will propagate at the close range field with a velocity exceeding the light velocity, an effect called superluminal propagation.

According to the above-mentioned conclusions about the superluminal propagation of a strong EM pulse along the path of the EM wave packet, it is obvious that the delayed strong pulse will propagate by the same path of the EM wave, but overriding it until reaching the front end of that packet. If the propagation time of the EM wave packet to this point is t, the time propagation of the superluminal pulse is $(t - t_d)$. From this moment the conditions for the superluminal propagation of the strong pulse becomes suddenly different and a kind of reflection effect will occur. This will affect also the further propagation of the EM wave packet and its energy will be deposited at this moment in a thin layer, forming something like a compressed zero point energy of the physical vacuum. If assuming for simplicity that the EM wave packet and the strong pulse are emitted by a spherical emitter, the aforementioned layer will correspond to a spherical surface with a radius R according to Eq. (8)

$$R = \frac{V_X t_d c}{V_X - c} \qquad (8)$$

where: V_X is the superluminal velocity of the strong EM pulse in a field distance of a few wavelengths of the EM wave packet frequency, c – is the light velocity

For the described case of emission of a strong EM pulse during the emission of an EM wave package, the value of V_X must be determined experimentally, since it may appear much larger than the experimental setup reported by D. Mugnai et al [21].

The deposition of the whole energy of the EM wave packet on the spherical surface with a radius R and small thickness means that the selfsynchronization of this spherical surface will be disturbed or rearranged. It was theoretically predicted by BSM-SG theory and confirmed by some observed phenomena that the disturbed or rearranged selfsynchronization needs a finite time for self-restoration. If the time between the emitted EM wave packets is shorter than the self-restoration time, many wavepackets will dissipate their energies until some energy balance occur. The disturbed selfsynchronization of the CL nodes in this spherical surface will affect the gravito-inertial mass of the dust particles, while the dissipated energy will create some kind of protective field shield against micrometerorites. According to the BSM-SG theory (Chapter 3, section 3.12.2.A) the disturbed selfsynchronization will affect the conditions for the quantum orbits and consequently it will cause a weakening of the atomic and the molecular bonds in the solids. Therefore the micrometeorites moving with large velocities might be disintegrated into smaller fractions.

When the field shield is created at conditions of normal Earth atmospheric pressure, part of the emitted EM energy will dissipate within the volume of the sphere due to partial ionization of the gas molecules. However, the protective field shield will be more efficient in highly rarefied atmosphere. The analysis predicts the possibility for creation a field shield over a spacecraft moving in a deep space, since the released by the spacecraft gas mixture for the necessary plasma may provide also the necessary conditions for a field shield up to some radius. Nevertheless, the described effect might be used not only for a spacecraft protection. One may speculate that if applied in a larger scale in a planet without or with a rarefied atmosphere, the protective field could be able to create a spherical dome inside of which an artificial atmosphere could be created. The field shield in this case will serve as a stop boundary of the artificial atmosphere in order to not escape into the deep space. In such case an artificial colony could be created for example on the Moon or on Mars.

Fig 7 shows an example of the electrodes configuration for means assuring a protective field shield, where 32 is a circular dipole antenna for emission of the EM wave packets, 33 is a sectored ring antenna for emission of the strong EM pulse, and 34a and 34b are spherical electrodes with a common connection serving as a as virtual ground for the sectored ring antenna 33. Since the emitters does not have a spherical emission diagram, the protective field shield will be still spherical but with strength stronger at radial directions where the dipole emission is stronger. This is illustrated by the density of the dashed line showing the protective field shield 36, while 35 shows the emission diagram of the dipole antenna 32. The dipole antenna 32 and the ring antenna 33 are with the same diameter, and their circumferences are equal to the wave packet wavelength. The virtual grounds for both antennas are completely isolated. This measure not only protects them from mutual interference but also allows operation with larger energy according to the Nonlinear Oscilator-Circuit Theory published by T. W. Barrett [22]. The ring antenna 33 is cut al least in one place, so it contains one or more gaps. This measure prevents it to behave as a short turn when the wavepacket is emitted by the dipole antenna 32. However, when emitting a strong EM pulse, the antenna 33 behaves as a single ring, since the gaps are of such length that to be crossed by sparks appearing during the strong pulse. The ring antenna 33 can be used also for

activation of the neutral plasma between it and the electrodes 34a and 34b for creation of SARG effect. Such twofold function of the antenna 33 allows better relation between the necessary propulsion force field and the protective field shield. For this purpose, however, a more complex electrode configuration is required, as it will be shown below.

Fig. 8 shows the shape of a spacecraft for interplanetary flight with the external functional elements of its propulsion system, where 37 is a spacecraft body with a thick isolation layer for withstanding high voltage potentials, 32 is a dipole antenna, 33 is a ring antenna, 38 is an upper spherical electrode, 39 is a set of three bottom spherical electrodes at 120 deg, 40 is a set of isolated electrodes, and 41 are set of portholes for preactivated plasma. The purpose and functions of the dipole antenna 32 and the ring antenna 33 are previously described by the help of Fig. 6 and Fig. 7. The oval shape electrodes 38, 39 and the ring antenna 33 are for EM activation of neutral plasma 42 around the spacecraft. The set of electrodes 40 is comprised of one or more narrow flat annular electrodes, completely isolated and not electrically connected to any activating circuit. Their functionality is similar to the electrodes 10 in Fig. 2 - to guide the plasma near the spacecraft body. The activation circuit for the bottom electrodes 39 is a three-phase AC high voltage system. based on Tesla coils the secondary of which are of Y type of configuration. The three phases are connected in series with attenuator-phase shifters to the three bottom electrodes 39, while the common point of the Y type is connected to the ring antenna 33. Separate rectifiers for each phase assure the necessary DC high voltage for the electrodes 39. The top electrode 38 obtains AC+DC high voltage from a separate single-phase Tesla coil [16], also in series with an attenuator. The common point of the Y type 3-phase Tesla coil and the second Tesla coil are connected together forming a "virtual ground" to which the ring antenna 33 is connected. A preferred embodiment of the Y-type and single phase Tesla coils with attenuator-phase shifters is shown in Fig. 10. The dipole antenna 32 for emission of EM wave packets is supplied by a separate circuit, which does not have any common point with the circuits connected to the electrodes 33, 38 and 39. Instead of Tesla coils with air gaps other type of circuits capable of generating high voltage pulses with short duration could be used. The portholes 41 serve to release a proper gas mixture as preactivated neutral plasma. The portholes are outputs of plasma guide tubes connected to an internal plasma-activating unit or plasma dispensers. The means for creation of neutral plasma are known from the prior art. The preactivated plasma removes the requirement for plasma ionization by the electrodes 33, 38 and 39, so they can operate at lower AC+DC high voltages. When the set of electrodes 38, 39 and 33 are supplied by AC+DC high voltages with proper magnitude and phase an asymmetric plasma envelope 42 appears around the spacecraft. According to SARG effect, this will permit creation of a force field in any desired direction. Additionally the gravito-inertial mass of the spacecraft can be reduced even in a motionless position if the activated plasma envelope is symmetrical. In this case the debit of the preactivated plasma must be increased. From this condition the spacecraft could be accelerated sharply from a stationary point or can make a sharp turn during a straight motion by changing the symmetrical to asymmetrical plasma envelope. This option allows to accelerate the spacecraft with less energy because at the beginning of acceleration its mass is reduced. The gas mixture must contain a working gas of low atomic number and a buffer gas with larger dielectric strength.

The AC high voltage between the electrodes 33, 38, 39 may not be continuous but in packet. The gravito-inertial effect shows sustainability for a finite time after the cause is removed. The effect has been observed by Kozirev [17]. He weighted solid objects, then vibrated them and weighted again. The vibrated solid objects lost a small fraction of their weight and their normal weight was restored exponentially for minutes. The restoration time he found does not depend on

the weight of the object but on its density. This is in good agreement with the BSM-SG explanation, that the disturbed selfsynchronization needs a finite time for its restoration and that the dens material affect stronger the CL space inside of the body – a micro effect of General Relativity. The finite time restoration of the CL nodes selfsychronozation is convenient to combine the pulse type activation of the surrounding plasma with the creation of the field shield, which also require repetition of the EM wave packets and the strong superluminal pulse. The other effect found by Kozirev – the dependence of the weight restoration time from the object density allows selecting the proper material for shielding the crew from the effect of the spacecraft acceleration. When moving in a planetary gravitational field the crew will feel almost a normal gravitational field, but when the spacecraft is far from any planet only the local star gravitational field will be felt.

During landing or take-off from a planetary ground the electrodes 39 must be at some distance from the ground in order to avoid short circuit or parasite discharge, so retractable legs are needed. The protective field shield must not operate during the landing or take-off, so the dipole antenna 32 must not be supplied in these cases. During maintenance, repair or staying on the ground the electrodes 32,36,38 and 39 must be grounded for human safety.

The portholes are connected with plasma guides inside of the spacecraft and they carry the preactivated plasma. They are known from the prior art. Particularly the configuration of S. Okazaki and M. Kogoma [18] is suitable.

A spaceship for a long range travel with a propulsion system based on a SARG effect must have different configuration because it will travel a long time in a space with a greatly reduced gravitational field. The side and the oblique view of the preferable embodiment of such spaceship is shown respectively by Fig. 9.a and Fig. 9.b, where 43 is the overall shape of the spacecraft, 44 and 45 are respectively front and back end thrust actuators, and 46 is a three set rows of side thrust actuators at angle 120 deg between the rows. The preferable motion of this spaceship is along the axes 47, in which case the thrust force is assured by the actuators 44 and 45, creating respectively plasma 48 and 49. If the plasma 48 is stronger than the plasma 49 the motion is from left to right. When moving in a strong gravitational field, the sets of side actuators 46 must also be activated. The two sets of actuators 46 at angle of 120 deg are capable of keeping a proper orientation in a gravitational field. In a long range travel the gravity from the star system is negligible for the crew, so it is necessary to create it artificially. This can be done by rotation of the spaceship around the axes 47. The necessary rate of rotational can be achieved by a proper phase activation of the 3 sets of side actuators 46, as they are shown in Fig. 9.b. They create side plasma 50. This type of spaceship is not suitable for landing and for this purpose it may carry disc-shape spacecrafts as one illustrated by Fig. 8. It may not have maneurability of the disk-shape spacecraft and must contain a thick shield for protection from harmful cosmic radiation by classical means.

Fig. 10 shows a proffered embodiment of the circuit that supply the AC+DC high voltage for the three electrodes 39 of the spacecraft shown in Fig. 8 and each triads of the side actuators 46 of the spaceship shown in Fig.9 a, b. The circuited is comprised of a low voltage AC power supply 51, a pulse transformer 51, a chock 61 a spark gap 53, a group of three primary coils 54 in series with capacitors 55, the said group connected in a series with the spark gap 53, a second group of three secondary coil 56 in series with a capacitors 57, said secondary group connected from one side to the electrodes 39 and from the other through three groups of parallel capacitors 58 and 59 to a common point 60, said the elements 57, 56,58 and 59 form Y type three-phase system. Each electrode 39 is connected by a parallel group of resistor 16 and rectifier 17 to the common point of the Y type system 60. The group of elements 16 and 17 serve to supply the electrodes 39 with a

DC high voltage witch is proportional to the AC high voltage. The number of winding of 56 is much larger than the number of windings of 54, according to the Tesla coil considerations in order to obtain the necessary AC high voltage. The elements 59 are high voltage variable capacitors, which serve to adjust the phase difference between the AC high voltages provided to the electrodes 39. They are shunted with capacitors 50 to assure a safety limit in the regulation of the phase, which is accompanied also with a change of the magnitude, causing some asymmetry of the central point 60 in respect to the electrodes 39.

The single-phase Tesla coil for supply the AC+DC high voltage to the top electrode 38 is comprised of a spark gap 62, a primary coil 63 a secondary coil 64, connected from the bottom side through capacitors 65 and 66 to the middle point 60 of the Y-type three-phase Tesla coil, end connected to the electrode 38 vias capacitor 67. The rectifier 17 through the resistor 16 assure the necessary DC high voltage potential for the electrode 38.

Let not consider at first the effect of the bottom electrodes 39 on the spacecraft showsn in Fig. 8. If the regulators 58 of the three phase shifters-attenuators are at equal calibrated positions the phase difference between the 39 electrodes is 120 deg and the voltage magnitudes between them and the point 60 are equal. The plasma surrounding the spacecraft at the bottom is uniform. If the phase difference is misbalanced by regulators 58 the voltage magnitudes become also different and the plasma envelope on the spacecraft bottom is asymmetric. This will invoke a force field in the direction of the stronger to weaker plasma envelope. When considering the function of the top electrode it is evident that a force field could be created at any desired direction including a possibility to tilting the spacecraft.

The described propulsion method based on the SARG effect is not suitable for application in commercial aircrafts flying in Earth atmosphere because of the following reasons:

- the effect creates EM noise and may affect the communication systems within some range
- staying in proximity to the spacecraft during the landing or takeoff is dangerous for humans and live species.

The suggested propulsion method is intended only for spacecrafts capable of leaving Earth atmosphere and traveling to other planets or star systems. A spacecraft with such propulsion will greatly overperform the rocket missions based on a jet propulsion system.

I claim:

1. A method and apparatus for a spacecraft propulsion with a field shield protection, wherein said method is achievable by envelope of neutral plasma activated by AC and DC EM fields and simultaneous emission of EM wave packet and strong EM pulses with selected time sequence, said method comprising steps of:

   releasing of preactivated plasma of gas mixture composed of working gas and a buffer gas,

   creation of envelope of electromagnetically activated plasma around the spacecraft by a controllable set of AC and DC electrical fields around the spacecraft from at least 5 electrodes assuring a necessary asymmetry of the plasma envelope, where the said DC electrical fields are kept proportional to the applied AC fields,

   emission of EM wave packet and strong EM pulse with a strong space and time correlation between them,

said apparatus for a spacecraft propulsion with a field shield protection comprising of:

a spacecraft body without external sharp edges when in operational mode,

a set of at least three bottom oval shape electrodes, each one connected simultaneously to a Y type type three-phase AC high voltage system with a proper frequency and means for phase and amplitude control,

at least one top electrode connected simultaneously to a single phase AC high voltage system and to a DC high voltage,

said single phase high voltage system having a common virtual ground with the central point of the said three-phase AC high voltage system,

separate DC high voltage circuits for each of the bottom and top oval shape electrodes, obtained by rectifying a fraction of the AC high voltages that supply those electrodes,

one ring electrode comprising of one or more sections separated by one or more gaps whereas at lease one or these sections is connected to the virtual ground point of the said three-phase AC high voltage system,

one circular dipole antenna connected to a generator of EM wave packets with a circumference length of the dipole antenna equal to one or multiple wavelengths of the said EM wave packet,

a set of portholes on the spacecraft body for releasing of preactivated plasma from a gas mixture, where said gas mixture is comprised of working gas with a low atomic number and a buffer gas with a higher dielectric strength.

2. The invention of claim 1, wherein the propulsion force field is a result of gravito-inertial effect invoked by applying of asymmetrically activated neutral plasma around the spacecraft.
3. The invention of claim 1, wherein said protective field shield is a result of mutual interaction between the emitted EM wave packet and the strong EM pulse possessing a superlumainal behavior with proper time correlation between them and a proper period, so an effect of energy dissipation occurs on the on molecular species or dust particles in the boundary of finite thickness serving as a protective shield.
4. The invention of claim 1, wherein said Y type three-phase AC high voltage system is part of a poly-phase Tesla coil system, in which the secondary windings are connected as Wye type, while the primary windings are connected in series with capacitors and one spark gap or other type of circuit interrupter.
5. The invention of claim3, wherein said strong electromagnetic pulse possessing superluminal behavior in a near field of a few wavelengths is experimentally confirmed.

REFERENCES:

[1] Albert Einstein, *Sidelights on Relativity*, Methuen & Co. Ltd, 36 Essex Street, W. C., London, 1922 (Republished later)

[2] Michelson, A. A.; Morley, E. W. (1887). "On the Relative Motion of the Earth and the Luminiferous Ether". *American Journal of Science* **34** (203): 333–345.

[3] S. Marinov, Measurement of the Laboratory's Absolute velocity, General Relativity and Gravitation, **12**, 57-66, (1980)

[4] S. Marinov, The interrupted "rotating disc" experiment, J. Phys A: Math. Gen, **16**, 1885-1888, (1983)

[5] S. Marinov, New measurement of the Earth's Absolute Velocity with the help of the "Couplet Shutters" Experiment, Progress in Physics, v. 1, , 31-37, (2007) (experiment done in 1984, but this article is published 10 years after Marinov's death by his co-worker)

[6] S. Sarg, New approach for building of unified theory, http://lanl.arxiv.org/abs/physics/0205052 (May 2002)

[7]. Stoyan Sarg, *Basic Structures of Matter – Supergravitation Unified Theory*, Trafford books, Canada ISBN 1412083877, (2006)

[8]. S. Sarg, A Physical Model of the Electron according to the Basic Structures of Matter Hypothesis, Physics Essays, International Journal Dedicated to Fundamental Questions in Physics, vol. 16 No. 2, 180-195, (2003); http://www.physicsessays.com

[9] S. Sarg, Basic Structures of Matter – Supergravitation Unified Theory based on an alternative concept of the physical vacuum, Proceedings of IX International Scientific Conference " Space, Time, Gravitation, 7-11 Aug, 2006, Saint-Petersburg, Russia

[10] Books review, in "**Physics in Canada**,", v. 62, No. 4, July/Aug, 2006, published by the Canadian Association of Physicists)

[11] S. Sarg, Gravito-inertial Propulsion Effect Predicted by the BSM - Supergravitation Unified Theory, 27th Annual Meeting of the Society of Scientific Exploration, June 25-28, 2008, Millenium Harvest House, Boulder, CO

[12] Massines et al. Experimental and theoretical study of a glow discharge at atmospheric pressure controlled by dielectric barrier, J. Appl. Phys. 83, 2950 (1998)

[13] K. J. van Vlaenderen and A. Waser, "Electrodynamics with the scalar field, www.aw-verlag.ch/EssaysE.htm also with slight adaptations: van Vlaenderen Koen and A. Waser, "generalisation of classical electrodynamics to admit a scalar field and longitudinal waves", Hadronic Journal **24**, 609-628 (2001)

[14] K. P. Butusov, Longitudinal Waves in Vacuum: Creation and Research, New Energy Technologies, Sep-Oct 2001, pp. 46-47.

[15] Lord Kelvin, On the generation of longitudinal waves in Ether, Proceedings of the Royal Society of London, v. 59, pp. 270-273, (1895-1896)

[16] Nicola Tesla, Colorado Spring Notes 1899-1900, NOLIT, Beograd, Yugoslavia, 1978.

[17] Н. А. Козырев, Избранные труды, Ленинградский Государственный Унивирситет, 1991

[18] Козырев Н. А, Насонов В. В, Новый метод определения тригонометрических параллаксов на основе измерения разности между истинным и видимым положением звезды // Астрометрия и небесная механика М.; Л., 1978. С.168-179. (Проблемы исследования Вселенной.Вып.7).

[19] Лаврентьев М.М., Еганова И.А., Луцет М.К., Фоминых С.Ф. О дистанционном воздействии звезд на резистор // Докл. АН СССР. 199б. Т.314, № 2. С.352-355.Лаврентьев М.М., Еганова И.А., Луцет М.К., Фоминых С.Ф. О регистрации реакции вещества на внешний необратимый процесс // Докл. АН СССР. 1991. Т.317, № 3. С.635-639.

[20] Hodowanec Eclips of 10-3-1986

[21] D, Mugnai, A. Ranfagni, and R. Ruggeri, Observation of Superluminal Behaviours in Wave Propagation, Phys. Rev. Lett., v. 84, No 21, 4830-4833, (2000).

[22] T. W. Barrett, Tesla's nonlinear oscillator-shuttle-circuit (OSC) theory, Annales de la Fondation Louis de Broglie, V. 16, No 1, 23-41, (1991)

[23] S. Okazaki and M. Kogoma, J. Photopolym. Sci. Technol., Vol. 6, No 3, 1993.

Search keywords in google and youtube: SARG effect, SARG Antigravity.

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1. A method and apparatus for a spacecraft propulsion with a field shield protection, wherein said method is achievable by envelope of neutral plasma activated by AC and DC EM fields and simultaneous emission of EM wave packet and strong EM pulses with selected time sequence, said method comprising steps of:

    releasing of preactivated plasma of gas mixture composed of working gas and a buffer gas,

    creation of envelope of electromagnetically activated plasma around the spacecraft by a controllable set of AC and DC electrical fields around the spacecraft from at least 5 electrodes assuring a necessary asymmetry of the plasma envelope, where the said DC electrical fields are kept proportional to the applied AC fields,

    emission of EM wave packet and strong EM pulse with a strong space and time correlation between them,

    said apparatus for a spacecraft propulsion with a field shield protection comprising of:

    a spacecraft body without external sharp edges when in operational mode,

    a set of at least three bottom oval shape electrodes, each one connected simultaneously to a Y type type three-phase AC high voltage system with a proper frequency and means for phase and amplitude control,

    at least one top electrode connected simultaneously to a single phase AC high voltage system and to a DC high voltage,

    said single phase high voltage system having a common virtual ground with the central point of the said three-phase AC high voltage system,

    separate DC high voltage circuits for each of the bottom and top oval shape electrodes, obtained by rectifying a fraction of the AC high voltages that supply those electrodes,

    one ring electrode comprising of one or more sections separated by one or more gaps whereas at lease one or these sections is connected to the virtual ground point of the said three-phase AC high voltage system,

    one circular dipole antenna connected to a generator of EM wave packets with a circumference length of the dipole antenna equal to one or multiple wavelengths of the said EM wave packet,

a set of portholes on the spacecraft body for releasing of preactivated plasma from a gas mixture, where said gas mixture is comprised of working gas with a low atomic number and a buffer gas with a higher dielectric strength.

2. The invention of claim 1, wherein the propulsion force field is a result of gravito-inertial effect invoked by applying of asymmetrically activated neutral plasma around the spacecraft.
3. The invention of claim 1, wherein said protective field shield is a result of mutual interaction between the emitted EM wave packet and the strong EM pulse possessing a superlumainal behavior with proper time correlation between them and a proper period, so an effect of energy dissipation occurs on the on molecular species or dust particles in the boundary of finite thickness serving as a protective shield.
4. The invention of claim 1, wherein said Y type three-phase AC high voltage system is part of a poly-phase Tesla coil system, in which the secondary windings are connected as Wye type, while the primary windings are connected in series with capacitors and one spark gap or other type of circuit interrupter.
5. The invention of claim3, wherein said strong electromagnetic pulse possessing superluminal behavior in a near field of a few wavelengths is experimentally confirmed.

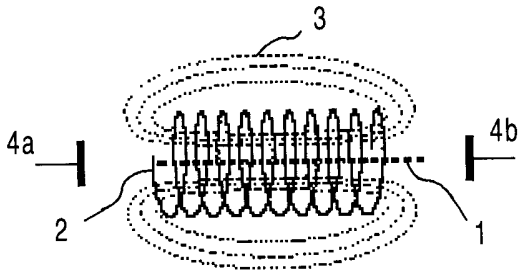

Fig. 1

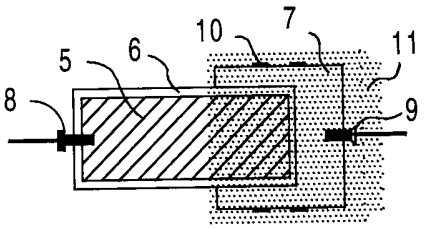

Fig.2

Fig. 4

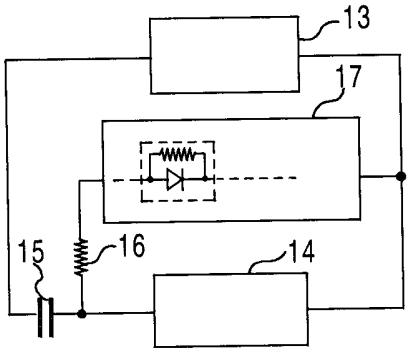

Fig. 3

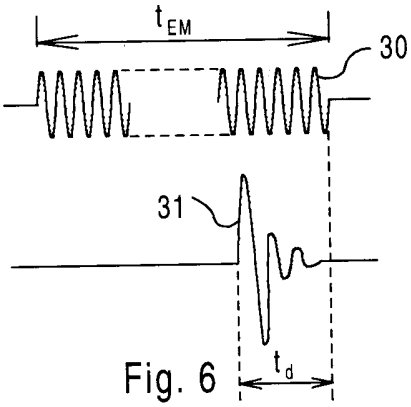

Fig. 6

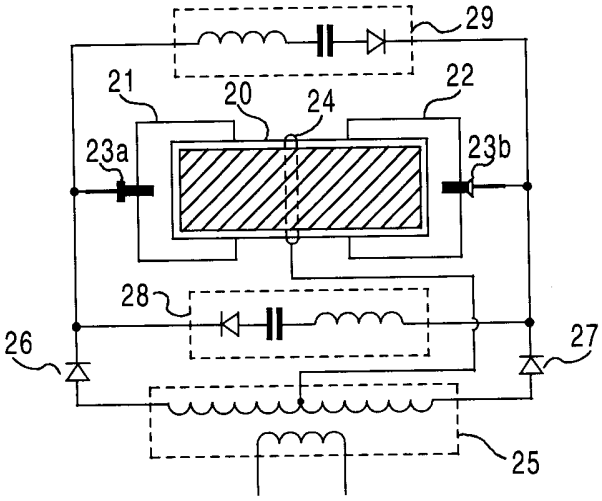

Fig. 5

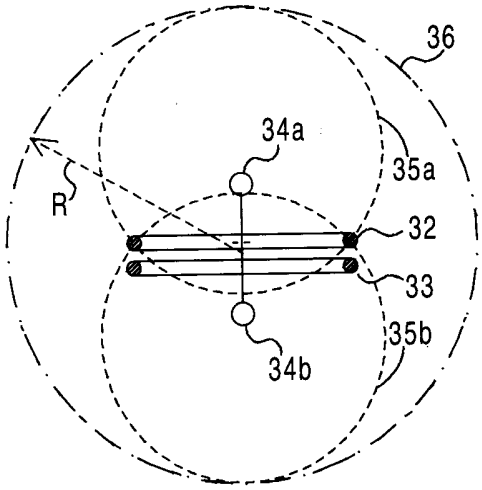

Fig. 7

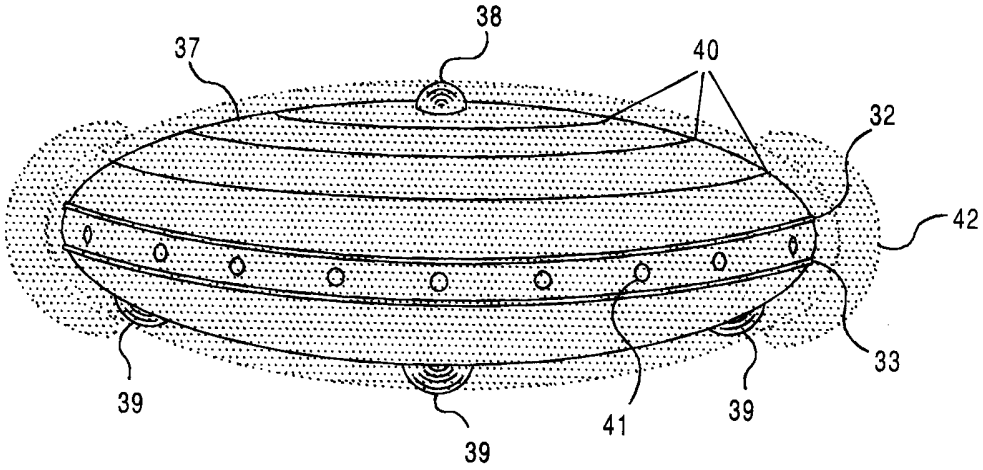

Fig. 8

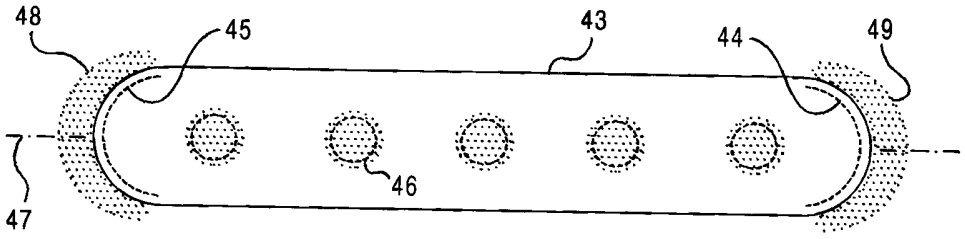

Fig. 9.a

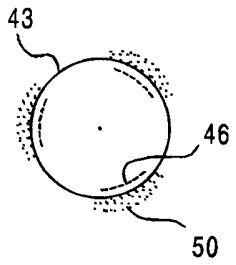

Fig. 9.b

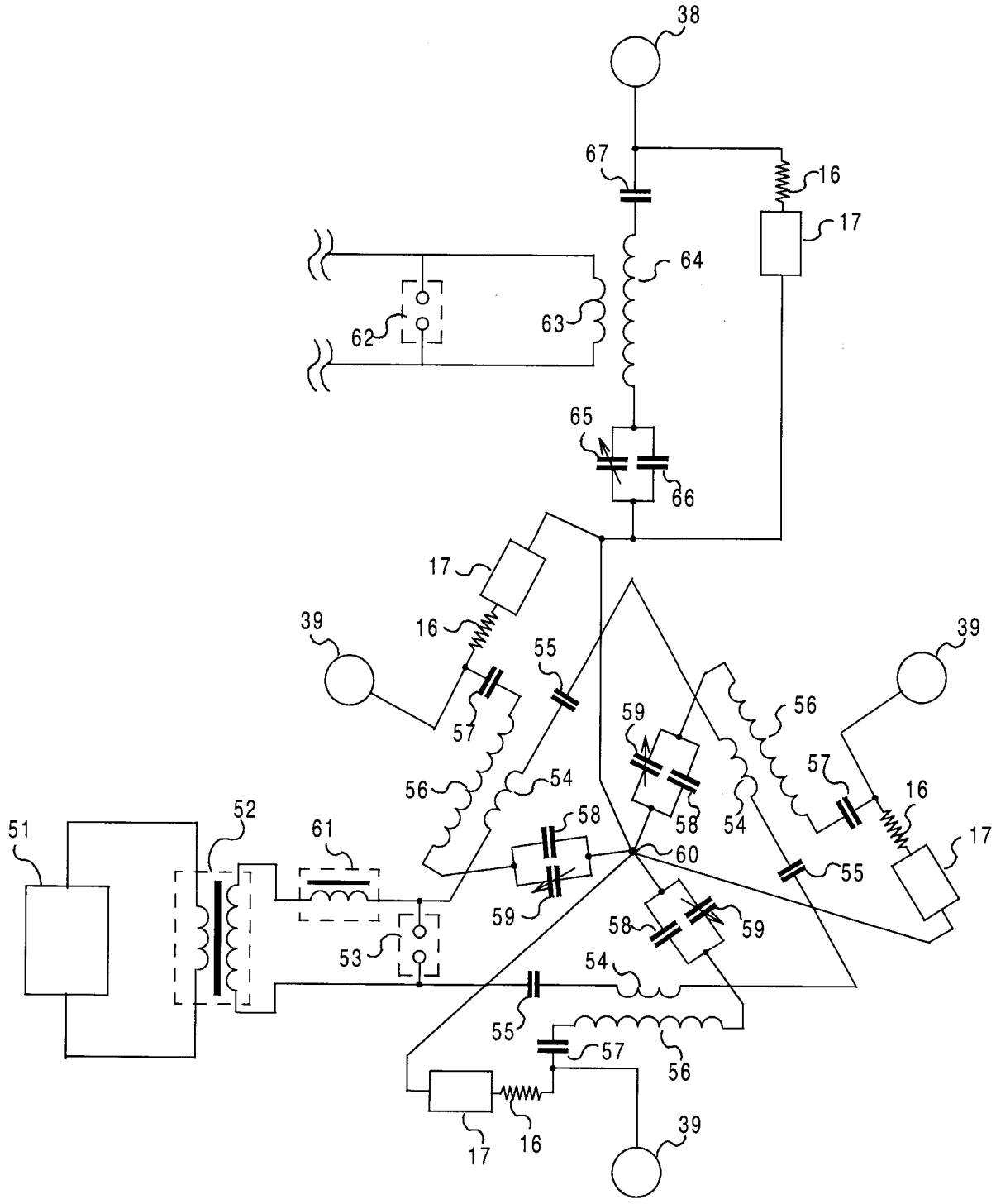
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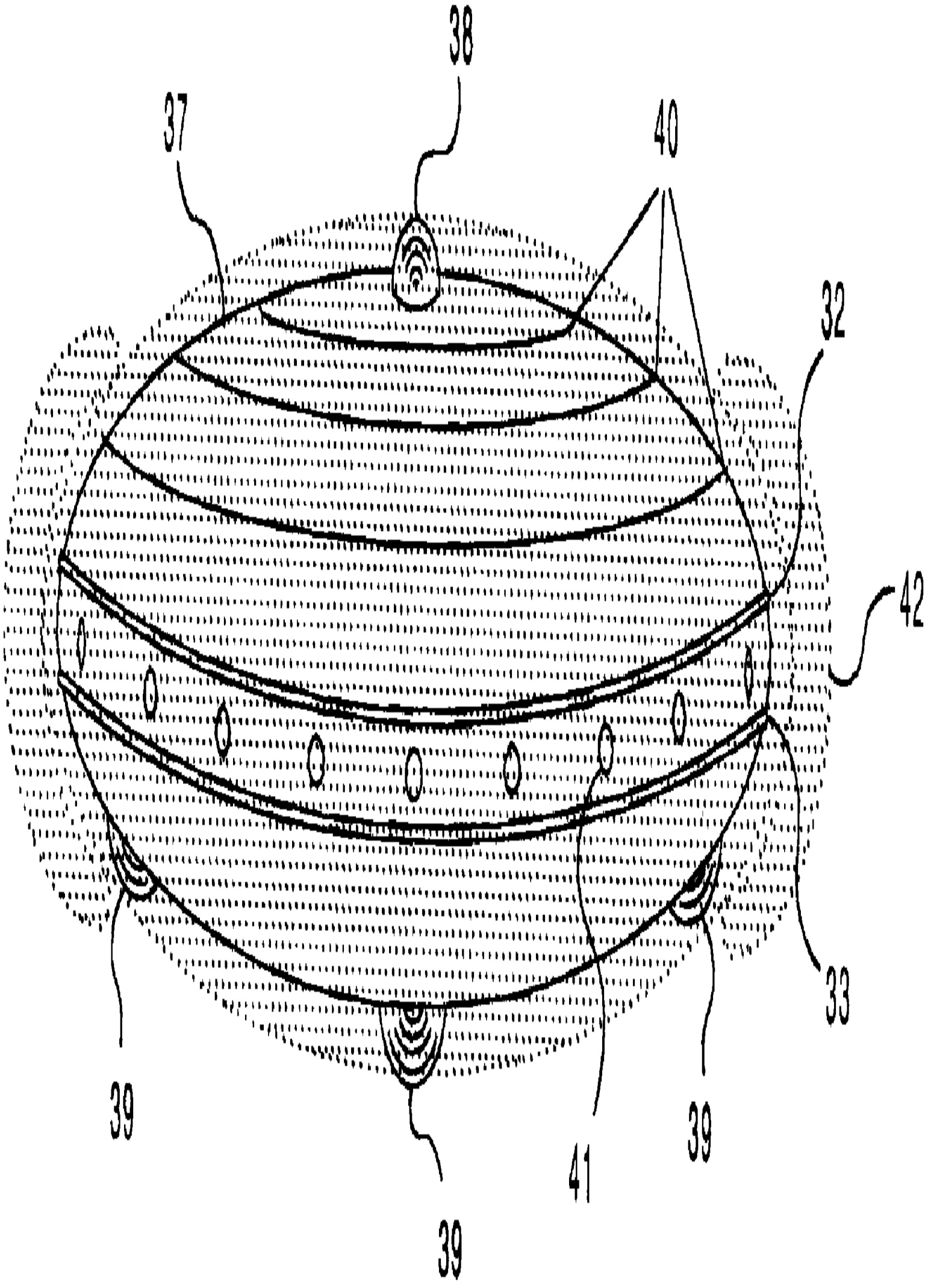
Fig. 10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