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(54) Title: PROPULSION SYSTEM USING THE ANTIGRAVITY FORCE OF THE VACUUM AND APPLICATIONS

(57) Abstract: The present invention relates to a new form of aerial, terrestrial, underwater or space propulsion, achieved through the manipulation (or engineering) of the vacuum with the proper electromagnetic interactions. This vacuum manipulation will allow the use of a new form of propulsion, and has applications in energy production and on the change of the time decay of radioactive elements. Opposing magnetic or electric fields create a mass repelling force, while attracting magnetic or electric fields create a mass attracting force. In particular, this vacuum manipulation process can be used to propel a mass (6) that contains the field sources that perturb the vacuum. One possible application is the creation of a repulsion point (48) in space through the interference of two or more longitudinal electrodynamic wave beams (46), which cause a repulsion force on mass (6),

Description

Propulsion System Using the Antigravity Force of the Vacuum and Applications

The present invention relates to a new form of aerial, terrestrial, underwater or space propulsion, achieved through the manipulation (or engineering) of the vacuum with the proper electromagnetic interactions. This vacuum manipulation will allow the use of a new form of propulsion, and has applications in energy production and on the change of the time decay of radioactive elements. In order to better understand the workings of this invention, we will first supply the underlying theory that made possible this innovation.

Usually science describes the four fundamental forces as:

1 – Electromagnetic force

2 – Gravitational force

3 - Nuclear strong force

4 - Nuclear weak force

This is an incomplete list since it has already been proven that there exists one additional fundamental force: Antigravity, This force was discovered by astrophysicists in 1998 in the sequence of astronomical observations that could only be explained if this new force existed (Glanz, 1998) . Thus, the existence of this force has been verified by direct observation. It is generated by the vacuum itself due to its state of high stress.

The antigravity force of the vacuum is well known in Astronomical circles (Grδn, 1986, 2009; Magueijo, 2003) . The state of stress in the vacuum is usually described with the analogy of two forces pulling in opposite directions and therefore generating a stress. As it is known, according to the Heisenberg uncertainty principle, there are always electromagnetic waves being created and destroyed in the vacuum of space. These electromagnetic oscillations are always created by pairs in opposition, in such a way that the vacuum shows zero net energy. This fact is usually described as the potential source of an enormous

quantity of energy. The vacuum looks like it doesn't have any energy because the electromagnetic waves that it generates are all phase cancelled by other waves in such a way that the final observable result is zero, remaining no observable energy to see. However, the vacuum possesses, at any time, an incredible quantity of electromagnetic fields in opposition and this is the source of its density and high stress or tension.

According to Grδn (1986) the gravitational mass of the vacuum is negative. The total density of gravitational mass p_G is given by:

$$\rho_G = T_0^0 - T_1^1 - T_2^2 - T_3^3. \quad (1)$$

The term on the right represents the components of the energy-momentum density tensor, where T_0^3 is the energy density and T_i^1, $\tau|$ and τ_3^3 are stress components. The energy density is always positive but the stress components can be positive or negative; $T_i^i < 0$, i=l, 2, 3 corresponds to compressed states or a positive pressure, $\tau_{\dot{?}->0}$ corresponds to stretched states or a negative pressure.

Equation (1) shows that systems with an extremely large negative pressure or positive tension can have negative gravitational mass density. Generally, a high negative pressure or stretched state wall produce a gravitational repulsion force. On the other hand, a positive pressure or compressed state will produce a gravitational attractive force.

According to the Friedman models of the universe, which are solutions of Einstein's field equations describing an expanding isotropic universe filled with perfect fluid, the fluid (vacuum) is described by an energy-momentum tensor of the form (Grδn and Hervik, 2007; Grδn, 2009) :

$$T_{\mu\nu} = \left(\rho + \frac{p}{c^2}\right) u_\mu u_\nu + p g_{\mu\nu}. \quad (2)$$

However, considering a vacuum polarization as a gas of virtual particles, Grδn (1986, 2009) and Grδn and Hervik (2007) showed that the energy-momentum density tensor of the vacuum as a dominating term of the form:

$$T_{\mu\nu} = P g_{\mu\nu} = -PC^2 g_{\mu\nu} - \quad (3)$$

Where the energy density p of the vacuum appears as a cosmological constant, p is the pressure, and both imply the equation of state: $p = -pc^2$, where c is the velocity of light. Since in hydrodynamic terms the pressure is given by: $P = -\tau$, where τ is the tension; the vacuum is in a state of extreme tension because its pressure is large and negative due to having a high density p, and also due to the multiplying factor of c^2. This is the reason behind the experimentally observed antigravity force of the vacuum observed by a team of astronomers (Glanz, 1998). A tense vacuum will have a tendency to expand under the action of its own repulsive gravitation. On the other hand, radiation and mass in space will have a positive gravitational mass that will favor space contraction,

In the Casimir effect, some of the electromagnetic vacuum propagating modes (which are in opposition by pairs) are eliminated between two metallic plates (1 and 2) that are very near (figure l.a), where 3 represents a high vacuum density and 4 represents a low vacuum density). Between the plates the vacuum density will be less than outside, and therefore the vacuum will also be less tense. The tenser vacuum that exists outside the plates will push them together, due to the negative gravitational properties of the vacuum as evidenced by equation (1). This is a simple effect, experimentally proven by Lamoreaux (1997) and one can gain extremely useful insights from it, such as a better understanding of the origin of gravity and electromagnetic forces.

Electromagnetic forces can be explained by the vacuum stresses they produce. This is being developed in a new theory called "Fluidic Electrodynamics" which interprets all electromagnetic forces in terms of fluid hydrodynamics and a perfect fluid and tense vacuum. The nuts and bolts of this theory are not yet published in order to secure a patent for the resultant spinoffs before publication. Basically, this theory shows parallels between the equations of electromagnetism and hydrodynamics in such a way that it allows electromagnetic forces to be interpreted as having a hydrodynamic origin from the vacuum itself. In this case, the vacuum is treated like a perfect fluid

(Gron, 1986, 2009) . Besides the interesting hydrodynamic analogy, the physical origin of the electromagnetic forces resides on the way electric charges and magnetic interactions alter the stress or tension of the vacuum in such a way to generate attraction or repulsion forces.

Let's consider two positive charges. The oppositely directed or canceling electric field between the positive charges will increase the vacuum density and stress between them. Because the vacuum is tenser between the charges, the antigravity force generated by the vacuum in that region will force the two particles apart. This explains the physical origin of the repulsion force between equal sign charges (figures l.b) and l.c), where the + signs represent positive charges and the - signs represent negative charges) .

As we will see, electromagnetic forces and gravity can be perfectly explained by the antigravity force generated by stresses in the vacuum. The gradient of the vacuum stresses will determine the direction of the observed forces . These vacuum forces will always be repulsive. Attraction and repulsion will depend on the resultant vector of the total repulsive forces .

If we consider a positive and a negative charge, we can see that the electric field is increased between the charges and therefore the vacuum stress and antigravity force of the vacuum is lower between the charges than outside. In this case the charges will be impelled towards each other by this vacuum stress gradient (figure l.d)).

A moving charge generates a magnetic vector potential in its direction of movement. This vector potential is equivalent to the hydrodynamic velocity of the vacuum (Maxwell, 1861) . Magnetic forces can easily be explained in hydrodynamic terms has interactions of the generated vector potentials. Hydrodynamic currents attract if they are in the same direction and repel if they are in opposite directions. In this way, the attraction and repulsion force between currents and magnets can be explained in hydrodynamic terms. On a more fundamental level, this force can be attributed to how the (interacting) vector potentials alter the vacuum stresses.

The magnetic vector potential A is always in the direction of the current I. In the case of two (steady state) parallel currents in the same direction, the vector potential of both currents is in the same direction (is not opposed). This will lower the vacuum density and tension between the two currents, generating an attraction force because the vacuum density is higher outside the currents (figure 2.a) on the left side). If the currents are parallel but in opposite directions, then the vector potential will tend to cancel between the currents, due to the oppositely directed vectors. This oppositely directed field will increase the vacuum density and tension between the currents and the vacuum antigravity force generated between them will be higher than outside, therefore the currents will repel each other (figure 2.a) on the right side). This explanation is also valid for magnets, since they have "equivalent surface currents" that generate the vector potentials and corresponding magnetic fields (figure 2.b) to 2.e), where N and S represent, respectively, the magnetic north and south poles, and A, represents the magnetic vector potential). This forms a physical basis for the interpretation of magnetic forces in terms of vacuum stresses (figure 2).

The important point here is that electromagnetic forces alter the state of tension of the vacuum which is reflected as attraction or repulsion, according to the vacuum density (tension) gradient. On this stance, the gravitational force can be attributed to vacuum stresses as well. We just have to look at how matter is made. It contains a concentration of positive charge in the center surrounded by circulating electrons with negative charge. This represents two concentrations of opposite charges in space that act like a "capacitor" (figure 3. a), where 5 represents a simplified atom, and 6 represents a mass agglomerate). If we reconsider the earlier explanation for the electrostatic forces we see that attracting charges diminish the local vacuum stress (tension) between them. Therefore, atoms will electrically induce a lower vacuum density inside their structure, generating an attracting gravitational force towards them due to the surrounding vacuum stress gradient (figure 3.b), where 7 represents the mass of the Earth). The lower vacuum density in atoms also implies the existence of less electromagnetic allowed states, like also observed in the Casimir effect experiment, that are known

to exist for the electrons that surround the nucleus. Atoms also contain opposing magnetic fields from the spin and movement of the charged particles that are responsible for the slight decrease in weight observed between an atom and its individual constituents. This happens because the opposing magnetism in atoms increases the vacuum stress but since magnetism has a much lower strength, in this case, than the existing electric fields, an attraction force towards atoms will be the resulting force.

It is known that a plasma does not allow the propagation of electromagnetic waves until a certain cutoff frequency is surpassed that depends on the plasma density and thickness (Laroussi and Anderson, 1998) . Therefore, the plasma is doing exactly what the parallel conductor plates in the Casimir effect did (figure l.a)). The vacuum density inside the plasma will also be lower, and it will induce a force on a nearby mass towards the plasma because of the vacuum stress gradient. This means that if we create a very high density plasma 8 (density and thickness have to be optimized) , we will generate a very strong gravitational pull towards this plasma (figure 3.c)). The plasma gravitational pull can be easily understood if we note that the plasma is made of a very high density charge concentration of both polarities. And, as explained in relation to figure l.d), attracting charges induce a low vacuum density between them.

Until now, the theory presented here could explain in simple terms the physical origin of electromagnetic and gravitational forces. They all derive from gradient stresses in the vacuum created by opposing or non-opposing electromagnetic fields. There exists a simple experiment that proves further the gravitational connection between vacuum stresses and electromagnetic interactions. This experiment was initially mentioned by Boyd Bushman (personal communication) , a retired engineer from Lockheed Martin. He repeated Galileo's experiment of dropping two masses side by side and measured the time they took to fall. Boyd verified that when we drop two opposing magnets in one container and normal matter in a second container (of equal geometry) , the opposing magnets arrived latter than the normal mass. This experiment violates the equivalence principle and proves the relation between opposing fields, vacuum stresses and gravitational

interactions. It can be easily verified by dropping opposing magnets trough coils connected to an oscilloscope, and then measure the falling time and compare to the falling time of simple magnets. The basic theory presented until this point will be the basis for the experimental ideas in antigravity propulsion proposed henceforth.

The present invention will now be described in detail, without a limited character and using preferred examples, presented in the accompanying drawings, where:

- Figure 1 depicts how conducting plates and electric charges alter the vacuum stress and induce mechanical forces .
- Figure 2 depicts how magnetic forces alter the vacuum stress and induce mechanical forces.
- Figure 3 depicts the origin of gravitational forces from vacuum stress gradients.
- Figure 4 depicts the first embodiment of this invention, based on opposing magnets.
- Figure 5 depicts an embodiment where several arrangements of opposing magnetic vector potentials are shown to induce mechanical forces Dn surrounding masses.
- Figure 6 depicts several units with opposing magnetic vector potentials that are used to induce mechanical forces on masses that are mechanically attached to the field sources.
- Figure 7 depicts several symmetric arrangements with opposing magnetic vector potentials that are used to induce a directed mechanical force on masses that are mechanically attached to the field sources.
- Figure 8 depicts units of more than one magnet excited by coils, with opposing magnetic vector potentials that are used to induce a localized region that develop an antigravity force source, using opposing currents generated by the Lenz law.
- Figure 9 depicts units with one magnet excited by coils, with opposing magnetic vector potentials that are used to induce a localized region that develop an antigravity force source, using opposing currents generated by the Lenz law.
- Figure 10 depicts units with toroidal, flat and circular coils, with opposing magnetic vector

potentials that are used to induce a localized region that develop an antigravity force source, using opposing currents generated by the Lenz law.

- Figure 11 depicts units with coils containing a ferromagnetic or magnetic core, with opposing magnetic vector potentials that are used to induce a localized region that develop an antigravity force source, using opposing currents generated by the Lenz law.
- Figure 12 depicts units with coils containing a ferromagnetic or magnetic core in a toroidal configuration, with opposing magnetic vector potentials that are used to induce a localized region that develop an antigravity force source, using opposing currents generated by the Lenz law.
- Figure 13 depicts units with coils containing a ferromagnetic or magnetic core in several different configurations, with opposing magnetic vector potentials that are used to induce a localized region that develop an antigravity force source, using opposing currents generated by the Lenz law.
- Figure 14 depicts units with coils containing a conducting material in several different configurations, with opposing magnetic vector potentials that are used to induce a localized region that develop an antigravity force source, using opposing currents generated by the Lenz law.
- Figure 15 depicts an embodiment where several arrangements of charged conducting plates are shown to induce mechanical forces on surrounding masses.
- Figure 16 depicts several units with charged conductors {and one unit with a plasma) that are used to induce mechanical forces on masses that are mechanically attached to the field sources.
- Figure 17 depicts segmentation of charged conductors that can be used in great number side by side.
- Figure 18 depicts longitudinal electrodynamic wave sources .
- Figure 19 depicts several embodiments which use longitudinal electrodynamic wave sources to produce interference at a distance with the purpose of inducing mechanical forces on nearby masses.
- Figure 20 depicts the use of several propulsion units disposed around different embodiments for the purpose

of controlling and directing the generated propulsion force.

- Figure 21 depicts mass manipulation for recreational or energy production purposes.
- Figure 22 depicts the use of opposing or attracting, electric or magnetic fields, to speed up or slow down the radioactive decay of radioactive elements, and energy production.

Detailed description of the invention

We will now proceed with the description of the preferred embodiments of this invention which are illustrated in the accompanying figures. Like numerals in these figures correspond to corresponding parts in the different embodiments .

We start by noting that Bushman's magnetic beam patent (1999) can be used for antigravity propulsion. Unfortunately, this fact is not mentioned in his patent where he only mentions the production of a magnetic beam that can be rotated or directed, which is capable qf generating higher magnetic fields for propulsion use in electric motors or levitating magnetic trains and is also capable to perform charge transfer. His concept is represented in figure 4.a). It consists of a geometric arrangement of opposing pairs of magnets 9-10 and 11-12 and unopposed magnet 13 (any number of magnets can be used). The letters N and S represent respectively the magnetic north and south pole. As we saw earlier, opposing fields increase the stress of the vacuum generating antigravity forces. This arrangement will generate a high vacuum stress between the opposing magnets, because the vector potential of the magnets is in opposition, which will induce gravitational repulsion from the area where the stress is highest.

Figure 4.b) depicts a side view of the magnet arrangement trough vertical line BB shown in figure 4.a). If a coil 14 is wrapped around the magnet setup 15 (surrounding each magnet, the magnet setup or a few of the magnets), then the changing magnetic fields generated can be greatly increased, by exciting the coils with changing (oscillating, pulsing or any shape) electromagnetic

signals. This will augment the magnetic vector potential strength of the opposing fields and consequently increase the vacuum stress that will induce strong antigravity forces (F) on nearby masses (figure 4.c)).

A setup like this could be used for propulsion with any number of units disposed around the periphery of the craft in order to generate directional forces. This setup is auto propelled because of its asymmetry of mass. Since there is more mass to one side (the unopposed magnet), it will be repelled from the higher vacuum stress zone. Bushman says that when the magnet arrangement is excited by a coil at ultraviolet frequencies it generates alternating magnetic fields with the equivalent strength of an electromagnetic pulse capable to destroy electronic components in a radius of several miles. The intensity of the generated magnetic field oscillations will increase with the frequency applied to the coils surrounding the magnets. This setup is ultra efficient for propulsion because of the extremely high opposing magnetic fields that can be created when the electromagnetic pulse is used. By using a higher excitation frequency we will generate higher opposing magnetic vector potential fields whidh will have a higher interaction with the vacuum by increasing its stress. In order to increase vacuum interaction and stress a number of different excitation processes can be used. Besides the use of symmetric or asymmetric waveforms (sinusoidal, triangular, squared, pulsed and others) at a single frequency (or at multiple simultaneous frequencies) , any modulation can be applied to the carrier wave (frequency or amplitude modulation) , were the arrangement of magnets 15 can be made to generate a rotating magnetic field or not. Even the frequency of the exciting wave can be changed continuously (chirped excitation) linearly or non-linear Iy, with or without any type of modulation. Other excitations may include white noise, pink noise, or any type of caotic electromagnetic excitation. The purpose of all these different excitation systems and frequencies is the possibility to excite and act on more vacuum zero point energy modes and frequencies according to the frequency spectrum generated by the oscillating magnetic poles that are excited by the coils. The antigravity force generated by this setup would be incredible with the advantage that the occupants would not feel any inertia force when being repelled by the stressed vacuum because they would be

propelled directly by space. As is known, masses in free fall in a gravitational field do not feel inertia, because they are being moved by space itself and not against space.

When we excite these magnets with alternating frequency current (AC) they create a magnetic field change with time, but the pole of the magnet will remain the same. Therefore it creates a time varying pulsed magnetic field or pole with symmetric rising and falling times. If instead we use an asymmetric alternated or asymmetric pulsed excitation (asymmetric sawtooth wave, for example) to the coils, then the rising and falling times of the magnetic field of the magnets will be asymmetric. This will create a new effect, developing another force on space itself, since time changing magnetic fields generate time changing electric fields and these will induce a new (another) changing magnetic field in the space surrounding the setup. This is represented in figure 4.d). In this figure, 19 stands for the new induced magnetic field in space which always has the direction provided by the arrows 16, 17 and 18. 16 represents an induced magnetic field oppositely directed to the magnetic field of the opposed magnets 9, 10 and 13. 17 represents the alternating magnetic field induced if the excitation to the coils is alternating or symmetrically pulsed, and 18 is an induced magnetic field which is attracted to the opposing magnet pole 9, 10 and 13.

Therefore we have three different possible situations according to the type of excitation (AC or pulsed - symmetric or asymmetric) and related to the difference between the rise and fall times of the exciting source, which will determine the symmetric or asymmetric variation of the magnetic field of the magnets. In the case of situation 16, the magnet setup (9, 10 and 13) will be further repelled by this space induced opposed magnetic field, where a classical explanation (repulsion of like poles) is sufficient to understand the propulsive repulsion force. Situation 17 corresponds to the discussion related to figure 4.c), and situation 18 will induce a magnetic field in space that will attract the magnet assembly to it, in the opposite direction to case 16.

The magnets 20 can also be placed side by side in repulsion or attraction. Figure 4.e) shows magnets 20 placed side by side (in a circular fashion) with the magnetic vector

potentials in repulsion (magnets are in repulsion; in this case we have a south pole pointing upwards in all magnets) . Figure 4.f) shows the setup of Figure 4.e) with an extra magnet 20 at the center also in repulsion with all the other magnets. And Figure 4.g) shows the magnets of Figure 4.f) surrounded by coils 14, which will augment the repulsion forces (between the magnets) when energized with a power source. When the magnetic vector potentials are in opposition any external mass will be repelled from that area, and when they are in attraction any mass would also be attracted. Figure 4.h) shows another variation that can be used, were the magnets 20 (that can all be involved with coils 14 or not) are all in opposition but in a semicircular section. Like before, this arrangement will be auto-propelled to the right due to its mass asymmetry.

Any experimental setup that generates opposing and non-opposing fields respectively increases or decreases the vacuum stresses generating mechanical forces on masses in response to these vacuum density gradients. Therefore a multitude of geometrical arrangements can be used to generate antigravity forces, with a body of mass always being repelled from the high vacuum stress towards the low vacuum stress. This concept is illustrated in figure 5 for several configurations of repelling or attracting magnets 20, with coils 14 wrapped around them and excited by DC (direct current) , AC (alternating current) , or pulsed symmetric or asymmetric current . When we oppose all magnets, like in figures 5.g) and 5.h), a symmetric setup is made with less external field leakage, and a stronger repelling field.

The only figures needing more explanation are figures 5.e) and 5.f). In figure 5.e) we can find one coil 21 excited from the center to the periphery (or inversely from the periphery to the center) ; that's why this coil has three connecting wires: one in the center and another in each extremity. The reason for this setup is that exciting the coil through its center to the periphery (or inversely) , we are able to generate opposing magnetic (vector potential) fields (or opposing induced electric fields, E=-∂A/øt, generated by the changing currents) due to the fact that the current flows in opposite directions when going to the extremities. Therefore, we will induce one magnetic pole that is in opposition at the center and induce the other

pole at both extremities. The changing currents will also induce opposing induced electric fields that repel each other. We can use a coil in two different configurations: in the first case (that we have just discussed) the wires from the center to the periphery of the coil go in opposite directions (anti-parallel), like when we just connect a wire to the center of a normal coil. In the second case the wires from the center to the periphery of the coil go instead in the same direction (parallel). In the parallel (second case) case we generate currents in the same direction and phase, and in the anti-parallel case we generate currents in opposite directions from the center to the periphery. The rotational direction of the coil wires between these two coils is opposite to the other, in the first case they are in opposite directions and in the second case, in the same direction. The generated forces will also be opposite. In the first case the opposed currents will generate a gravitational repulsion, and in the second case the attracting currents will generate a gravitational attraction. Our preferential embodiment is the coil used in the first case, although any coil may be used according to the desired purpose. If whished one can use a greater density or concentration of turns of coil wire on one of the sides of the coil. We may use only the center wire if we excite coil 21 with Tesla coils or the Avramenko's (2000) longitudinal system. The effect increases with increasing frequency and current. If we excite this coil (the preferential embodiment) in an asymmetric way by displacing the center wire to one side {figure 5.f)), the mass of the coil *(and mass* inside the coil) will feel a force to the left because the generated opposed poles and antigravity force will be stronger on the right. Again, one can use more turns of coil wire on one of the sides of the coil. This coil can be very small or the size of a whole spaceship (involving the outside of the spaceship or a smaller propulsion unit). Coil 21 can be an air core coil or it may have a ferromagnetic core or any type of magnet (s), which are surrounded by the coils, in order to increase efficiency. Please note that, although the coil(s) in figures 5.e) and 5.f) are represented with a symmetric geometry, the diameter of the coil can be nonlinear. That is, it can have a bigger or lower diameter at the center and/or periphery. Another variation to the setup using this coil would be to wrap around coil 21

another coil or coils (not represented) that would generate opposed currents to coil 21 in a passive (induction by Lenz law in response to currents in coil 21) way or in an active (by direct excitation of a power source) way.

Figure 5.i) depicts several embodiments with opposing poles, near our planet Earth *1,* that will lose weight and be propelled upwards when they are excited with DC, AC, pulsed symmetric or asymmetric (which also includes pulsed DC or AC) or rotating fields (the opposite fields can rotate in phase (or not) in the embodiments represented in figures 5.g) and 5.h)). This happens because the high vacuum stress generated by these propulsion units repels the mass of our planet also. If the symmetric systems (embodiments in figure 4 and figure 5.f) are asymmetric) were excited in an isotropic gravitational environment, no force would be produced because of the external vacuum symmetry. An asymmetry in the surrounding stress gradient or mass distribution is needed for directional propulsion.

In figure 6 we have depicted the force generated by the units (propulsion units) described in figures 4) and 5), which alter the vacuum stress locally. In this case each propulsion unit is mechanically fixed to a mass 6 so that when they are excited with a power source a repulsion force will be generated in the vacuum, which will act on the surrounding mass 6 that will also transport the propulsion unit with it. This happens because there is more mass being acted upon in a given direction (or an asymmetric distribution of mass), outside the opposing magnets/coils, which will determine the direction of propulsion. Since these propulsion units repel all mass, generally they have to be used at the extremities of the volume to be propelled so that the mass is concentrated in the direction that the force is to be produced. Figure 6 represents several possibilities of directional propulsion which are not limiting in nature. If some of these units have attracting fields instead of opposing, then an opposite directed force would result (mass would be attracted to these areas) .

In order to achieve directional control, several propulsion units have to be distributed along the periphery, as illustrated in figure 7. These are just a few examples and are not limiting in nature. Each represented section can be energized independently in order to vector the propulsion force. If desired, a grid of repelling magnets wrapped in

coils can be used as a propulsion unit with greater surface area (figure 7.f))- The coils 14 illustrated are wrapped around magnets or ferromagnetic cores 20. The coils that excite magnets can also be made of fiber optic, instead of conducting metal. One can always choose to use repelling or attracting forces to vector propulsion. The use of repulsion forces has certain advantages like repelling also the surrounding atmosphere in operation while on a planet. When traveling, repulsion fields would be generated in the front in order to reduce friction and interaction with the atmosphere; and stronger repulsive fields would have to be generated in the backward section in order to achieve forward propulsion. Other simpler alternative would be to use only the repulsion fields at the back which would also repel the atmosphere in the forward part of the vessel.

Figures 8 and 9 illustrate magnets or ferromagnetic cores 20 surrounded by coils 14 (these coils can have or not element 20 inside their core) . The use of a ferromagnetic material will increase the magnetic vector potential generated by the currents in the electromagnetic coils thereby augmenting the effect, but the excitation of magnets by coils (metallic conductors, fiber optic conductors, or plasma conductors) is more efficient due to the electromagnetic pulse that is generated when the excitation of the magnet by the coil is at high frequencies like, for example, ultraviolet frequencies. The coils/magnets (arbitrary number can be used) are excited near a diamagnetic or paramagnetic (or any) metal conductor (22) (that may also be a non-conductor (dielectric), or semi-conductor or be any other material, that may rotate or not, or that may be superconducting or not, or that may be charged (to any polarity or voltage) with a static (not changing) or dynamic (changing) charge, or that may be not charged) in such a way that opposing magnetic vector potentials from currents, and/or opposing induced electric fields $E=-\partial A/\partial t$ (or magnetic fields) are induced in element 22 according to the Maxwell equations (including specially the Faraday law, Lenz law, and the Ampere-Maxwell law) , causing a repulsion force between elements 20 (and 14) and element 22. This repulsive interaction will increase the vacuum stress in that area, generating an antigravity force that will act on any nearby mass.

Figure 8.a) depicts a flat conductor 22 that will respond to the excitation of magnets 20 (that are surrounded by coils 14) with opposing currents and changing electric fields. Figure 8.b) shows element 22 as a curved metallic conductor instead of a flat one like in figure 8.a) (this round shape may eventually be conical also, or any other). In figure 8.c) the element 22 is a metallic cylindrical tube (which may also be a cone) placed in front of the magnet/coil assembly and is used for the same purpose. In all these embodiments, element 22 may be superconductor or not, or may be charged or not, and may rotate or not.

Figures 9.a) and 9.b) are equivalent to figures 8.a) and 8.b), but with only one magnet/coil being excited near element 22. Figure 9.c) depicts a magnet/coil being excited near a metallic cylindrical (or conical) tube 22 for the same purpose. Figure 9.d) shows the magnet(s) 20, with coil(s) 14, inside the metallic tube 22 for improved performance, and figure 9.e) shows two such units in close proximity and in repulsion one to the other. Like before, in all these embodiments, element 22 may be superconductor or not, or may be charged or not, and may rotate or not.

Since the magnetic vector potential of coils is augmented by materials of greater magnetic permeability, it is advantageous to use such materials and impose opposed (or non-opposed) vector potentials . The coil and the respective cores can be cylindrical, toroidal, rectangular, conical or any other shape (figures 10 to 13) . An asymmetric shape would also induce a force on the system. But the primary interest here is to generate vacuum stress gradients to apply on surrounding masses for propulsion and control.

We can use straight cylindrical coils or toroidal coils 24 near a flat (figure 10.a)) or curved (figure 10.b)) element 22 (with the same properties referred to before) . Several cylindrical or toroidal coil(s) can be used, with or without element(s) 22 in proximity, in order to generate opposing vector potential fields (and opposing induced electric fields E=-SA/St or magnetic fields, according to the Maxwell equations, including specially the Faraday law, Lenz law, and the Ampere-Maxwell law) to create antigravity forces on any surrounding mass. In this case we can have symmetric (figure 10.c)) or asymmetric toroidal coils (2 or more), with different geometric dimensions. These coils can

be energized by dc, ac or pulsed currents. The coils can have an air core or preferentially a ferromagnetic (or other) core 23, that may also be any type of magnet(s) (with any shape and cross section). The ferromagnetic/magnetic core will increase the magnetic vector potential strength, therefore increasing the efficiency of the vacuum stress generation. We could also have an element or coil 22 inside another coil 24 (figure lO.d)). If coil *24* is excited with a changing current, then it will induce opposed currents in coil 22. We can have several layers of coil(s) 22 and 24 interposed (figure 10.e)) between themselves. The passive coil 22 can also be excited with opposed currents to coil 24 if desired.

In a similar way, planes of parallel cylindrical coils can be used to create repulsive or attractive gravitational forces in surrounding masses. If the currents (and generated changing electric and magnetic fields) in the coils are in opposite directions nearby, then a repelling force will be generated on nearby masses. These planes of coils are disposed in the periphery of the mass in order to induce directional movements through selective activation of the coils. Any embodiment with coils or magnets that is excited by a changing current will also generate a repulsion force to other coils or passive conductors 22 when the induced electric field (E=-dA/3t), due to the time change of both currents, is in opposition. We which to emphasize that, whenever we mention the induction (or interaction) between opposed currents, the opposing force is not only provided by the currents that are in opposition but also by the interaction of the induced electric fields generated by those changing currents (changing vector potential). That is, the opposing force also contains an electric repulsion (or attraction) interaction component, and not only a magnetic factor. This is an important remark since we σan have an important repulsion force between changing currents without having to generate necessarily big currents that could heat too much the material of the used conductor(s). This understanding is employed in all embodiments in this patent using interactions between changing currents.

Figure 10.f) depicts two flat coils wrapped side by side (with or without a ferromagnetic or magnetic material 23 interposed between coils 25 and 26). Coil 25 is active and

excited by AC or pulsed currents. Coil 26 is passive (closes on itself) and is of a diamagnetic/paramagnetic material which will passively generate opposed currents to coil 25 by induction through the Lenz law. Or alternatively, coil 26 can also be active and excited by a power source in order to generate opposed currents to the currents of coil 25.

In like manner, different embodiments of this concept are depicted in figures 10.g) and 10.h). Figure 10.g) represents a flat coil 24 (or a magnet (s) or ferromagnetic core surrounded by a coil 24) near a flat diamagnetic, or paramagnetic (or any other) conducting surface 22. If element 24 is adjusted to a curved conducting surface 22, we have the situation depicted in figure 10.h). As before, element 24 is active and 22 is passive (or eventually also active) .

Alternatively we can have a circular coil 24 (with or without a magnetic or ferromagnetic core 23), which surrounds a metallic conducting plate or coil 22, like in figure 10.i). Element 22 can be a circular ring (or a circular coil, active or passive), like in figure 10.j). The central element 22 can also be asymmetric (figure 10.k)), but this time will also develop a directional force due to the asymmetry of element 22. In this case, the opposed induced currents on the asymmetric element 22 will also be in opposition between themselves. Please note that the referred coils 24 (or elements or arrangements of elements 23 surrounded by coils 24) in figures 10.i) to 10.k) can also be above or below element 22. In these last embodiments (figures 10.g) to 10.k)), element 22 may be superconductor or not:, or may be charged or not, and may rotate or not. Or one can use a ferromagnetic (or magnetic, or other) material 23 together with elements 22 and/or 24, or eventually use several parallel planes of elements 22, and/or 23, and/or 24 interposed in succession.

Figures 11 to 13 represent different variations of the same physical principle. We have (or not) a core of ferromagnetic material (or simply a magnet (s) of any type) 23 with a coil 24 wrapped around it (from the inside or outside) . Element 23 will amplify the vector potential generated by the coil when it is excited by AC, or pulsed currents. When this vector potential changes around the coil(s) (one or more) 24 surrounding or involving (from the

inside or outside/ or instead intermingle in the same plane) a tubular (conical, toroidal, oval, spherical, cylindrical or any other shape; hollow or not) element 22 (with the same properties referred to before, and connected or not to a power supply), the element (s) 22 (when not connected to a power source) will generate opposed induced currents, and opposing (changing) electric fields (and also magnetic fields) in response to any externally applied changing electromagnetic field (or fields) generated by coil or coils 24. Element (s) 22 (when connected to a power source) will generate opposed currents and opposing (changing) electric fields (and also magnetic fields) , in relation to the changing electromagnetic field (or fields) generated by coil or coils (24) . These opposing fields will generate antigravity forces that can be used to vector propulsion as discussed before. In all these embodiments, either (or both) coil or coils 22 and 24 can be formed by a tubular coil material (of any shape) that can allow the presence of a (conducting) plasma inside.

Figure 11.a) shows the setup described before with a solid ferromagnetic core (or a magnet (s) of any type) 23 and a metallic tube 22 surrounding (from the inside or outside) coil 24. The element 23 can be hollow as shown in figure 11.b). Instead of a metallic tube 22 around coil 24 we can have an active or passive (excited or not by a power source, respectively) coil 22, as in figure 11.c). Or we can have a coil 24 surrounding (from the inside or outside) element 22 (figure 11.d)) which will generate opposed currents according to Lenz law.

Instead of surrounding coil(s) 24, coil(s) or element (s) 22 (active or passive) can involve (side by side or intermingle) coil 24 (in the same plane) as shown in figure 11.e). Figures 11.f) and 11.g) show, respectively, how the elements 22, and/or 23, and/or 24, in figures 11.c) and 11.e) can be conical, or have any other shape (even be hollow) . In these embodiments, element 22 and/or 24 may be superconductor or not, or may be charged or not, and may rotate or not. Or one can use (or not) an element 23 together (or not) with element (s) 22 and/or 24, or eventually use several parallel (or at any other angle) planes of element (s) 22, and/or 23, and/or 24 interposed in succession.

Figure 12 shows a toroidal shape for the same concept. In figure 12.a) we have passive (or active) coil 22 involving (laterally in the same plane) active coil 24, and a solid ferromagnetic (or magnetic) core 23 which can also be hollow. Coil 22 can also surround (from the inside or outside) coil 24 as in figure 12.b). Passive (or active) element 22 can be a solid metal with a toroidal shape like in figure 12.c), or can have a hollow (27) toroidal ferromagnetic (or magnetic) core 23 (figure 12.d)).

Figure 13 repeats the same concept with other shapes. In figure 13.a) we have an oval shape, in figure 13.b) a saucer shape, and in figure 13.c) a cylinder or rectangle shape. Openings 28 can be introduced where desired (figure 13.d)), and we can introduce windows or cupolas 29 for viewing purposes (figure 13.e)). These windows can be made of any transparent material, including transparent metals, glass, plastic, or other. The coil 24 represented in these last figures can be more than one (any number of coils parallel or perpendicular to one another) and can be divided into different or independent sections. This coil or sets of different coils can be excited by AC, pulsed or rotating magnetic fields (monophasic or poliphasic excitation) . As shown, the element 22 can be the external conducting surface of the craft or any internal element. Please note that in all the preceding setups where we have passive coils or metals 22 that transport current only because of induction due to an active coil 24, can also be used has active coils with currents in opposition (or not) relative to the primary active coil 24. In this case, we can use a DC, AC, pulsed or rotating field excitation of both coils.

Please note that, although in figures 11 to 13 there is used a ferromagnetic (or magnetic) core 23 near the exciting coil 24 (or 22), all these embodiments can equally function without any element 23. In these embodiments, element 22 may be superconductor or not, or may be charged or not, and may rotate or not. Element 23 can be used together with elements 22 and/or 24, or eventually we can use several parallel planes of elements 22, and/or 23, and/or 24 interposed in succession. Eventually, element 24 can have all the properties ascribed to element 22.

Therefore, we can use excited magnets (surrounded by coils) and/or coils (14, and/or 22, and/or 23, and/or 24) or

arrangements of them interacting with the metallic conducting skin of the craft (or interior metallic elements) . The external element 22 and/or 23, and/or 24 would generate opposing currents in relation to the coils or magnets (20, and/or 14, and/or 22, and/or 23, and/or 24). This repulsion force produced would increase the vacuum stress locally and the mass of the craft would be repelled by the high vacuum stresses generated by these units inducing propulsion of the whole system. When using opposed currents trough the Lenz law we must remember that there is a frequency limit for which the metal will respond. It is known that metals become transparent to electromagnetic radiation above the ultraviolet range. If the excitation is at or above these frequencies then the metal would not generate opposed currents through the Lenz law. Nevertheless, other systems described would continue to function at these frequencies, namely any asymmetric magnet arrangements excited by fiber optic at these higher frequencies (which function independently of having or not a metallic conductor in front of the unpaired magnet) . Propulsion efficiency increases with applied frequency and also with a larger spectrum or frequency bandwidth of the generated signals .

A different configuration is depicted in figure 14.a) which depicts a toroidal chamber 30 involved by a coil 24 (with or without a ferromagnetic or magnetic core 23, inside or outside coil 24) . The longitudinal section of this chamber is shown in figure 14.b), and the cross section in figure 14.c) . There we can see a coil 24 surrounding a chamber 30 which contains a conducting diamagnetic (or paramagnetic, or semi-conducting, or superconducting, or non-conducting, or any other conducting or ionizable) material 31, which can be in liquid, gas, vapor or plasma (ionized) form (in any combination, like ionized mercury vapor, for example) , that may be charged (to any polarity or voltage) with a static (not changing) or dynamic (changing) charge, or that may be not charged.

When the coil 24 is excited by AC, pulsed or rotating field, then element 31 will strongly respond with opposing currents due to the Lenz law. This will generate an antigravity force. As a way of example, this toroidal chamber 30 can occupy the whole outside perimeter of the craft (s) detailed in figure 13. If the coil 24 in figure

14.a) is operated around the whole circumference, then a uniform antigravity force will be generated. If the coil 24 is separated into different sections around the perimeter (the toroidal chamber 30 can also be separated into different and independent sections) like in figure 14.d) then directional propulsion can be achieved by isolated excitation. Alternatively, the coils 24 in figure 14.d) can be independent units like shown in figure 14.b). Figure 14.e) shows coil 24 excited from the center to the periphery (or inversely) that will also interact with the generated opposing currents by element 31, to develop an antigravity force. Figure 14.f) shows a propulsion unit in vertical position. It can also be used as a vertical mast in the craft(s) of figure 13 (as an example) in order to provide a sustaining antigravity force. A variation of this geometry is shown in figure 14.g) with a cylindrical shape, where we have a coil 24 surrounding the circular chamber 30 that contains element 31. This setup will also function as a propulsion unit. As a way of example, the use of three of these units at the bottom of a craft can be used to vector propulsion. The element 31 inside the chamber 30 can also be excited with a toroidal coil 24 (figure 14.h)), which may have a ferromagnetic or magnetic core 23.

If the coil 24 of figure 14.b) is excited with a propagating pulsed current 32 to the left (figure I4.i)), then element 31 inside the chamber 30 responds with opposing currents. Since these opposing currents are propagating to the left, then a propagating antigravity wave will be emitted which will transmit a force to any mass in its path. This can be used for propulsion purposes and also to transmit force to any mass at a distance.

If mercury is used as the diamagnetic material, then it is of advantage to work at the temperature and pressure where the mercury behaves has a superconductor (Kohno and Yao, 1999). Operation at these parameters would greatly increase the force effects. Note that any other conducting material 31 (diamagnetic, superconductor or other) can be used. Although not mentioned before, all embodiments with passive (or active) elements 22 or 31 (solid, liquid, vapor or plasma) will generate opposed currents more efficiently if they are superconducting.

It is to be noticed that all the setups represented in figure 11 can also be used to generate gravity or

antigravity beams depending on excitation of the coils 24 (and/or 22). If the coil 24 is excited with a directional pulsed current like in figure 14.i) then an antigravity beam would be emitted. Electromagnetic waves of propagating opposing fields or attracting fields will function as antigravity or gravity beams, respectively (depending also on the sense and direction of the phase of the propagating wave). A setup (figure 11) with one or more conducting wires (coils, elements) could be used to generate a gravity or antigravity beam depending if it propagates non-opposing or opposing fields along its length. If element 22 is passive then it can only generate opposing fields. It functions as an antenna emitting vacuum stresses that can be attractive or repulsive. For example, if we have two conducting wires (24 and 22 are both active and excited) and both carry a current were the current of one wire (or of both wires) is phase shifted in relation to the other, we can create propagating opposed or non-opposed fields that would be emitted from the coils like radio waves are but with the property to exert forces in its propagating path according to the vacuum stress being propagated, and of the sense and direction of the phase of the propagated wave. A traveling standing wave is generated by causing a slight phase difference between two phase cancelled carriers. By varying the phase (by changing the phase of the exciting frequency (ies) or of the modulation of this frequency (ies)), the standing wave field can be caused to walk or move. In this manner it is possible to create fixed or moving points in space (using one or more units that interfere in space) that are attractive or repelling (figure 14.j), were 33 represents an attraction or repulsion point, and element 23 can also be element 31). Besides the use as an attractive or repelling beam, it can be used to create attractive or repelling points in space to cause a propelling force on a craft or mass 6 (figure 14.k)), were 34 represents a repulsion point, and the element 23 can also be element 31). The use of this system while emitting a traveling wave of repulsion can be used to impart a constant force on any nearby mass (a craft or any other mass 6; being a possible application the extinguishing of fires). Another embodiment of this concept (figure 14.1), where 33 represents an attraction or repulsion point), would use two or more magnets 23 (or 20) surrounded by coil(s) 14 (or coils 22 and/or 24 (figure

14.ITi), where 33 represents an attraction or repulsion point) that would interfere at a distance (as described before) in order to create an attraction or repulsion point. Please note that, although not shown, the mentioned coils can be in any position around the magnet (s): at the front, side, back or around the magnet (s) or the complete setup of magnets.

In a different way (figure 14.n)), one could use a hollow magnet 23 (or 20) surrounded by a coil or coils 14, which contain a chamber with a conducting material 31 (that is diamagnetic, or any conductive or ionizable element in liquid, gas, vapor or plasma form). Alternatively (figure 14.o)) the magnet is not hollow, and the chamber with the material 31 is on the outside of the magnet 23 (or 20) and of the coil 14 (22 and/or 24). In these last two embodiments, the excitation of coil(s) 14 (22 and/or 24) will induce opposed currents in the conducting material 31 (amplified by the magnetic field of the magnet). The generated field opposition will create an increased vacuum stress which will induce a repulsion force on nearby masses which can be used for propulsion purposes. If the excitation is directional (from right to left for example), and waves with fields *in* opposition are emitted in space, then masses *on* the propagation path will be subject to a directional force. In an alternative way, one could also use two electrodes 35 and 36 (of any conducting material, that are superconductive or not) on the extremities of the chamber containing the material 31, that is inside (or outside) a magnet 23 (or 20) (Figure 14.p)), and eventually use a coil or coils 14 (and/or 22 and/or 24) that can be active or passive, surrounding that chamber (Figure 14.q)). In these last two cases, the material 31 is excited by an electrical discharge using electrodes 35 and 36. Since the discharge occurs inside a magnetic field, the particles will have a spiral movement towards the opposite electrode in a way to generate a magnetic field opposite to the applied field of the magnet. If there are one or more passive coils 14 that are surrounding the chamber with the material 31, then these coils will generate currents that are opposite to those generated by element 31. These opposed currents, like discussed before can be used for propulsion purposes, or if the excitation is directional, were waves with fields in opposition are emitted in space,

then masses on the propagation path will be subject to a directional force.

In order to create repulsion forces on masses 6, one could also use the setup depicted in figure 14.r), which uses several magnets 20 (with coils 14 around them) in opposition, and a chamber 30 containing a diamagnetic material 31. When coil(s) 14 around elements 20 are excited, element 31 (in liquid, gas, vapor or plasma form) will respond with opposing currents. Since that perturbation is propagating to the right, and will continue to propagate in space as opposed fields, any mass 6 on that path will be actuated with a force F.

If we want to use the arrangement of opposing magnets 20 (with coils 14 around them) as a propulsion unit (to be distributed around a spacecraft to vector propulsion) we can add a chamber 30 that contains an element 31 (with the properties described previously) like depicted in figure 14.s). Element 31 will respond with opposing currents to the magnets (and coils) thereby generating an antigravity force. Chamber 30 can have different geometries like depicted in figures 14.s and 14.t) (not limiting), and the external excitation system (magnets 20 with coils 14) may vary in configuration (figure 14.u); not limiting). These are only examples, and applications are not limited to those shown. In all the embodiments of figure 14 and before, any coil 14, and/or 22, and/or 24, can be formed by a metal conducting coil, or a fiber optic coil, or a radiofrequency cable coil, or a microwave cable coil, or a coil material that permits a (conducting) plasma inside, or any other suitable conductor of electromagnetic energy.

Alternatively to magnetic forces we could also use opposing and non-opposing electrostatic forces (using positive or negative polarities, or the ground) for the same purpose. In figure 15 we can see how opposing and non opposing electric fields act on external masses. Opposing fields, shown in figures 15.a) to 15.i), repel masses. In this case one can use parallel (perpendicular, or at any other angle) plates, concentric rings, or concentric electrodes (in solid, liquid, vapor, or plasma (ionized) state, where a containing chamber and electrical exciting means are used when necessary), having a symmetric or asymmetric shape (of flat, concave, conical, tubular, elliptical, circular, semi-circular or any other shape), charged (or ionized by

any means) to the same polarity, and in relative rotation (figures 15.h) and 15.i)) or not (figures 15.a) to 15.g)). Electrodes 37 or 38 can be symmetric or asymmetric, that is, they can have equal or different dimensions (diameter, length, thickness, etc), were any combinations of shapes and dimensions can be used. Electrodes 37 or 38 can be (one or more layers of) concentric rings or electrodes of any shape (that close on themselves or not, that is, they are symmetric or asymmetric) . One can use one electrode (or multiple concentric electrodes) inside a Faraday cage charged to the same high voltage polarity, or one can use one or more layers of concentric metallic enclosures (of any shape, or that close on themselves or not, that is, they are symmetric or asymmetric) . Electrodes 37 or 38 can be superconductive or not, or even not conductive. In this last case the non-conductive material is charged, which will still respond to changing electrical fields with opposing currents. The spacing and thickness (or any dimension) of electrodes 37 or 38 can be of any scale, using a normal thickness or separation distance between the electrodes in the order of millimeters or centimeters (or more) or down to micrometers or smaller. Electrodes 37 or 38 can be parallel, perpendicular or at any angle to each other, or eventually form a grid of parallel or perpendicular planes (or planes at any other angle) that interconnect or not between themselves.

If one or more electrodes 37 or 38 are disposed in an asymmetric configuration like that in figures 15.e) and 15.f) (in one or more successive layers, or separated or not by non-conductive (dielectric materials with any dielectric constant) or semi-conductive, or any other elements which can also be the atmosphere or the vacuum), then a force will act on the setup itself as well as on any external masses. This happens because of the asymmetry of the mass distribution in relation to the area were the vacuum is stressed. Therefore, the setup shown in figures 15.e) and 15.f) will be auto-propelled in the direction shown when charged at the same high voltage polarity (all positive or instead all negative, or instead all alternating or pulsed at the same time) . The last drawing on the right of figure 15.f) is not auto-propelled. It represents the possibility of electrodes 37 or 38 being a chamber (of any shape) which contains an ionized material that is charged positive or instead is charged negative

(since electrodes 37 or 38, and 35 or 36 can be in the solid, liquid, vapor, or in plasma (ionized) state; or any combination of physical states), which uses any type of confinement system (electrostatic confinement for example) and any electrical (or ionizing) exciting means (using electrodes inside the chamber or accelerating electric particles to the confinement area, for example) can be used when necessary. This concentration of charges of the same polarity exerts repulsive forces on nearby masses.

When electrodes 37 or 38 are charged to the same polarity (constant, pulsed or oscillating) and generate a gravitational repulsion, all electrodes can be permanently connected between themselves, or connected independently to the power source, or connected (or not connected) in any variation. A material with several (parallel, perpendicular or both) layers of conductive and non-conductive (or semi-conductive, or any) elements (which can also be the atmosphere or the vacuum) that are very near to each other (millimeters, micrometers or less), would be very effective at producing gravitational repulsion forces on nearby masses (figure 15.g)) when the conducting electrodes are charged to the same high voltage polarity (constant, pulsed or oscillating). If the spacing between the electrodes 37 (or 38), in figures 15.e) and 15.f) (that have an asymmetrical shape and are auto-propelled), is very small (millimeters, micrometers or less) then it will increase the magnitude of the propulsive force generated.

Attracting fields, shown in figures 15.j) to 15.m), attract masses. In this case one can use parallel (perpendicular or at any other angle) plates, concentric rings, or concentric electrodes (in solid, liquid, vapor or plasma state, where a containing chamber can be used when necessary), with any symmetric or asymmetric shape (flat, parabolic, concave, conical, tubular, elliptical, circular, semi-circular, or of any other shape), charged (or ionized) oppositely, or one polarity towards ground, and in relative rotation or not. Besides this, the other practical and operational considerations provided for the repulsion mode are also valid for the attraction mode, taking due care of the opposed polarity and inverse force between the electrodes.

Of special note is the use of rotation in opposite direction of the nearby plates or rings or ion clouds (in solid, liquid, vapor or plasma (ionized) state, where a

containing chamber and electrical exciting means are used when necessary) 37 or 38, with velocity v, charged to the same potential (constant, pulsed or oscillating) like represented in figure 15.h). This will increase the repulsion between the plates because of the added repulsion between the oppositely directed currents (a magnetic repulsion component is added to the already existing electric repulsion component) . If these charged plates (or rings) were rotating in the same sense they would transform the repulsion into an attraction (figure 15.k)). One can also use pulsed currents in both cases, were instead of a constant velocity v one can have an acceleration a, of the charges (with symmetric or asymmetric acceleration rising or falling times) . In this case one would have to take care of the induction of opposing or attracting induced electric fields, E=-∂A/5t, generated by the changing currents. In practice, we can accelerate or decelerate the plates directly, or else, we can make the rotation axis of one (or more) plate (s) eccentric (the axis of the motor is displaced from the geometric center of the rotating mass; plates, concentric rings, etc.) in such a way that, even if the applied force is constant, the plates are continuously accelerated one in relation to the other. However, as before, repulsing fields repel matter and attracting fields attract matter.

One could also use an electret material (with a single layer or multiple layers of opposite charges), or use the metallic plates or rings 35 and 36 (single pair or multiple parallel pairs, rings or layers), charged to opposite polarities (to a very high voltage, constant, pulsed or oscillating) , with or without a dielectric (non-conducting) member, or semi-conducting member, (or any other member) interposed in between, that are rotated as a whole (or not) in the same direction with velocity v (figure 15.i)), in order to create a repulsion between the generated oppositely directed currents. This repulsion would create a tenser vacuum, increasing the negative gravity field of the vacuum in this area. Alternatively, electrodes or plates 35 and 36 (single pair or multiple parallel pairs, rings or layers) , charged to opposite polarities, with or without a dielectric (non-conducting) member, or semi-conducting member, (or any other member) interposed in between, can be rotated in opposite senses with velocity v (figure 15.1)),. in order to induce attraction between the generated

currents, and therefore a gravitational attraction of nearby masses.

As before, one can also use pulsed currents were instead of a constant velocity v one can have an acceleration a, of the charges (with symmetric or asymmetric rising or falling times). In this case one would have to take care of the induction of opposing or attracting induced electric fields, E=-θA/9t, generated by the changing currents. In practice, we can accelerate or decelerate the plates directly, or else, we can make the rotation axis of one (or more) plate(s) eccentric (the axis of the motor is displaced from the geometric center of the rotating mass; plates, concentric rings, etc.) in such a way that, even if the applied force is constant, the plates are continuously accelerated one in relation to the other. However, like before, repulsing fields repel matter and attracting fields attract matter.

Although represented symmetrically, the parallel plates 37 or 38 (or 35 and 36) can be asymmetric, that is, have different relative dimensions; and may be flat, concave, conical or any other shape. The represented parallel plates 37 or 38 (or 35 and 36) can also be (multiple) concentric rings (stationary or rotating), that can be superconductive or not, or even not conductive (but electrostatically charged), or can form a single pair or multiple parallel pairs (or electrodes), with or without a dielectric (non¬conducting, semi-conducting or any other material) member interposed in between,

If we repeated the Galileo dropping experiment with two (or multiple) parallel conductors 37 or 38 charged to the same (high voltage) polarity (constant, pulsed or oscillating), we would also observe a slower fall (figure 16.a)). This would happen because the conductors are charged to the same polarity and therefore the electric field between them would be in opposition, increasing the vacuum stress in that area, thereby repelling also the planet.

For propulsion purposes we can surround a mass by parallel conductive plates that can be charged to any constant, pulsed or oscillating polarity (figure 16). In particular, if we have conductive plates 37 or 38 at one extremity and conductive plates 35 and 36 at the other extremity, and we charge plates 37 (or 38) with the same charge, and charge

(or not charge) plates 35 and 36 with opposite charges, the mass will feel a force towards the lower vacuum stress (away from the plates with the same charge and towards the plates with opposite charges) as shown in figures 16.b) to 16.j). Since there is no danger of disruption between the plates charged at the same polarity we can charge them to millions of volts without electrical disruption. But since the plates 37 or 38 may also be used to be charged with opposite charges (like plates 35 and 36), we can encapsulate all (multiple) plates or rings in a dielectric material or a non-conducting material, with the advantage of increasing mechanical strength, stability and security. The vacuum stress induced by the electric forces would induce propulsion forces on surrounding masses as discussed also in relation to figure 15.

Instead of parallel plates we could use a Faraday cage for the same purpose. Charging a metallic enclosure to millions of volts (DC, AC, pulsed) would have the same effect of using two parallel plates that are charged with the same charge because the electric field is zero summed inside. Alternatively, one could introduce one electrode 35 inside the Faraday cage 36. In the attractive mode, the interior electrode 35 would be charged to whatever voltage and the exterior electrode 36 would be charged neutral in order to maintain exterior electric neutrality (figures 16.g) to 16.i), where 39 represents the application of a radiofreguency to electrode 35), or inversely, we could charge the external electrode 36 and maintain electrode 35 neutral. This arrangement functions in the repulsive mode if the charges are egual (figure 16.e) and 16.f)) or in the attractive mode if the applied charges on each electrode are opposite or even if the external enclosure is maintained at ground potential and the inner electrode is charged plus (figure 16.g)), minus (figure 16.h)) or submitted to a pulsed or AC radiofrequency (RF) 39 (figure 16.i)). Please note that the parallel plates 37 or 38 that are in repulsion mode (figures 16.b) to 16.f)) can be excited by high voltage DC (direct current), high voltage AC (alternating current), or pulsed current (any waveform).

Alternatively, in accordance with the explanation given to figure 3.c), a high density plasma 8 can be used to induce an attractive force towards it (figure 16.k)). This force will increase with the plasma density produced (plasma

density and thickness have to be optimized like described by Laroussi and Anderson (1998), for example). This plasma may be formed using one or more electrodes (or coils, or electromagnetic antennas in any combination and of any shape and form), inside (or at the periphery) a chamber 40 (spherical, rectangular or any other shape; made of transparent metal or any other conducting, non-conducting, semi-conducting or any other material), that are excited by a power source in order to form a solid state plasma (an ionized solid material), a liquid, a vapor or a gaseous plasma (at high pressure, for example), or using any adequate substance inside chamber 40 that can be ionized to form that plasma 8 (figure 16.k)). Besides the chamber 40 to contain the plasma, any other already known means to contain the plasma 8 can be used (electrostatic or magnetic confinement for example). If plasma 8 is solid state, then chamber 40 might not be needed.

The parallel metallic electrodes 37 or 38 (or 35 and 36) represented in the different setups of figures 15 and 16 can be of any number as exemplified by the parallel plates 41 represented by the side view in figure 17.a). Although they are represented has symmetric they can also be asymmetric (have different dimensions in relation to the other electrodes). The plates 41 (37 or 38, or 35 and 36) can also be separated into different and independent sections in order to vector propulsion, like exemplified in the upper view in figure 17.b). These independent sections 41 are a short distance separated in order to really function independently, and the whole setup may be encapsulated in a non-conducting (dielectric) material, semi-conducting or any other material.

Electric longitudinal waves can also be used for propulsion. Monstein and Wesley (2002) have verified experimentally the existence of longitudinal electrodynamic waves. These are waves where the electric field 42 oscillates along the propagation axis and not perpendicularly as usual. As they say in their article, a spherical symmetrical electrode 43 can only propagate longitudinal waves (figure I8.a)). Other shapes can radiate both types of electric field (longitudinal and transversal). Since other shapes can also emit longitudinal waves they are shown as illustrative useful examples (not limiting) in figures 18.b) to 18.e). Figure 18.b) shows an

oval shape, figure 18.c) is a toroid shape, figure 18.d) is a rectangle shape, and figure 18.e) is a concave shape of a conducting material 45. In these figures, elements 43 and/or 45 are exposed to the surrounding environment or may be involved by a protective enclosure 44 made of non-conductive (dielectric) material, or semi-conductive material or any material, and whose shape can be similar or different to the shape of elements 43 and/or 45. If used, the protective enclosure 44 can be molded (or not) to the shape of elements 43 and/or 45, or instead can allow the presence of a separating space or chamber (between the enclosure 44 and elements 43 and/or 45), that can be filled with a solid or liquid (non-conductive dielectric or semi-conductive), material for protective purposes (avoid plasma formation), or that can be filled with a liquid, vapor or gaseous material for the purpose of plasma creation if desired (a material that can be ionized). For example, if the enclosure 44 allows the existence of a space that can be filled with a gas, then it can be ionized and form a plasma 8 if the conductor 45 is excited by AC or pulsed current (high voltage) (figure l8.fj), and this plasma can also be used to generate longitudinal waves, functioning as a plasma antenna (Jenn, 2003).

A longitudinal interference zone in space can be formed by the excitation with a power source of two or more nearby elements 43 and/or 45, in proximity (that face each other, or not), with or without the enclosure 44 (and with or without a plasma inside the enclosure). But the conductor 45 can also be passive (not excited directly by a power source) and used only to reflect incoming waves from elements 43 as shown in figures 18.g) to 18.i). In these figures the electrode 43 is placed below element 45 and is excited by an AC or pulsed (high) voltage. The longitudinal waves generated by these electrodes 43 (any number may be used) are reflected by the passive conducting element 45 in order to form a directed propagation path or beam of longitudinal waves. In figure 18.g) electrode 43 as the shape of a ring or torus (or may be two spheres or may even have any other shape as exemplified by figures 18.a) to 18.e), but not limited to those). In figure 18.h) electrode 43 has a spherical shape, and in figure 18.i) we can see how an electrode 43 placed at the focus point of a parabolic reflector generates a directed beam of longitudinal waves in the direction of the represented

arrows. This last setup in figure 18.i) (electrode(s) 43 and parabolic reflector 45) constitutes the longitudinal beam emitter 46. In this case, reflecting element 45 can be passive (not connected to a power source), or charged to a static (or changing) high voltage (any polarity), or connected to any given power source. Element 45 is formed by any conductive metal, that may have any shape, or may be a plasma reflector.

We can also charge element(s) 43 and/or 45 with static (pulsed or oscillating) high voltage and produce longitudinal waves by mechanically vibrating element(s) 43 and/or 45. In this way it is possible to emit longitudinal waves in space that interfere in order to create one or more attraction or repulsion points in space. Alternatively we can charge element(s) 43 with a static (pulsed or oscillating) high voltage, and generate longitudinal waves by mechanically vibrating element(s) 43, which is placed at the focus point (or simply below) of a parabolic (or a reflector with any other shape, flat or semi-circle for example) reflector 45 (connected or not to a power source), that may be charged or not with a static (or changing) high voltage. The parabolic reflector 45 can also be charged with static (or changing) high voltage and mechanically vibrated in order to generate longitudinal waves that can also create directly a focus point in space (figure 19.j), where 52 represents an interference zone) that can repel or attract matter (and the reflector itself).

Figure 19.a) shows the variation in time (or a projection in space) of the longitudinal electric field intensity 42 and direction or vector 47, emitted by electrode 43 or 45 or by the beam in figure 18.i), emitted by element 46. Considering that this represents the projection of the electric field vectors 47 in space of the longitudinal electric field 42, we can see areas were the electric field vectors are in opposition and others were they are not. We had concluded from figure 1 that electric charges with opposed electric field vectors increase the vacuum density between them, thereby creating a repulsion force from that zone. And the non-opposed (or attracting) electric fields decreased the vacuum density creating an attraction force towards that area. This theory also applies to the electric field vectors 47 generated by propagating longitudinal waves. The repulsion points 48 (figure 19.a)) are located

were the electric field vectors are in opposition, and the attraction points 49 are located were the electric field vectors are not in opposition. Figure 19.a) also shows that any mass 6 acted by these forces will tend to be transported towards the attraction points 49.

If two longitudinal beam emitters (figure 19.b)) are positioned face to face, and if they are excited by a frequency that allows for a standing wave pattern (that can change in time or not, but which maintains the same field relation, in opposition or attraction) to be formed along their axis of separation, then we will have one or more attraction and/or repulsion points, 49 and 48 respectively, along this axis. Therefore a mass subjected to these forces can be levitated, transported and moved by varying the phase 50 of the longitudinal standing wave pattern (by changing the phase of the exciting frequency (ies) or of the modulation of this frequency (ies); the use of equal or similar frequencies facilitates the process of phase synchronization) .

Alternatively, we can use only one (or more) beam emitter (s) 46, as shown in figure 19.c), and/or one (or more) longitudinal wave emitter (s) (43) and/or (45) (element (45) can be a plasma antenna or not) . If the phase 50 of the emitted wave (or of the resultant wave from the interference of more than one source) changes (or propagates in space) continually in one direction, in order to form a traveling wave in space, then it can be used has an attractive or repelling wave (in all directions, like the repulsion from the epicenter of an explosion due to the propagating pressure wave if we use element 43 or 45), or instead can be used has an attractive or repelling focused beam, were the attraction and/or repulsion depends on the direction of the phase change (any mass will be dragged by the moving attracting/repelling points in the direction they propagate) of the propagating wave or beam in space (by directly changing the phase 50 of the emitted wave or beam, for example). Considering figure 19.c), if the phase propagates from the beam emitter 46 to the right, then it will function as a repelling beam on a nearby mass in that direction. If the phase propagates from the right towards the beam emitter 46, then it will function as an attractor beam on that mass. This happens because any mass subjected to this beam will be "locked" at the attracting points 49

because it is being repelled from repulsion points 48. If these attracting and repelling points move in space, then the mass will follow in the same direction. A system like this can be used for propulsion, or to manipulate masses at a distance (or also the mass that carries the generating elements 43, and/or 45, and/or 46), and eventually also to extinguishing fires at a distance.

If we have a metallic conductor 51 (that can be passive: reflecting, or active: longitudinal wave emitting), that is flat (concave or of any other shape), facing the longitudinal beam emitter 46, or the longitudinal wave emitter 43 and/or 45, it will reflect (passive behavior) the incoming longitudinal waves and create an interference pattern between incoming and reflected longitudinal waves. This process may generate a standing wave pattern has represented in figure 19.d). Along this standing wave there will be several stationary attraction points 49 and repelling points 48 on which masses can be suspended. Element 51 can be moved or not, charged or not with static (pulsed or oscillating) high (or low) voltage or also excited or not by a power source, in order to generate a standing or changing wave pattern. One can vary the phase of the mentioned longitudinal standing wave pattern (by moving element 46, and/or 51, and/or 43, and/or 45, or by changing the phase of the exciting frequency (ies) or the phase of the modulation of this frequency (ies)) in order to transport, levitate or move a mass (including also the mass of the generating elements 43, and/or 45 and/or 46, and/or 51).

In figure 19.e) a concave metallic conductor 51 is used (any shape can be used) which also reflects the incoming longitudinal waves and creates an interference pattern. Since the shape is parabolic (concave, or any other shape), it may create a stronger focus point on an interference zone 52 at short distance, that can be used to create forces on nearby masses, including the reflecting plate 51 also.

In figure 19.f) we have two longitudinal beam emitters 46 that create a repelling focus point 48 in space from the interference of two (or more) wave patterns at a distance. This system can be used to manipulate masses at a distance. If these emitters are mounted on an aircraft, then the mass 6 of the craft will be repelled from this point and will be

propelled upwards (figure 19.g)). Any number of beam emitters 46 can be used. Using two (or three) beam emitters that create a focus in the downward direction, and another two (or three) beams that create a different focus (attractive or repulsive) upwards (figure 19.h)) will allow for a better propulsion control.

Alternatively, one can use more than one electrode 43 near the passive conductor 45, like shown in figure 19.i). Using two or more electrodes 43, like shown, will also create an interference area 52 below element 45 which can induce propulsive forces (on elements 43 and 45) as discussed before. Or we may use two or more electrodes 43 that interfere between themselves (without using any outside element 45 above or below electrodes 43), in order to create an interference pattern in space and induce propulsion forces as discussed above. In another embodiment, conductor 45 can be directly excited by a power source, in order to create an interference zone 52 (or a focus) as shown in figure 19.j). In all cases, besides normal excitation using AC or pulsed generators (Tesla coils tuned to pulsed or AC mode, for example), one can also use an excitation developed by the Avramenko's (2000) (which can be used in all former embodiments).

Another way to create an interference zone for the purposes discussed before is the use of an acoustic lens 53 that can be, for example (but not limiting), a zone plate in order to focus the longitudinal waves from element 43 (or 45 or 46) in an interference zone 52 (figure 19.k) and 19.m)). Zone plates function like an acoustic lens 53, and are made of several metal concentric rings (figure 19.1)) and are used in the field of acoustics (Everest, 2001) as acoustic lens, in order to focus sound on a specific point. The slits in the zone plate 53 are arranged so that the several path lengths differ by multiples of a half wavelength of the longitudinal wave propagated, so that all diffracted rays arrive at the focal point in phase, combining constructively. This setup can also function as an acoustic lens for electrodynamic longitudinal waves (figure 19.k) and 19.m)). Element 53 can be any type of acoustic lens that is known. One can use more than one setup like that represented in figure 19.k) or 19.m) in order to create a stronger focal point. One or more zone plates can be used as an acoustic lens 53 for electrodynamic longitudinal

waves in order to create a focal point for the longitudinal waves emitted by elements (or emitters) 43, and/or 45, and/or 46, and/or 51. The focus of this lens can create a repelling point 48 or an attracting point 49 for mass manipulation or propulsion purposes as before.

In order to illustrate some non-limiting applications of the propulsion units (54) discussed above (in figures 4 to 19, using magnetic or electric forces) we illustrate some concepts in figure 20. There can be a uniform distribution of propulsion units around the periphery of the craft (with mass 6) in order to vector propulsion as illustrated in figure 20.a). Figures 20.b) and 20.c) illustrate a top or bottom view of figure 20.a) with more propulsion units to vector propulsion. When traveling, these propulsion units 54 can be used to repel the atmosphere while on a planet, to avoid friction losses, or to repel space debris (for safety) when traveling in space. Figures 20.d) and 20.e) illustrate some different shapes. There can be used any shape whatsoever for the vessel or mass 6. The only important factor is the use of several propulsion units 54 to vector propulsion. Besides these propulsion units 54, the craft can have a general global and symmetric system that generates antigravity forces, like illustrated in figures 12 and 13, that can be excited asymmetrically (in sections) or were propulsion units 54 are used to vector propulsion.

Since any mass can be attracted or repelled with this system, we can use it to manipulate masses, extinguish fires, or achieve propulsion (aerial, terrestrial, underwater or space propulsion), levitation or suspension. Figure 21.a) illustrates another conceptual use where (animated or non animated) masses are suspended inside (or in any other adequate space) a chamber (active zone) for recreation purposes or scientific research. The upper 55 and/or lower 56 sections (and/or side sections) of the chamber contain propulsion units 54 and can produce repulsive or attractive forces on the masses 6 inside the chamber in order to induce weightlessness or directed movements. These can be produced by all propulsion units 54 discussed above using magnetic or electric forces to polarize the vacuum, and are contained in sections 55, and/or 56, and/or in any lateral section, were any section can function independently of one another.

The propulsion units 54 can also be used to produce energy, as exemplified in figures 21.b) to 21.e). Because the propulsion units repel or attract any mass 6, then if we place one propulsion unit 54 in physical contact with a mass 6 the setup would move as discussed before. If we hook up physically one or more of these setups (mass 6 and propulsion unit 54) to an axis 58 through a connecting arm 57, as illustrated in figure 21.b), in such a way that a binary of force is produced, then the axis 58 will rotate with rotational velocity 59. This system can produce energy if the axis 58 transmits its rotational velocity (or torque) to a normal electric generator, like that used for example in wind or hydroelectric electric system generators (not represented) . If the propulsion units are asymmetric, then they will be auto-propelled and it won't be necessary to use of an additional external mass 6 (figure 21.c)), in order to achieve the same effect. On the other hand, the propulsion units don't need to be in physical contact with mass 6 that will be displaced (figure 21.d)). Since we can use any number of propulsion units 54, that can function in attractive or repulsive mode (figure 21.d), where 60 represents a vertical support for the axis 58, and 61 represents a support surface that can support the setup including the propulsion units 54. Mass 6 can have any shape or geometry, including a ring as represented in figure 21.e). Since we can use any number of propulsion units 54 to induce a rotation of mass 6 around the axis 58, we can eventually use only one propulsion unit 54 in order to produce repulsive forces on a part of the ring mass 6 (or in separate and independent masses like in previous figures), were one of the sides (left, for example) is subject to a repulsive force and the other (right) side is subject to an attractive force due to the natural gravity force of Earth 7 that is bellow surface 61. In this way (figure 21.e)> in this possible to generate a rotation of mass 6 around axis 58 and produce energy as discussed before. The efficiency of energy production will depend on the power consumed by the propulsion units 54. Although we can use any propulsion unit 54 with any power source, it would be preferable the use of constant voltages in the appropriate propulsion units, due to the fact that they are able to consume less power.

It should be mentioned one secondary effect or important alternative use of opposing and attracting magnetic or

electric fields related to radioactive elements. It is known that in specific conditions, the radioactive decay may be induced to increase and thereby become stronger. This process will deplete the radioactive process at a faster pace depending on the vacuum stress at the location of the radioactive element. In this manner it is possible to shorten the radioactive decay lifetime from hundreds of years to weeks or days. A first experimental indication for this process occurred with the work of Reich (1951) . He introduced radioactive elements inside an orgone accumulator which is nothing more than a closed capacitor with several concentric parallel plates, separated by a non-conducting material (and not connected to any electromagnetic source) . Unexpectedly, the radioactive power of the elements became much stronger inducing ill effects on the health of his staff. Therefore the setup was disassembled, but only months later did they found that these radioactive elements had lost their radioactive energy.

It is easy to explain what happened at this unfortunate incident. Just like in the Casimir effect where two conducting plates decrease the vacuum density between them, leading to a vacuum force pushing the plates together, the capacitor or multiple metallic plates (concentric Faraday cages) in close proximity achieved a similar (but smaller) decrease in the vacuum density. Since the vacuum density (tension) decreased, it lead to an increase in emitted power and faster depletion of the radioactive energy.

A vacuum density (tension) decrease can be accomplished in various ways as discussed before. Therefore it is intended to use the aforementioned processes to decrease or increase the vacuum density (tension) to control the speed of radioactive decay with applications to nuclear batteries or power sources which are more reliable, allowing the increase or decrease of the, radioactive power output when needed. Another important application of this process would be for cleaning the radioactive waste of nuclear energy production, by depleting the radioactive element at a faster pace. In this way, radioactive waste with lifetimes of thousands of years can have that time reduced significantly.

Submitting opposing electric or magnetic fields (vacuum density and tension increases) on radioactive elements 62

should stabilize and prolong the lifetime of these elements. If the fields are attracting (vacuum density and tension decreases) they should speed up the radioactive elements decay, releasing temporarily more power. Figure 22 shows several application examples (not limited to those shown), where the radioactive element 62 is placed at electric or magnetic, attraction *or* repulsion points, according to the desire to increase depletion or stabilize the radioactive element.

Figure 22.a) to 22.d) shows radioactive element 62 inside a Faraday cage which can have multiple concentric electrodes 35 and 36 charged to equal polarities, opposite polarities, or one electrode to the ground and the other to a source of radiofrequency (RF) 39. Element 63 is a dielectric element (non-conductor, semiconductor, or any other material) that is gaseous, liquid or solid (or a mixture of each). In Figure 22.d) instead of element 63, we have element 64 that can be easily ionized by a power source in order to form a plasma surrounding electrode 35 and radioactive element 62, in order to decrease the surrounding vacuum tension. In figure 22.d) electrode 35 is connected to a radiofrequency source 39 (coils or electromagnetic antennas, or any other electromagnetic excitation source) connected to the appropriate power source, in such a way to generate a plasma 8 between electrodes 35 and 36 (were the radioactive element 62 is inside electrode 35), with the purpose of diminishing the vacuum tension around element 62. In an alternative form, it is possible to place radioactive element 62 inside a chamber 40 of any material, and that contains (or is surrounded by) element 64, were element 62 could be protected by a second chamber 40 inside the first. Element 64 would be also ionized as described before and for the same purpose. Figure 22.e) shows the radioactive element 62 placed between parallel plates that are attracting or repelling. Radioactive element 62 can also be placed at the attracting or repelling points formed by the longitudinal beam emitter(s) 46 (and/or 43, and/or 45, and/or 51), or one can use an element 43 (and/or 45, and/or 46, and/or 51) together with an acoustic lens 53 (a zone plate, for example), like shown in figures 22.f), 22.g) and 22.h). Furthermore, magnetic forces can also be used has shown in figures 22.i) and 22.j), where the coils 14, that surround magnets 20, can be used and excited by DC, AC, or pulsed currents. There are much more possibilities

according to all the previous techniques used for antigravity propulsion that create a point in space with opposed or attracting fields and that can be used for this purpose also.

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Claims

1. Device for vacuum manipulation (antigravity propulsion through the repulsion or attraction of a mass like planet Earth (7) or a general mass (6)), characterized by a geometric (or not geometric) arrangement of at least one pair (two magnets or any other number) of magnets (20) with the north pole or the south pole in opposition (disposed in the same parallel plane, or at a perpendicular plane, or at any desired angle or angles); or were the magnets are arranged symmetrically (circular, hexagonal or any other) or asymmetrically (semicircular, conic, pyramidal, or any other); or by the magnets being disposed in a way to oppose the magnetic vector potential component (with magnetic poles face to face, or side to side, or at any other angle) in order to stress the vacuum and create a gravitational repulsive force on nearby masses (if the mentioned magnets are disposed with the magnetic vector potentials in attraction, with their vectors in the same direction, then they would generate an attractive gravitational force instead); or by the possibility of using a grid of multiple repelling (or attracting) magnets (20) with (or without) coil or coils (14) wrapped around them (each magnet or the whole or partial assembly of magnets); or by one or more magnets being wrapped by one or more coils (14).

2. The apparatus according to claim 1, further characterized by the use of a geometric (or not geometric) arrangement of several opposing pairs (two or more) of magnets (pairs 9-10, and 11-12, or any other number of magnets or pairs of magnets in opposition, which form geometric patterns or not) with the fields in opposition (the magnetic vector potentials are in opposition), with one (or more) unopposed magnet (s) (13) (which do not have another magnet (s) facing them), but whose magnetic field (and vector potential) is also in opposition relative to the fields of the other magnets; were the opposing magnets (each or all magnets) are disposed in a plane or at any desired angle or angles (including a parallel and/or perpendicular angle, for example) relative to the unopposed magnet (s) (13) (and/or relative to other opposing magnets); or were the magnets are arranged symmetrically (circular, hexagonal or any other) or asymmetrically (semicircular, conic, pyramidal, or any other), were the opposing magnetic vector potentials (the magnetic poles all point in the same

direction, or can be partially focused/asymmetric) stress the vacuum and create a gravitational repulsive force on nearby masses (if the mentioned magnets are disposed with the magnetic vector potentials in attraction, then they would generate an attractive gravitational force instead); or by the possibility of using any number of opposing (or attracting) magnet(s) (or electromagnet(s)) (20) or pairs of magnets (or any number of magnets or electromagnets) in the plane perpendicular (or at any other desired angle or angles) to the unopposed magnet(s) (13) (which can also be more than one magnet, also at equal or different angles to each other); or by the possibility of using (or not) at least one electromagnet constituted by a ferromagnetic core (20) (or any other conducting, or non-conducting, or semi¬conducting or any other) material core surrounded by coil(S) (14).

3. The apparatus according to claims 1 and 2, further characterized by the possibility of using at least one magnet (20) (or the whole or partial assembly of magnets) that is wrapped by one or more metal conducting coil (14), or a fiber optic coil (14), or a radiofrequency cable coil (14), or a microwave cable coil (14), or a coil material (14) that can produce a (conducting) plasma inside, or any suitable conductor of electromagnetic energy, were the coil(s) can have any geometry (cylindrical, toroidal, etc.), or can have one or more conducting layers in any disposition.

4. The apparatus according to claims 1 to 3, further characterized by a power source of direct current, or by a power source of (symmetric or asymmetric) alternating or pulsed current and/or voltage, that operates at any frequency (high or low, including radiofrequency, microwave, ultraviolet or higher), with or without any type of modulation (frequency or amplitude modulation, for example); or a power source according to Avramenko's patent (US6104107); or a power source that produces electric or magnetic (symmetric or asymmetric) rotating fields; or a power source that produces one or more frequencies; or by the connection of one or more power sources to the same coil(s); or a power source that changes continuously the frequency of the exciting wave (current or voltage) in a sequential, caotic or repetitive manner (chirped excitation), linearly or non-linearly, with or without any

type of modulation, or using or not white noise, pink noise, or any type of noise or caotic electromagnetic excitation, or by the use of a power source with a delicate control of the phase; or by the use of any number of these power sources in an isolated or conjugated way; or by the use of any other power source; or by the use of any of these power sources connected to one or more coil(s) (14).

5. Device for vacuum manipulation (antigravity propulsion through the repulsion of a mass like planet Earth (7) or a general mass (6)), characterized by the use of coil(s) (21) (with cylindrical, tubular, toroidal (open or closed) or any other shape; coil(s) (21) are metal coils or can have the same properties of coils (14)) excited from the center to the periphery (or inversely from the periphery to the center), where said coil (21) has three connecting wires: one in the center and another in each extremity (the connection can be in the extremity itself or at a certain desired distance from it); or by the possibility that the center wire may also be displaced from the center to one of the extremities (not in the geometric center of the coil).

6. The apparatus according to claim 5, further characterized by the possibility of coil (21) with no connecting wires at the extremities (or near them) of coil (21) (only a center wire or displaced wire); or by coil (21) with no connecting wire at the center of coil (21) (only at both extremities, or near them); or by using more turns of coil on one of the sides of coil (21) (with or without connecting wires at the extremities); or by coil (21) being composed of several layers (one or more layers) of conducting coil or coils connected to the same (or different) feeding connections; or by using coil (21) were the wires from the center to the periphery go in opposite directions (anti-parallel), like when we just connect a wire to the center of a normal coil; or by using coil (21) were the wires from the center to the periphery of the coil go in the same direction (parallel) (but the gravitational force generated by this last coil will be attractive); or by using coil (21) with the wires in any disposition.

7. The apparatus according to claims 5 and 6, further characterized by the possibility of coil (21) where the diameter of the coil is nonlinear, that is, it can have a bigger or lower diameter at the center and/or periphery; or by wrapping coil (21) (from the inside or outside) with one

or more coil or coils that generate opposed currents to coil (21) in an active (direct excitation with a power source) or passive way (generation of opposed currents according to the Maxwell equations, including specially the Faraday law, Lenz law, and the Ampere-Maxwell law), where these extra coil or coils may be disposed in more than one layer.

8. The apparatus according to claims 5 to 7, further characterized by the possibility of using (or not) at least one electromagnet constituted by a ferromagnetic (or any other conducting, or non-conducting, or semi-conducting or any other) material core, that may have any shape and be hollow or not, that is surrounded by coil(s) (21); or by the possibility of using (or not) at least one magnet (s) (20) (one or more) of any type (and disposed in any manner, have any shape and be hollow or not), that is surrounded by coil(s) (21); or by using the aforementioned setups together with coil (21) as a small propulsion unit disposed around the periphery (or at any other desired position) of mass (6), and/or as a mass repelling system (including Earth (7)), were coil (21) can completely involve the outside of mass (6) (which can have tubular, cylindrical, spherical or any other shape).

9. The apparatus according to claims 5 to 8, further characterized by a power source of (symmetric or asymmetric) alternating or pulsed current and/or voltage, that operates at any frequency (high or low, including radiofrequency, microwave, ultraviolet or higher), with or without any type of modulation (frequency or amplitude modulation, for example); or a power source according to Avramenko's patent (US6104107); or a power source that produces electric or magnetic (symmetric or asymmetric) rotating fields; or a power source that produces one or more frequencies; or by the connection of one or more power sources to the same coil(s); or a power source that changes continuously the frequency of the exciting wave (current or voltage) in a sequential, caotic or repetitive manner (chirped excitation), linearly or non-linearly, with or without any type of modulation, or using or not white noise, pink noise, or any type of noise or caotic electromagnetic excitation, or by the use of a power source with a delicate control of the phase; or by the use of any number of these power sources in an isolated or conjugated

way; or by the use of any other power source; or by the use of any of these power sources connected to one or more coil(s) (21) and/or any other coil that is used.

10. Device for vacuum manipulation (antigravity propulsion through the repulsion of a mass like planet Earth (7) or a general mass (6)), characterized by the possibility of using apparatus according to claims 1 to 4; or by using the apparatus according to claims 5 to 9; or by the possibility of using, in any independent or conjugated way, any of the setups mentioned in this claim, mechanically attached to a mass (6) and disposed around its periphery (or at any other desired position, in the interior or exterior of mass (6)) in any number and/or disposition.

11. Device for vacuum manipulation (antigravity propulsion through the repulsion of a mass like planet Earth (7) or a general mass (6)), characterized by one magnet (20) (or several magnets side by side, at any angle to each other) with a coil or coils (14) wrapped (or not) around it, or instead by the apparatus according to claims 1 to 4 (and in particular claim 2), where the unopposed element (s) (and the rest of the opposing magnets) , faces (or is at any other angle) a flat (square, triangular, circular, parabolic, concave, conical, pyramidal, or of any othex shape or cross section) slab of diamagnetic or paramagnetic (or any other material) conducting element (22) , that may also be a non-conductor (dielectric) , or semi-conductor or be any other material, that may rotate or not, or that may be superconducting or not, or that may be charged (to any polarity or voltage) with a static (not changing) or dynamic (changing) charge, or that may be not charged, were element (22) will generate opposed (magnetic vector potentials from) induced currents, and opposing (changing) electric fields (and also magnetic fields) due to the induced changing currents, in response to any externally applied changing electromagnetic field (or fields) generated by the apparatus described; or by the possibility of using at least one magnet (20) wrapped by coil(s) (14) inside a tubular element (22) ; or by the possibility of using at least one magnet (20) wrapped by coil(s) (14), inside a tubular element (22) (whose extremities can be closed or not, and whose section can vary towards the extremities; were it can have a cylindrical, pyramidal, or any other section) , were we can have one or more successive

layers of magnet (s) (20) with coil(s) (14), and/or element (s) (22), and/or coil(s) (14); or by the possibility of using more than one apparatus side by side, or face to face (or at any angle to each other), in any number; or by the possibility of coil(s) (14) having the properties described in claim 3.

12. The apparatus according to claim 11, further characterized by the possibility of not using the magnetic unopposed element (s) (13) (from claim 2), and using any number of elements (20) (wrapped or not by coil(s) (14)) that are parallel, perpendicular or at any other angle to element (22) (and in its proximity); or by a power source of (symmetric or asymmetric) alternating or pulsed current and/or voltage, that operates at any frequency (high or low, including radiofrequency, microwave, ultraviolet or higher), with or without any type of modulation (frequency or amplitude modulation, for example); or a power source according to Avramenko's patent (US6104107); or a power source that produces electric or magnetic (symmetric or asymmetric) rotating fields; or a power source that produces one or more frequencies; or by the connection of one or more power sources to the same coil(s); or a power source that changes continuously the frequency of the exciting wave (current or voltage) in a sequential, caotic or repetitive manner (chirped excitation), linearly or non-linearly, with or without any type of modulation, or using or not white noise, pink noise, or any type of noise or caotic electromagnetic excitation, or by the use of a power source with a delicate control of the phase; or by the use of any number of these power sources in an isolated or conjugated way; or by the use of any other power source; or by the use of any of these power sources connected to one or more coil(s) (14) (that wrap or not magnets (20)).

13. Device for vacuum manipulation (antigravity propulsion through the repulsion of a mass like planet Earth (7) or a general mass (6)), characterized by a (toroidal, cylindrical, or any other shape) coil or coils (24) with (or without in its interior or exterior) a ferromagnetic (or any other conducting, or non-conducting, or semi-conducting or any other) material core (23), that may also be any type of magnet (s) (with any shape and cross section), were the element (23) can have any shape (toroidal, cylindrical, conical, oval, spherical, for

example) or section (it can be hollow or not); were elements (23) and (24) are facing (or are at other angles to) a flat (square, triangular, circular, concave, conical, pyramidal, or of any other shape or cross section) slab of diamagnetic or paramagnetic (or any other) conducting element (22), that may also be a non-conductor (dielectric), or semi-conductor or be any other material, that may rotate or not, or that may be superconducting or not, or that may be charged (to any polarity or voltage) with a static (not changing) or dynamic (changing) charge, or that may be not charged, were element (22) will generate opposed (magnetic vector potentials from) induced currents, and opposing (changing) electric fields (and also magnetic fields) due to the induced changing currents, in response to any externally applied changing electromagnetic field (or fields) generated by element (s) (23) excited by coil(s) (24) (or only coil (S) (24)).

14. The apparatus according to claim 13, further characterized by the possibility of replacing element (22) with another coil (24) (connected or not to a power source) which has (or not) in its interior (or exterior) an element (23), which can have different dimensions than the first coil (24) (constituting in this way an asymmetric arrangement), were the two coils generate opposed (magnetic vector potentials from) induced currents, and also opposing (changing) electric and magnetic fields.

15. The apparatus according to claims 13 and 14, further characterized by the possibility of element (22) being a (diamagnetic or paramagnetic material, or any other material) conductor in solid, liquid, gas, or plasma state, or any combination of these states (vapor, for example), and contained by an appropriate chamber when needed.

16. The apparatus according to claims 13 to 15, further characterized by the possibility of using several elements or coils (22) and/or (24), with (or without, in its interior or exterior) an element (23), disposed side by side, or in (any number of) concentric layers (of circular, toroidal or any other shape); or by also providing direct electrical excitation to (the usual passive) element (s) or coil(s) (22), in order to generate currents (and changing electric fields and magnetic fields) in opposition to coil or coils (24).

17. The apparatus according to claims 13 to 16, further characterized by the possibility of using at least one coil or coils (22) and/or (24) that can be made by a metal conducting coil, or a fiber optic coil, or a radiofrequency cable coil, or a microwave cable coil, or a coil material that can produce a (conducting) plasma inside, or any suitable conductor of electromagnetic energy, were the coil(s) can have any geometry (cylindrical, toroidal, etc.), or can have one or more conducting layers in any disposition; or by a power source of (symmetric or asymmetric) alternating or pulsed current and/or voltage, that operates at any frequency (high or low, including radiofrequency, microwave, ultraviolet or higher) , with or without any type of modulation (frequency or amplitude modulation, for example) ; or a power source according to Avramenko's patent (US6104107); or a power source that produces electric or magnetic (symmetric or asymmetric) rotating fields; or a power source that produces one or more frequencies; or by the connection of one or more power sources to the same coil(s); or a power source that changes continuously the frequency of the exciting wave (current or voltage) in a sequential, caotic or repetitive manner (chirped excitation) , linearly or non-linearly, with or without any type of modulation, or using or not white noise, pink noise, or any type of noise or caotic electromagnetic excitation, or by the use of a power source with a delicate control of the phase; or by the use of any number of these power sources in an isolated or conjugated way; or by the use of any other power source; or by the use of any of these power sources connected to one or more coil (s) (22) and/or (24) .

18. Device for vacuum manipulation (antigravity propulsion through the repulsion of a mass like planet Earth (7) or a general mass (6)), characterized by a flat (concave, cylindrical, conical, tubular, or any other shape) conducting elements or coils (wires, for example) (25) and (26) , that are side by side, face to face or at any angle to each other, with (or without) a ferromagnetic (or any other conducting, or non-conducting, or semi-conducting or any other) material (23) , that may also be any type of magnet (s) (with any shape and cross section), interposed between coils (25) and *(26),* were the element (23) can have any shape (toroidal, cylindrical, conical, oval, spherical, for example) or section (it can be hollow or not); where

coil (25) is active and excited by a power source, and coil (26) is made of a diamagnetic or paramagnetic (or any) conducting element, that may also be a non-conductor (dielectric), or semi-conductor or be any other material, that may rotate or not, or that may be superconducting or not, or that may be charged (to any polarity or voltage) with a static (not changing) or dynamic (changing) charge, or that may be not charged, were element (s) or coil(s) (26) will generate opposed induced currents according to the Maxwell equations (including specially the Faraday law, Lenz law, and the Ampere-Maxwell law), in response to coil(s) (25); or by coil(s) or element (s) (26) being also active and excited by a power source in order to generate opposed (magnetic vector potentials from) currents (and changing electric and magnetic fields) to coil(s) or element (s) (25).

19. The apparatus according to claim 18, further characterized by the possibility of using at least one coil or coils (25) and/or (26) that can be made by a metal conducting coil, or a fiber optic coil, or a radiofrequency cable coil, or a microwave cable coil, or a coil material that can produce a (conducting) plasma inside, or any suitable conductor of electromagnetic energy, were the coil(s) can have any geometry (cylindrical, toroidal, etc.), or can have one or more conducting layers in any disposition; or by a power source of (symmetric or asymmetric) alternating or pulsed current and/or voltage, that operates at any frequency (high or low, including radiofrequency, microwave, ultraviolet or higher), with or without any type of modulation (frequency or amplitude modulation, for example); or a power source according to Avramenko's patent (US61041Q7); or a power source that produces electric or magnetic (symmetric or asymmetric) rotating fields; or a power source that produces one or more frequencies; or by the connection of one or more power sources to the same coil(s); or a power source that changes continuously the frequency of the exciting wave (current or voltage) in a sequential, caotic or repetitive manner (chirped excitation), linearly or non-linearly, with or without any type of modulation, or using or not white noise, pink noise, or any type of noise or caotic electromagnetic excitation, or by the use of a power source with a delicate control of the phase; or by the use of any number of these power sources in an isolated or conjugated

way; or by the use of any other power source; or by the use of any of these power sources connected to one or more element (s) or coil(s) (25) and/or element (s) or coil(s) (26) , or both.

20. Device for vacuum manipulation (antigravity propulsion through the repulsion of a mass like planet Earth (7) or a general mass *[S)),* characterized by a flat (square, triangular, circular, parabolic, concave, conical, pyramidal, or of any other shape or cross section) coil(s) (24) with (or without, in its interior or exterior) a ferromagnetic (or any other conducting, or non-conducting, or semi-conducting or any other) material core (23) , that may also be any type of magnet (s) (with any shape and cross section) , were the element (23) can have any shape (toroidal, cylindrical, conical, oval, spherical, for example) or section (it can be hollow or not) ; were elements (23) and (24) are facing (or are at other angles to) a flat (square, triangular, circular, concave, conical, pyramidal, or of any other shape or cross section) slab of diamagnetic or paramagnetic (or a,ny other) conducting element (or coil) (22) (connected or not to a power source) , that may also be a non-conductor (dielectric) , or semi-conductor or be any other material, that may rotate or not, or that may be superconducting or not, or that may be charged (to any polarity or voltage) with a static (not changing) or dynamic (changing) charge, or that may be not charged; were the element (22) can have any shape (toroidal, cylindrical, conical, oval, spherical, for example) or section (it can, be hollow or not); were element or coil (22) (when not connected to a power source) will generate opposed (magnetic vector potentials from) induced currents, and opposing (changing) electric fields (and also magnetic fields) due to the induced changing currents, in response to any externally applied changing electromagnetic field (or fields) generated by element (s) (23) excited by coil(s) (24) (or only coil(s) (24)); or were element or coil (22) (when connected to a power source) will generate opposed (magnetic vector potentials from) induced currents, and opposing (changing) electric fields (and also magnetic fields), in relation to the field (or fields) generated by element (s) (23) excited by coil(s) (24) (or only by coil(s) (24)).

21. The apparatus according to claim 20, further characterized by the possibility of using coil(s) (24) (or element(s) (23) surrounded by coil(s) (24)), adjusted to the shape of any surface (parabolic, concave, conical or any other shape or section) belonging to element(s) or coil(s) (22).

22. The apparatus according to claims 20 and 21 further characterized by the possibility of using a circular coil or coils (24), and/or element(s) (23) surrounded by coil(s) (24) (all of circular or other shape), surrounding a circular (or other shape) slab or coil (or ring slab or coil, or elliptical slab or coil, or circular symmetric or asymmetric (with a segmented "triangular", or of any other shape, cut from the periphery (to a given radius or) to the center) slab or coil, or of any other shape) of element(s) or coil(s) (22).

23. The apparatus according to claims 20 to 22, further characterized by the possibility of using coil(s) (24), or element(s) (23) surrounded by coil(s) (24), above or below element(s) or coil(s) (22); or by using several parallel (or at any other angle) planes of element(s) (22), and/or (23), and/or (24), that can be interposed (in different planes) or intermingled (in the same plane) in any succession.

24. The apparatus according to claims 20 to 23, further characterized by the possibility of using at least one coil or coils (22) and/or (24), and/or magnet(s) (or element(s) (23)) surrounded by coil(s) (24), that can be made by a metal conducting coil, or a fiber optic coil, or a radiofrequency cable coil, or a microwave cable coil, or a coil material that can produce a (conducting) plasma inside, or any suitable conductor of electromagnetic energy, were the coil(s) can have any geometry (cylindrical, toroidal, etc.), or can have one or more conducting layers in any disposition; or by a power source of (symmetric or asymmetric) alternating or pulsed current and/or voltage, that operates at any frequency (high or low, including radiofrequency, microwave, ultraviolet or higher), with or without any type of modulation (frequency or amplitude modulation, for example); or a power source according to Avramenko's patent (US6104107); or a power source that produces electric or magnetic (symmetric or

asymmetric) rotating fields; or a power source that produces one or more frequencies; or by the connection of one or more power sources to the same coil(s); or a power source that changes continuously the frequency of the exciting wave (current or voltage) in a sequential, caotic or repetitive manner (chirped excitation) , linearly or non-linearly $_{r}$ with or without any type of modulation, or using or not white noise, pink noise, or any type of noise or caotic electromagnetic excitation; or by the use of any number of these power sources in an isolated or conjugated way; or by the use of any other power source, or by the use of a power source with a delicate control of the phase; or by the use of any of these power sources connected to coil(s) (22) and/or (24), and/or magnet (s) (or element (s) (23)) surrounded by coil (s) (24).

25. Device for vacuum manipulation (antigravity propulsion through the repulsion of a mass like planet Earth (7) or a general mass (6)), characterized by a flat (square, triangular, circular, parabolic, concave, conical, pyramidal, or of any other shape or cross section) coil(s) (24) with (or without, in its interior or exterior) a ferromagnetic (or any other conducting, or non-conducting, or semi-conducting or any other) material core (23), that may also be any type of magnet (s) (with any shape and cross section) , were the element (23) can have any shape (tubular, toroidal, cylindrical, conical, oval, spherical, for example) or section (it can be hollow or not) ; were elements (23) and (24) surround (through the inside or outside) a conducting (diamagnetic or paramagnetic, or any other) element or coil (22) (that is connected or not to a power source) , and that may also be a non-conductor (dielectric) , or semi-conductor or be any other material, that may rotate or not, or that may be superconducting or not, or that may be charged (to any polarity or voltage) with a static (not changing) or dynamic (changing) charge, or that may be not charged; were the element (22) can have any shape (tubular, toroidal, cylindrical, conical, oval, spherical, ellipsoidal, flat, square, triangular, circular, parabolic, concave, pyramidal, for example; hollow or not) or any section (it can be hollow or not) ; were element or coil (22) (when not connected to a power source) will generate opposed (magnetic vector potentials from) induced currents, and opposing (changing) electric fields (and also magnetic fields) due to the induced changing currents, in

response to any externally applied changing electromagnetic field (or fields) generated by coil(s) (24), or by element(s) (23) excited by coil(s) (24); or were element or coil (22) (when connected to a power source) will generate opposed (magnetic vector potentials from) induced currents, and opposing (changing) electric fields (and also magnetic fields), in relation to the field (or fields) generated by coil(s) (24), or by element (s) (23) excited by coil(s) (24).

26. The apparatus according to claim 25, further characterized by the possibility of using (or not) at least one electromagnet with a ferromagnetic (or any other conducting, or non-conducting, or semi-conducting or any other) material core (23), that may also be any type of magnet (s) (one or more, and with any shape and cross section); were element (23) can have any shape (cylindrical, conical, toroidal, oval, spherical or any other shape or section that may be hollow or not), and can be inside (or outside) coil(s) or element (s) (24), which can also be inside (or outside) a tubular (cylindrical, conical, toroidal, oval, spherical or any other shape; hollow or not) element (s) (22); or by using (or not) one or more (several) parallel (or at any other angle) planes of elements (22), and/or (23), and/or (24), interposed in succession at any order, or alternatively intermingled side by side in the same plane (s) or material (s).

27. The apparatus according to claims 25 and 26, further characterized by the possibility of substituting element (s) (22) by a coil, with the wires parallel (or at any other angle) to that of coil(s) (24); or by the possibility of involving or intermingling coil(s) (22) and coil(s) (24) in the same plane (or in successive parallel planes, or at any angle to each other), which surrounds (or not) (from the outside or inside) element (23), with the properties described above; or by the possibility of having openings (28) at desired points, which may constitute doors or windows (or any other opening (s) for any other purpose (s)) (29), made of transparent metal or any other material; or by the possibility of element (s) (22), and/or (23), and/or (24), being the whole external surface (which can be of any material) of the craft (or mass) or any smaller internal elements used to vector propulsion; or by the possibility of element (s) or coil(s) (22) and/or (24), being more than

one coil (any number of coils parallel or perpendicular, or at any angle to one another), that can be divided (or not) into different or independent sections; or by the possibility that element (s) (24) have the same properties ascribed to element (s) (22).

28. The apparatus according to claims 25 to 27, further characterized by the possibility of using at least one coil or coils (22) and/or (24) that can be made by a metal conducting coil, or a fiber optic coil, or a radiofrequency cable coil, or a microwave cable coil, or a coil material that can produce a (conducting) plasma inside, or any suitable conductor of electromagnetic energy, were the coil(s) can have any geometry (cylindrical, toroidal, etc.), or can have one or more conducting layers in any disposition; or by a power source of (symmetric or asymmetric) alternating or pulsed current and/or voltage, that operates at any frequency (high or low, including radiofrequency, microwave, ultraviolet or higher) , with or without any type of modulation (frequency or amplitude modulation, for example) ; or a power source according to Avramenko's patent (US6104107); or a power source that produces electric or magnetic (symmetric or asymmetric) rotating fields; or a power source that produces one or more frequencies; or by the connection of one or more power sources to the same coil(s); or a power source that changes continuously the frequency of the exciting wave (current or voltage) in a sequential, caotic or repetitive manner (chirped excitation) , linearly or non-linearly, with or without any type of modulation, or using or not white noise, pink noise, or any type of noise or caotic electromagnetic excitation, or by the use of a power source with a delicate control of the phase; or by the use of any number of these power sources in an isolated or conjugated way; or by the use of any other power source; or by the use of any of these power sources connected to coil(s) (22) and/or (24) .

29. Device for vacuum manipulation (antigravity propulsion through the repulsion of a mass like planet Earth (7) or a general mass (6)), characterized by a coil(s) (24) with (or without in its interior or exterior) a ferromagnetic (or any other conducting, or non-conducting, or semi-conducting or any other) material core (23), that may also be any type of magnet (s) (with any shape and cross section), were the

element (23) can have any shape (toroidal, cylindrical, conical, oval, spherical, for example) or section (it can be hollow or not); were element (s) (23) and/or (24) surround (by the inside or outside) a chamber (30), of tubular shape (toroidal, cylindrical, conical, oval, spherical, or any other shape; hollow or not), which contains a conducting element (diamagnetic, or paramagnetic, or semi-conducting, or superconducting, or non-conducting, or any other conducting or ionizable) or material (31) in liquid, gas, vapor or plasma (ionized) form (or in any combination of physical states, like ionized mercury vapor, for example), that may rotate or not, or that may be charged (to any polarity or voltage) with a static (not changing) or dynamic (changing) charge, or that may be not charged; were element (s) (31) will generate opposed (magnetic vector potentials from) induced currents, and opposing (changing) electric fields (and also magnetic fields) due to the induced changing currents (according to the Maxwell equations, including specially the Faraday law, Lenz law, and the Ampere-Maxwell law) on element (s) (31) that occur in response to any externally applied changing electromagnetic field (or fields) generated by coil(s) (24), and/or element (s) (23) excited by coil (s) (24).

30. The apparatus according to claim 29, further characterized by the possibility of using one or more coil(s) (24) and/or chamber (s) (30), that are separated into different and independent sections around (the perimeter) of the main chamber or sectioned chambers (30), and which can be individually excited by a power source; or by using coil(s) (24) according to claims 5 to 9; or by using one or more coil(s) (24) which contains inside an element or material (31), with the properties already described above.

31. The apparatus according to claims 29 and 30, further characterized by the possibility of using one or more coil (s) (24) with the same (or different) shape (s) of element (s) (23) and/or chamber (30); or by the possibility of using (or not) one or more parallel planes (or at any other angle) of element(s) (23), and/or (24), and/or (30) (which contains element (31)) interposed in any order or disposition.

32. The apparatus according to claims 29 to 31, further characterized by the possibility of using a cylindrical (or any other shape) coil(s) (24), with (or without) element (s) (23) (outside or inside coil(s) (24)), around (or inside a possible hollow section, if one chooses to use this geometry) chamber (30), were coil(s) (24) are excited with a current or voltage (asymmetric alternating form or) pulse of any shape, and/or modulation, and/or repetition (or any other type of excitation 32), directional or not, in order to emit opposing electromagnetic waves in space due to the opposed currents (and/or changing induced electric fields and/or magnetic fields) generated by element (s) (31) in response to coil(s) (24), or element (s) (23) wrapped by coil(s) (24), which in this way can transmit a force to a mass (6) at a distance (short or long, and including any mass placed in a hollow section of the generating setup) and/or chamber (30); were this system can also be used for propulsion purposes (considering any type of excitation on coil (S) (14), and/or (22), and/or (24)).

33. The apparatus according to claims 29 to 32, further characterized by the possibility of placing the chamber with element (31) inside or outside a magnet (23) (hollow or not), or surrounding a magnet (hollow or not) (23), or at the side of a magnet (23), with one or more coil(s) (14), and/or coil(s) or element (s) (22), and/or (24), interposed or disposed in any manner or succession in relation to elements (23) and/or (31) (inside, outside, or at any other disposition, with one or more layers of any of these elements); were the coil(s) (14), and/or (22), and/or (24) can be excited with a current or voltage (pulsed, symmetric or asymmetric alternating form, or a pulse of any shape, and/or modulation, and/or repetition, or any other type of excitation) , directional or not, in order to emit opposing electromagnetic waves in space due to the opposed currents (and/or changing induced electric fields and/or magnetic fields) generated by element (s) (31), in response to coil(s) (14), and/or (22), and/or (24), and/or element (s) (23) surrounded by coil(s) (14), and/or (22), and/or (24), which in this way can transmit a force to a mass (6) at a distance, or on the generating setup itself (including any mass placed in a hollow section of the generating setup and/or chamber (30); were this system can also be used for propulsion purposes (considering any type of excitation on coil(s) (14), and/or (22), and/or (24)).

34. The apparatus according to claims 29 to 33, further characterized by the possibility of placing the chamber with element (31) inside or outside a magnet (23) (hollow or not), or surrounding a magnet (hollow or not) (23), or at the side of a magnet (23), with one or more coil(s) (14), and/or coil(s) or element (s) (22), and/or (24), interposed or disposed in any manner or succession in relation to elements (23) and/or (31) (inside, outside, or at any other disposition, with one or more layers of any of these elements); and with electrodes (35) and/or (36) (superconducting or not, and of any shape and/or cross section) disposed at the extremities (or at any other position) of the chamber with element (31); were electrodes (35) and/or (36) can be connected to a power source in order to induce currents on element (31) if desired, for the same purpose referred in claim 33 (including any mass placed in a hollow section of the generating setup), and were the opposed currents can be induced on coil(s) (14), and/or coil(s) or element (s) (22), and/or (24), by reaction to the currents in element (31) or the inverse (the element (31) responds with opposed currents to coil(s) (14), and/or (22), and/or (24)); or by the possibility of element (22) having the same properties of element (31) (including also in the solid state), or having the same shape of chamber (30), or *even* by the possibility of element (22) being connected or not to a power source.

35. The apparatus according to claims 29 to 34, further characterized by the possibility of using one or more apparatus according to claims 1 to 4, surrounding (in the exterior or interior of) a chamber (30) (for example, placed in the hollow central part of a toroidal chamber (30), or in any other relative position), which can have any shape or cross section (circular, flat, square, tubular, cylindrical, toroidal, for example), and that contains element (31) inside of it.

36. The apparatus according to claims 29 to 35, further characterized by the possibility of using one (or more) apparatus according to claims 1 to 4, near one (or more) extremity (ies) of chamber (30) (of any shape and cross section), which contains element (31), were the coil(s) (14) of the aforementioned (claims) setup are excited with a current or voltage (pulsed, symmetric or asymmetric alternating form, or a pulse of any shape, and/or

modulation, and/or repetition,. or any other type of excitation) , in order to emit opposing electromagnetic waves (and fields) in space, due to the opposed currents generated by element (31) , in response to any externally applied fields (the time varying fields of the magnets excited by coil(s) (14)), which in this way can transmit a force to a mass (6) at a distance (short or long), or on the generating setup itself (including any mass placed in a hollow section of the generating setup and/or chamber (30)); were this system can also be used for propulsion purposes (considering any type of excitation on coil(s) (14) .

37. The apparatus according to claims 29 to 36, further characterized by the possibility of using at least one coil(s) (14) (that surround one or more elements (20)), and/or coil(s) or element(s) (22), and/or (24) that can be made by one or more metal conducting coil, or a fiber optic coil, or a radiofrequency cable coil, or a microwave cable coil, or a coil material that can produce a (conducting) plasma inside, or any suitable conductor of electromagnetic energy, were the coil(s) can have any geometry (cylindrical, toroidal, etc.), or can have one of more conducting layers in any disposition; or by a power source of (symmetric or asymmetric) alternating or pulsed current and/or voltage, that operates at any frequency (high or low, including radiofrequency, microwave, ultraviolet or higher) , with or without any type of modulation (frequency or amplitude modulation , for example) ; or a power source according to Avramenko's patent (US6104107) ; or a power source that produces electric or magnetic (symmetric or asymmetric) rotating fields; or a power source that produces one or more frequencies; or by the connection of one or more power sources to the same coil(s); or a power source that changes continuously the frequency of the exciting wave (current or voltage) in a sequential, caotic or repetitive manner (chirped excitation) , linearly or non-linearly, with or without any type of modulation, or using or not white noise, pink noise, or any type of noise or caotic electromagnetic excitation, or by the use of a power source with a delicate control of the phase; or by the use of any number of these power sources in an isolated or conjugated way; or by the use of any other power source; or by the use of any of these power sources connected to

coil(s) (14) (that are wrapped around magnets (20)), and/or (22), and/or (24).

38. Device for vacuum manipulation (antigravity propulsion through the repulsion of a mass like planet Earth (7) or a general mass (6)), characterized by the possibility of using one or more apparatus according to claims 25 to 28, or 29 to 37, when coil or coils (14) (that are wrapped around magnet (s) (20) or (23), or wrapped around ferromagnetic element (s) (23), or wrapped around chamber (30) which contains element (31)), and/or coil(s) or element (s) (22), and/or (24) (that can be wrapped around magnet (s) (23), or wrapped around ferromagnetic element (s) (23), or wrapped around chamber (30) which contains element (31)), are excited with a current or voltage (pulsed, symmetric or asymmetric alternating form, or a pulse of any shape, and/or modulation, and/or repetition, or any other type of excitation), in order to emit opposing electromagnetic waves (and fields) in space, due to the opposed currents generated by element (s) (31) and/or (22), in response to any externally applied fields (generated or induced by the aforementioned element (s) (14), and/or (22), and/or (24)), which in this way can transmit a force to a mass (6) at a distance (short or long), or on the generating setup itself (Including any mass placed in a hollow section of the generating setup and/or chamber (30)); were this system can also be used for propulsion purposes (considering any type of excitation on the referred coil(s).

39. The apparatus according to claim 38, further characterized by the possibility of also exciting coil(s) or element (s) (22) (besides coil(s) (24)) with a power source, were the current (or the current modulation) of one wire (of one or of both coil(s) (22) and/or (24)) is phase shifted (the use of equal or similar frequencies facilitates this process) in relation to the other (wire or coil), so that propagating opposed or non-opposed fields are emitted from the apparatus like radio waves but with the property to exert forces of repulsion or attraction in its propagating path (where one can use one or more units that interfere in space, and that can create an attraction or repulsion point in space), due to the propagated opposed or non-opposed components (which can also exert forces on

any mass placed in a hollow section of the generating setup) .

40. The apparatus according to claims 38 and 39, further characterized by the possibility of creating a traveling or standing wave (that can (or not) vary in time but which maintains the same field relation, be it in opposition or attraction) by causing (and/or controlling) a phase difference (slight or big) between two (or more) phase (cancelled or not) carriers (waves, currents or voltages) , propagated in coil(s) or element (s) (22) and/or coil(s) (24) (in any number), where the control of the phase (the use of equal or similar frequencies facilitates this process) can be accomplished by any means (including the manipulation of the phase of the exciting current frequency (ies) , or of the modulation of the frequency (ies) of these currents) , where by varying the phase (of one or more interfering waves, currents or voltages in space) , the standing wave field can be caused to walk or move, in such a way that it is possible to create fixed or moving points in space (using one or more units that interfere in space) that are attractive or repelling (and capable to exert repulsive or attractive forces on external nearby masses, including any mass placed in a hollow section of the generating setup) , were this system can also be used for propulsion purposes if desired, or eventually to stop fires.

41- The apparatus according to claims 38 to 40, further characterized by at least one coil(s) or element (s) (22), and/or coil Cs) (24), and/or coil(s) (14) (surrounding elements (20) and/or (23)), that can be made by a metal conducting coil, or a fiber optic coil, or a radiofrequency cable coil, or a microwave cable coil, or a coil material that can produce a (conducting) plasma inside, or any suitable conductor of electromagnetic energy, were the coil(s) can have any geometry (cylindrical, toroidal, etc.), or can have one or more conducting layers in any disposition; or by a power source of (symmetric or asymmetric) alternating or pulsed current and/or voltage, that operates at any frequency (high or low, including radiofrequency, microwave, ultraviolet or higher) , with or without any type of modulation (frequency or amplitude modulation, for example) ; or by a power source according to Avramenko's patent (US6104107); or a power source that

produces electric or magnetic (symmetric or asymmetric) rotating fields; or a power source that produces one or more frequencies; or by the connection of one or more power sources to the same coil(s); or a power source that changes continuously the frequency of the exciting wave (current or voltage) in a sequential, caotic or repetitive manner (chirped excitation), linearly or non-linearly, with or without any type of modulation, or using or not white noise, pink noise, or any type of noise or caotic electromagnetic excitation, or by the use of a power source with a delicate control of the phase; or by the use of any number of these power sources in an isolated or conjugated way; or by the use of any other power source; or by the use of any of these power sources connected to coil(s) (24) and/or (22), and (14).

42. Device for vacuum manipulation (antigravity propulsion through the repulsion of a mass like planet Earth (7) or a general mass (6)), characterized by the possibility of using the apparatus according to claims 11 to 12, or by using the apparatus according to claims 13 to 17, or by using the apparatus according to claims 18 to 19, or by using the apparatus according to claims 20 to 24, or by using the apparatus according to claims 25 to 28, or by using the apparatus according to claims 29 to 37, or by using the apparatus according to claims 38 to 41, or by the possibility of using, in any independent or conjugated way, any of the setups mentioned in this claim, mechanically attached to a mass (6) and disposed around its periphery (or at any other desired position, in the interior or exterior of mass (6)) in any number and/or disposition,

43. Device for vacuum manipulation (antigravity propulsion through the repulsion of a mass like planet Earth (7) or a general mass (6)), characterized by the possibility of using (one or more layers of) conducting parallel (or at any other angle) plates (electrodes) (37) or (38) charged to the same high voltage polarity (all positive or instead all negative; were the voltage and/or the polarity can be constant and/or changing in time); or by the possibility of plates (37) and/or (38) having a symmetric or asymmetric shape, being of flat, parabolic, concave, conical, tubular, elliptical, circular, pyramidal, semi-circular or any other shape; or by the possibility of plates (37) and/or (38) being symmetric or asymmetric, that is, the plates can have

equal dimensions (of diameter , length, thickness, etc) or different dimensions (of diameter, length, thickness, etc) , were any combinations of shapes and dimensions can be used; or by the possibility of plates (37) or (38) being disposed (with any shape or composition of shapes, for example, a conducting tube closed on one face by a flat, pyramidal, parabolic or semi-circle electrode) in an asymmetric configuration (with one or more successive layers of electrodes, separated or not by non-conductive or semi-conductive, or any other elements which can also be the atmosphere or the vacuum) in such a way that the gravitational repulsive gravitation generated by the electrodes (or by an electrode with an asymmetric configuration) generates a force that makes the asymmetric electrode assembly auto-propelled because of the electrode asymmetry of mass, besides also repelling any external nearby masses.

44. The apparatus according to claim 43, further characterized by the possibility of plates (or electrodes) (37) or (38) being (one or more layers of) concentric rings or electrodes (of any shape, that close on themselves or not, that is, they are symmetric or asymmetric) ; or by the possibility of using one electrode (or multiple concentric electrodes) inside a Faraday cage, (where all or some electrodes are) charged to the same high voltage polarity; or by the possibility of plates (37) or (38) being in solid, liquid, vapor, or in plasma or ionized state (or in any combination of physical states) , that is charged positive or instead is charged negative (were the charge and the polarity can be constant and/or changing in time) , where a containing chamber (of any shape) , which uses (or not) any type of confinement system (electrostatic confinement for example) , and that can use (when necessary) any electrical (or ionizing) exciting means (using electrodes inside the chamber or accelerating electric particles to the confinement area for example) to create a charge accumulation or concentration of a positive or negative polarity (inside the chamber) ; or by the possibility of plates (37) or (38) being superconductive or not, or even not conductive (but electrically charged) ; or by the possibility of the spacing and/or thickness (or any dimension) of plates (37) and/or (38) being of any scale, using a normal thickness or separation distance between the electrodes in the order of millimeters or centimeters (or

more) or down to micrometers or smaller; or by the possibility of plates (37) or (38) being parallel, perpendicular (or both) or at any angle to each other, or eventually form a grid of parallel or perpendicular (or both) planes (or planes at any other angle) that interconnect or not between themselves; or by the possibility of plates (37) or (38) being separated (or not) by non-conductive (or semi-conductive, or any other) material (which can also be the atmosphere or the vacuum); or by the possibility of all electrodes being permanently connected between themselves, or connected independently to the power source, or connected (or not connected) in any variation,

45. The apparatus according to claims 43 and 44, further characterized by the possibility of rotation of the plates (as a whole, or with different parts at different speeds), rings or electrodes (single pair or any number of electrodes) (37) or (38), that are charged to the same polarity (were the voltage and the polarity can be constant and/or changing in time), in opposite directions in order to increase repulsion between the opposed generated currents; or by the possibility of using an electret material (with a single layer or multiple layers of opposite successive charges) that is rotated as a whole (or with different parts at different velocities) in the same direction, in order to increase repulsion between the opposed generated currents; or by the possibility of using the metallic plates or rings (or with any other shape) (35) and (36) (single pair or any number of electrodes), charged to opposite polarities (were the voltage and the polarity can be constant and/or changing in time), that are rotated (as a whole or with different parts at different relative velocities) in the same direction, in order to increase repulsion between the generated opposed currents.

46. The apparatus according to claims 43 to 45, further characterized by the possibility of using or not a non¬conducting (dielectric materials with any dielectric constant), semi-conducting or any other material member (which can also be the atmosphere or the vacuum) interposed (or involving) in between the electrodes (37), and/or (38), and/or (35), and/or (36); or by the possibility of using pulsed currents, were instead of a constant velocity v of the charged elements, one can have an acceleration (with

symmetric or asymmetric rising or falling times) of the charged elements ((37)$_r$ and/or (38), and/or (35), and/or (36)), in order to produce opposing induced electric fields, $E=-\partial A/\partial t$, generated by the changing currents, in order to increase repulsion between the opposed currents, where the relative acceleration between the elements ((37), and/or (38), and/or (35), and/or (36)) with equal or opposite moving charges, can be synchronized in order to strengthen the repulsion component of the induced electric fields, which can be accomplished with any technique, including direct control of the velocity and/or acceleration of the involved elements, or using an eccentric (asymmetric) rotation system were the axis that transmits the rotational movement to the elements is displaced from the geometric center of these elements, in such a way that the element acquires an acceleration even when the axis velocity is constant, or by the possibility of this system being applied to one or more elements of the setup (for example, two plates face to face, were one or both elements are rotated with an eccentricity and therefore are accelerating relative to the other; or two concentric rings side to side, were one or both elements are rotated with an eccentricity and therefore are accelerating relative to the other) .

47. The apparatus according to claims 43 to 46, further characterized by a power source of" constant voltage, or (symmetric or asymmetric) alternating or pulsed voltage, that operates at any frequency (high or low, including radiof requency, microwave, ultraviolet or higher), with or without any type of modulation (frequency or amplitude modulation, for example) ; or a power source according to Avramenko's patent (US6104107); or a power source that produces electric or magnetic (symmetric or asymmetric) rotating fields; or a power source that produces one or more frequencies; or by the connection of one or more power sources to the same plate (s); or a power source that changes continuously the frequency of the exciting wave (current or voltage) in a sequential, caotic or repetitive manner (chirped excitation), linearly or non-linearly, with or without any type of modulation, or using or not white noise, pink noise, or any type of noise or caotic electromagnetic excitation; or by the use of any number of these power sources in an isolated or conjugated way; or by the use of any other power source, or by the use of a powex

source with a delicate control of the phase; or by the use of any of these power sources connected to plates (37) or (38), or (35) and (36), or to the rotating mechanism of these plates (which can be mechanical or electrical); or by the possibility of using the apparatus according to claims 43 to 46 to impart a repulsive gravitational force on nearby masses when the setups generate a strong electric or electromagnetic repulsion, or to impart an attractive gravitational force on nearby masses when the setups generate a strong electric or electromagnetic attraction.

48. Device for vacuum manipulation (antigravity propulsion through the attraction of a mass like planet Earth (7) or a general mass (6)), characterized by (one or more layers of) parallel (or at any other angle) plates (electrodes) (35) and (36) charged to opposite high voltage polarities (were the voltage and the polarity can be constant and/or changing in time), or by the possibility of one of the electrodes being at ground potential, or by the possibility of plates (35) and/or (36) having a symmetric or asymmetric shape, being of flat, concave, conical, tubular, elliptical, circular, semi-circular or any other shape; or by the possibility of plates (35) or (36) being symmetric or asymmetric, that is, the plates can have equal dimensions (of diameter, length, thickness, etc) or different dimensions (of diameter, length, thickness, etc), were any combinations of shapes and dimensions can be used; or by the possibility of plates (35) or (36) being disposed in any shape or composition of shapes (symmetric or asymmetric) in one or more successive layers of electrodes, separated or not by non-conductive or semi-conductive, or any other elements which can also be the atmosphere or the vacuum.

49. The apparatus according to claim 48, further characterized by the possibility of plates (35) and/or (36) being (one or more layers of) concentric rings or electrodes (of any shape, that close on themselves or not, that is, they are symmetric or asymmetric); or by the possibility of using one (or more) electrode (s) (or multiple concentric electrodes) inside a Faraday cage, charged to opposite high voltage polarities (were the voltage and the polarity can be constant and/or changing in time), or with one (or more) of the electrodes at ground potential and the other electrode (s) to any polarity (were

the voltage and the polarity can be constant and/or changing in time); or by the possibility of plates (35) and/or (36) being in solid, liquid, vapor, or in plasma (ionized) state (or in any combination of physical states), and where a containing chamber and electrical exciting means can be used when necessary, were plates (35) and/or (36) are charged positive or instead are charged negative (were the charge and the polarity can be constant and/or changing in time), where a containing chamber (of any shape), which uses (or not) any type of confinement system (electrostatic confinement for example), and that can use (when necessary) any electrical (or ionizing) exciting means (using electrodes inside the chamber or accelerating electric particles to the confinement area for example) to create a charge accumulation or concentration of a positive or negative polarity (inside the chamber) can be used; or by the possibility of plates (35) and/or (36) being superconductive or not, or even not conductive (but electrically charged); or by the spacing and thickness (or any dimension) of plates (35) and/or (36) being of any scale, using a normal thickness or separation distance between the electrodes in the order of millimeters or centimeters (or more) or down to micrometers or smaller; or by the possibility of plates (35) and/or (36) being parallel, perpendicular (or both) or at any angle to each other, or eventually form a grid of parallel or perpendicular (or both) planes (or planes at any other angle); or by the possibility of plates (35) and/or (36) being separated (or not) by non-conductive (or semi-conductive, or any other) material (whiGh can also be the atmosphere or the vacuum); or by the possibility of all electrodes (that are charged to the same polarity) being permanently connected between themselves, or connected independently to the power source, or connected (or not connected) in any variation.

50. The apparatus according to claims 48 and 49, further characterized by the possibility of rotation (as a whole, or with different parts at different speeds) of the plates, rings or electrodes (single pair or any number of electrodes) (35) and (36), that are charged to opposite polarities (were the voltage and the polarity can be constant and/or changing in time), in the opposite direction in order to increase attraction (between themselves); or by using the metallic plates or rings (35)

or (36) (single pair or any number of electrodes), charged to the same polarity (were the voltage and the polarity can be constant and/or changing in time) , that are rotated (as a whole or at different relative velocities) in the same direction, in order to increase attraction (between themselves) .

51. The apparatus according to claims 48 to 50, further characterized by the possibility of using or not a non¬conducting (dielectric materials with any dielectric constant) , semi-conducting or any other material member (which can also be the atmosphere or the vacuum) interposed (or involving) in between the electrodes (35) and/or (36) ; or by the possibility of using pulsed currents, were instead of a constant velocity v of the charged elements, one can have an acceleration (with symmetric or asymmetric rising or falling times) of the charged elements (35) , and/or (36) , in order to produce attracting induced electric fields, E=-3A/3t, generated by the changing currents, in order to increase attraction between the generated currents; where the relative acceleration between the elements ((35) , and/or (36)) with equal or opposite moving charges, can be synchronized in order to strengthen the attraction component of the induced electric fields, which can be accomplished with any technique, including direct control of the velocity and/or acceleration of the involved elements, or using an eccentric (asymmetric) rotation system were the axis that transmits the rotational movement to the elements is displaced from the geometric center of these elements, in such a way that the element acquires an acceleration even when the axis velocity is constant, or by the possibility of this system being applied to one or more elements of the setup (for example, two plates face to face, were one or both elements are rotated with an eccentricity and therefore are accelerating relative to the other; or two concentric rings side to side, were one or both elements are rotated with an eccentricity and therefore are accelerating relative to the other) .

52. The apparatus according to claims 48 to 51, further characterized by a power source of constant voltage, or of (symmetric or asymmetric) alternating or pulsed voltage, that operates at any frequency (high or low, including radiofrequency, microwave, ultraviolet or higher) , with or

without any type of modulation (frequency or amplitude modulation, for example); or a power source according to Avramenko's patent (US6104107); or a power source that produces electric or magnetic (symmetric or asymmetric) rotating fields; or a power source that produces one or more frequencies; or by the connection of one or more power sources to the same plate(s); or a power source that changes continuously the frequency of the exciting wave (current or voltage) in a sequential, caotic or repetitive manner (chirped excitation), linearly or non-linearly, with or without any type of modulation, or using or not white noise, pink noise, or any type of noise or caotic electromagnetic excitation; or by the use of any number of these power sources in an isolated or conjugated way; or by the use of any other power source, or by the use of a power source with a delicate control of the phase; or by the use of any of these power sources connected to plates (37) and/or (38), and/or (35), and/or (36), or to the rotating mechanism of these plates (which can be mechanical or electrical); or by the possibility of using the apparatus according to claims 48 to 51 to impart a repulsive gravitational force on nearby masses when the setups generate a strong electric or electromagnetic repulsion, or to impart an attractive gravitational force on nearby masses when the setups generate a strong electric or electromagnetic attraction.

53. Device for vacuum manipulation (antigravity propulsion through the attraction of a mass like planet Earth (7) or a general mass (6)), characterized by the possibility of using a high density plasma (8), that is (or not) inside a chamber (40), and that makes use of any available means to control the plasma density (and/or thickness), were the gravitational force of attraction increases with the density (and/or thickness) of the plasma.

54. The apparatus according to claim 53, further characterized by possibility of using one or more electrodes (and/or coils, and/or electromagnetic antennas in any combination and of any shape and form), inside (or at the periphery) a chamber (40) (spherical, rectangular or with any other shape; made of transparent metal or any other conductor, or non-conductor, or semi-conductor, or any other material), that are excited by a power source in order to form a solid state plasma (an ionized solid

material; which may eventually dispense the use of the chamber (40)), or a liquid, a vapor or a gaseous (at high pressure, for example) plasma (any element (s) in any combination of physical states), using any adequate substance inside chamber (40) that can be ionized in order to form a plasma (8), that can be contained by any known means (chamber (40), or electrostatic or magnetic confinement, for example).

55. The apparatus according to claims 53 and 54, further characterized by a power source of (symmetric or asymmetric) alternating or pulsed current and/or voltage, that operates at any frequency (high or low, including radiofrequency, microwave, ultraviolet or higher), with or without any type of modulation (frequency or amplitude modulation, for example); or a power source according to Avramenko's patent (US61041Q7); or a power source that produces electric or magnetic (symmetric or asymmetric) rotating fields; or a power source that produces one or more frequencies; or by the connection of one or more power sources to the same coil(s); or a power source that changes continuously the frequency of the exciting wave (current or voltage) in a sequential, caotic or repetitive manner (chirped excitation), linearly or non-linearly, with or without any type of modulation, or using or not white noise, pink noise, or any type of noise or caotic electromagnetic excitation, or by the use of a power source with a delicate control of the phase; or by the use of any number of these power sources in an isolated or conjugated way; or by the use of any other power source; or a power source of high energy electromagnetic waves, or a power source for induction heating, or by the use of any of these power sources or any adequate power source connected to electrodes, coils or electromagnetic antennas used to ionize the medium inside chamber (40) and make the plasma (8); or by the possibility of using the apparatus according to claims 53 to 54 to impart an attractive gravitational force on nearby masses when the setups generate a strong density (and/or thickness) of the plasma (8).

56. Device for vacuum manipulation (antigravity propulsion through the attraction of a mass like planet Earth (7) or a general mass (6)), characterized by the possibility of using the apparatus according to claims 43 to 47, or by using the apparatus according to claims 48 to 52, or by

using the apparatus according to claims 53 to 55, or by the possibility of using, in any independent or conjugated way, any of the setups mentioned in this claim, mechanically attached to a mass (6) and disposed around its periphery (or at any other desired position, in the interior or exterior of mass (6)) in any number and/or disposition.

57. The apparatus according to claim 56, further characterized by the possibility of encapsulating the plates (37), and/or (38), and/or (35), and/or (36) (any number), in a non-conductive (dielectric) material, or a semi-conductive material (or any other material), with the advantage of increasing mechanical strength, stability and security.

58. The apparatus according to claims 56 and 57, further characterized by the possibility of using multiple (two or more) parallel (or at any other angle) plates (flat plates, concentric rings or with any other shape) (37), and/or (38), and/or (35), and/or (36) (any number), that are segmented in partial and independent sections (which can have any partial shape), and that can be excited independently, or in groups by a power source.

59. Device for vacuum manipulation (antigravity propulsion through the repulsion or attraction of a mass like planet Earth (7) or a general mass (6)), characterized by a conductive emitter (43) and/or (45) (of spherical, oval, ellipsoid, parabolic, toroidal, ring, rectangular, concave or any other shape), that is connected to a power source; or by the possibility of using element (s) (43) (one or more elements, connected to a power source), placed at the focus point (or simply below) of a parabolic reflector (45) (which may have any other shape, flat or semi-circular for example) that can be passive (not connected to a power source), or can be charged to a static (high or low) voltage (any polarity, static or changing), or can also be connected to any given power source, and were element (45) can be made of any conductive metal (or material), or any charged (non-conductive, semi-conductive or any) material, or may also be a plasma reflector (with any shape), in order to form or constitute a longitudinal electrodynamic wave beam emitter (or beam) (46), which is not limited to the description given above, since the element (46) can represent any other source or emitter of electrodynamic longitudinal waves.

60. The apparatus according to claim 59, further characterized by the possibility of charging element (43) and/or (45) with static (or changing) high voltage and produce longitudinal waves by mechanically (or electromagnetically or by any other means) vibrating element(s) (one or more) (43) and/or (45); or by using two or more elements (43) and/or (45), in order to emit longitudinal waves that interfere in space (it is advised the choice of the proper frequency (ies) for each case) to create one or more attracting or repelling points; or by the possibility of the (mechanically or electromagnetically or by any other means) referred vibrated elements being made from a non-conducting (or semi-conducting or any other) material that is charged to any polarity.

61. The apparatus according to claims 59 and 60, further characterized by the possibility of involving the conducting emitter (43) and/or the parabolic reflector (45) by a protective enclosure (44) (made of non-conductive dielectric material, or semi-conductive material or any other material) , whose shape can be similar or different to the shape of elements (43) and/or (45) , or that can be molded to the shape of elements (43) and/or (45), or that can allow (or not) the presence of a separating space or chamber (between the enclosure (44) and elements (43) and/or (45)) which can be filled with a solid, liquid or gas material (non-conductor, semiconductor or any other) for protective purposes (avoid plasma formation) , or which can be filled with a solid, liquid, vapor or gaseous material (or any combination of physical states) for the purpose of plasma creation if desired; or by the possibility of involving only the exterior surface of the conducting emitter (43) , and/or only the exterior surface of the element (45) (parabolic reflector or other) with a non-conductive (dielectric) protective material or a semi-conductive material or any other material.

62. The apparatus according to claims 59 to 61, further characterized by the possibility of (with or without element (43) placed below element (45)) filling the enclosure (44) (that surrounds element (45) and/or both elements (43) and/or (45)) with a solid, liquid, vapor or gaseous material (or any combination of physical states) that can form a plasma (8) if the element (s) (45) (and/or (43)) is (are) excited by a power source, in order to

function also as a longitudinal wave emitter (plasma antenna) .

63. The apparatus according to claims 59 to 62, further characterized by the possibility of using two or more electrodynamic longitudinal wave emitters (46) , and/or (43), and/or (45) (were element (43) and/or (45) can be a plasma antenna or not), positioned face to face (or positioned in any manner and in any angle forming or not a geometric arrangement) , and excited by a (one or more) wave shape (s) (the frequency (ies) of the current or tension applied to the emitters) that allows for a longitudinal standing wave pattern (that can (or not) vary in time but which maintains the same field relation, be it in opposition or attraction) , or longitudinal travelling wave pattern, to be formed along their axis of separation (or in any point in space) , in order to create one or more attraction points (49) and/or repulsion points (48) (that are in a fixed or in a variable position) along their axis or in any point in space (it is advised the choice of the proper frequency (ies) for each case), in order to transport, levitate or move any mass (including that of the generating setup) by varying (or maintaining constant) the phase (50) of the longitudinal standing wave pattern by any means (including the manipulation of the phase of the exciting current /tens ion frequency (ies) , or of the modulation of the frequency (ies) of these currents/ tensions, or using or not the technique mentioned in claims 40, and/or 60) , which will maintain or change the space position of the attraction and/or repulsion points; or by the possibility of element (46) having more than one conducting emitter (43) , connected to a power source, and placed below the parabolic reflector (45) (connected or not to a power source) in order to create, by interference, one or more attraction points (49) and/or repulsion points (48) (that are in a fixed or in a variable position) in the near space in order to levitate or move any mass (including that of the generating setup) by varying (or maintaining constant) the phase (50) of the longitudinal standing wave pattern by any means (as discussed before) , which will maintain or change the space position of the attraction and/or repulsion points (in order to control the direction of the propulsive force) .

64. The apparatus according to claims 59 to 63, further characterized by the possibility of using one (or more) electrodynai ïiic longitudinal wave emitters (46), and/or (43), and/or (45) (were element (43) and/or (45) can be a plasma antenna or not) in any relative position, were the phase (50) of the emitted wave (or of the resultant wave from the interference of more than one source) changes (or propagates in space) continually in one direction (or one can also change the phase direction, or also maintain the phase constant if desired), in order to form a traveling wave in space (or a fixed pattern in space, that can also be variable but which maintains the same field relations in time, and in space if desired, which can attract or repel any nearby mass), that can be used has an attractive or repelling wave (in all directions), or instead can be used has an attractive or repelling focused beam, were the attraction and/or repulsion depends on the direction of the phase change (any mass will be dragged by the moving attracting (49)/repelling (48) points in the direction they propagate) of the propagating wave or beam in space (by directly changing the phase (50) of the emitted (or interference created) wave or beam, or by changing the phase of the exciting frequency (ies) or the phase of the modulation of this frequency (ies), or using or not- the technique mentioned in claims 40, and/or 60 and/or 63, or using any other means):, allowing to manipulate masses at a distance (or also the mass that carries the generating elements (43), and/or (45) and/or (46)), and eventually also to extinguishing fires at a distance.,

65. The apparatus according to claims 59 to 64, further characterized by the possibility of using a (reflecting or longitudinal wave emitting) flat (parabolic, concave or of any other shape) element (51) (conducting and/or metallic material, plasma reflector, etc.), which can be moved or not, charged or not with static (or changing) high (or low) voltage, or also excited or not by a power source, and were element (51) is facing (or in any other position or angle near or far away) the longitudinal beam emitter (46), or the longitudinal wave emitter (43) and/or (45.), in order to generate a standing (or traveling) wave pattern (that can (or not) vary in time but which maintains the same field relation, be it in opposition or attraction) with one or more stationary (or moving) attraction points (49) and/or repelling points, (48), where any mass: (or masses,) can be

suspended and controlled, using (or not) the capacity to control or change the phase (50) of the stationary or traveling wave pattern (the use of equal or similar frequencies facilitates this process), or by varying the phase of the longitudinal standing wave pattern (by moving element(s) (46), and/or (51), and/or (43), and/or (45), or by changing the phase of the exciting frequency (ies) or the phase of the modulation of this frequency (ies), or by using or not the technique mentioned in claims 40, and/or 60 and/or 63, or using any other means), in order to transport, levitate or manipulate masses at a distance (or also the mass that carries element (s) (43), and/or (45) and/or (46), and/or (51)), and eventually also to extinguishing fires at a distance.

66. The apparatus according to claims 59 to 65, further characterized by the possibility of using a parabolic (or any shape that creates a focus point in space for the reflected waves) element (51) facing (or in any other position or angle near or far away) the wave emitters (46), and/or (43), and/or (45) (were element (43) and/or (45) can be a plasma antenna or not), in order to create a stronger focus (interference) point nearby (or far) element (51) which can be used to propel element (51) (or any nearby mass) for any desired purpose, using or not the phase change techniques described in claim 65; or by the possibility of using a parabolic (or any shape that creates a focus point in space for the emitted waves) element (51) (one or more), connected to a power source, in order to create a stronger focus (interference) point nearby (or far) element (51) which can be used to propel element (51) (or any nearby mass) for any desired purpose, using or not the phase change techniques described in claim 65.

67. The apparatus according to claims 59 to 66, further characterized by the possibility of using two (or more) electrodynamic longitudinal wave emitters (46), and/or (43), and/or (45) (were element (43) and/or (45) can be a plasma antenna or not), and/or (51), that create one or more repelling points (48) or attraction points (49) in space (focused or not; it is advised the choice of the proper frequency (ies) for each case), from the interference (at a distance) of two (or more) elements (46), and/or (43), and/or (45), and/or (51), which generate wave patterns at a distance (at one or more frequencies), were

the phase (50) (the use of equal or similar frequencies facilitates this process) of the fields coincides in time, or can be changed (or maintained constant) using (or not) the technique mentioned in claims 40, and/or 60 and/or 63, and/or 65, for any purpose including manipulation, transport, or levitation of any mass (or masses) at a distance, including also the mass of the generating elements (43), and/or (45) and/or (46), and/or (51), and eventually also to extinguishing fires at a distance.

68. The apparatus according to claims 59 to 67, further characterized by the possibility of using one or more element (s) (45), that have a parabolic shape (or any shape that creates a focus point in space; it is advised the choice of the proper frequency (ies) for each case), with a power source in order to create directly a focus point in space that can repel or attract matter (and the reflector (45) itself), using (or not) the phase control techniques described in claim 65; or by charging electrically one or more elements (45) with static (or changing) high voltage and mechanically (:or electromagnetically or by any other means) vibrate element (45) in order to generate longitudinal waves that can also create directly a focus point in space that can repel or attract matter (and the reflector (45) itself), using (or not) the phase control techniques described in claim 65.

69. The apparatus according to claims 59 to 68, further characterized by the possibility of using in the referred claims one or more acoustic lens(es) (53) for longitudinal waves (any acoustic lens used for acoustic sound waves can be used or adapted for the electrodynamic longitudinal waves), which can consist for example in one or more "zone plates" (which can be made of any conducting material, or superconducting, or any non-conducting or semi-conducting material or any other material (charged or not); were each element or ring can be a plasma reflector) in order to create a focus point (it is advised the choice of the proper frequency (ies) for each case) for the longitudinal wave(s) emitted by element(s) (43) and/or (45), and/or (46), and/or (51), in order to attract or repel any nearby mass as before,

70. Device for vacuum manipulation (antigravity propulsion through the repulsion or attraction of a mass like planet

Earth (7) or a general mass (6)), characterized by the apparatus according to claims 59 to 69, mechanically attached to a mass (6) and disposed around its periphery (or at any other desired position, in the interior or exterior of mass (6)) in any number and/or disposition; or by a power source of static high (or low) voltage, or of (symmetric or asymmetric) alternating or pulsed current and/or voltage, that operates at any frequency (high or low, including radiofrequency, microwave, ultraviolet or higher) , with or without any type of modulation (frequency or amplitude modulation, for example) ; or a power source according to Avramenko's patent (US6104107); or a power source that produces electric or magnetic (symmetric or asymmetric) rotating fields; or a power source that produces one or more frequencies; or by the connection of one or more power sources to the same element (s); or a power source that changes continuously the frequency of the exciting wave (current or voltage) in a sequential, caotic or repetitive manner (chirped excitation) , linearly or non-linearly, with or without any type of modulation, or using or not white noise, pink noise, or any type of noise or caotic electromagnetic excitation, or by the use of a power source with a delicate control of the phase; or by the use of any number of these power sources in an isolated or conjugated way; or by the use of any other power source; or a power source with delicate control of the phase, or by the use of any of these power sources that can be connected to element or elements (43) and/or (45), and/or {46} , and/or (51) , and/or (53) .

71. Device for vacuum manipulation (antigravity propulsion through the repulsion or attraction of a mass like planet Earth (7) or a general mass (6)), characterized by the possibility of using apparatus according to claims 10, 42, 56, 57, 58 and 70; or by the possibility of using, in any independent or conjugated way, any of the setups mentioned in this claim (propulsion units (54)), mechanically attached to a mass (6) and disposed around its periphery (or at any other desired position, in the interior or exterior of mass (6)) in any number and/or disposition.

72. Device for vacuum manipulation (manipulation of a mass (6)), characterized by the possibility of using apparatus according to claim 71 (but were the repulsive or attracting gravity generating means can also be external to the mass

or masses to be levitated or manipulated), that can be used to manipulate any mass (6) in any environment (free or constrained), including the use of a chamber (of any shape, with or without one or more lateral walls or the ceiling, or the ground) with repulsive or attracting gravity generating elements (propulsion units (54)) according to claim 71, disposed on the upper (55), and/or lower (56), and/or in any lateral section (or side walls), in order that any (animated or non animated) masses can be subject to a suspension force in order to induce weightlessness, or instead be subject to directed movements, for any purpose including any recreational, industrial or scientific purposes; or by the possibility of using apparatus according to claim 71 (were the repulsive or attracting gravity generating means can be attached, or detached, to any mass or masses), to extinguish fires at a distance.

73. Device for vacuum manipulation (manipulation of a mass (6) for energy production), characterized by the possibility of using one or more connecting arms (57), between an axis (58) and the setups (or propulsion units (54), that generate attractive or repulsive gravitational forces) that are in accordance with claim 71, and which can be in direct physical contact (or at a distance) with one or more masses (6) (that are actuated by propulsion forces by elements (54)), in order to produce a binary of force and induce a rotational velocity (59) on the axis (58); or by the possibility of mass or masses (6) can be present in any number and have any geometry, where it can by constituted by independent sections near each propulsion unit (54) or by a continuous mass (in ring shape for example) connected to axis (58) by the connecting arm(s) (57); or by the possibility of using any number of propulsion units (54) (at any distance from one or more masses (6)) supported or not on a surface (61) (and using or not a vertical support (60)), and were the gravity force of the Earth (7) can be (or not) one of the forces to be used together with one or more propulsion units (54), in order to induce a rotational velocity (59) on the axis (58); or by the possibility of using only the propulsion units (54) (not being necessary an additional mass (6)) if these are asymmetric, in order to induce a rotational velocity (59) on the axis (58).

74. The apparatus according to claim 73, further characterized by the possibility of axis (58) transmitting its rotational velocity (or torque) (59) to a normal electric generator, like that used for example in wind or

hydroelectric electric system generators, in order to produce electrical energy.

75. Device for vacuum manipulation (to speed up or slow down the radioactive decay of a radioactive element (62)), characterized by the possibility of using electric and/or magnetic fields (magnetic vector potentials) in attraction or repulsion, respectively, to accelerate or decelerate the radioactive decay of a radioactive element (62).

76. The apparatus according to claim 75, further characterized by the possibility of placing radioactive element (62) inside or between electrodes (35) and/or (36), and/or (37), and/or (38); or by the use of electrodes (35) and/or (36), and/or (37), and/or (38) in any number, or in parallel planes (or at other angles), that close on themselves (concentric) or not, and that can be interposed in succession, with or without a dielectric (or semiconductor or any other material) element (63), that can be solid, liquid, gaseous (or eventually the atmosphere or the vacuum); or by the use of a power source of static voltage, or of (symmetric or asymmetric) alternating or pulsed voltage, that operates at any frequency (high or low, including radiofrequency, microwave, ultraviolet or higher), with or without any type of modulation (frequency or amplitude modulation, for example); or a power source according to Avramenko's patent (US6104107); or a power source that produces electric or magnetic (symmetric or asymmetric) rotating fields; or a power source that produces one or more frequencies; or by the connection of one or more power sources to the same element(s); or a power source that changes continuously the frequency of the exciting wave (current or voltage) in a sequential, caotic or repetitive manner (chirped excitation), linearly or non-linearly, with or without any type of modulation, or using or not white noise, pink noise, or any type of noise or caotic electromagnetic excitation, or by the use of a power source with a delicate control of the phase; or by the use of any number of these power sources in an isolated or conjugated way; or by the use of any other power source connected to one or more elements (35), and/or (36), and/or (37), and/or (38).

77. The apparatus according to claims 75 and 76, further characterized by the possibility of placing radioactive

element (62) inside a chamber (40) (of any material, and that contains element (64), were the element (62) can be protected by a second chamber (40) inside the first), or inside or between electrodes (35) and/or (36) (and/or (37) and/or (38)), that can be in any number, or in parallel planes (or at other angles), that close on themselves (concentric) or not, and that can be interposed in succession, with or without an element (64) (any solid, liquid, vapor or gas) susceptible to ionization and plasma formation (using in any appropriate position, a power source connected to one or more electromagnetic antennas which emit electromagnetic waves of high energy directed to element (64), and/or using one or more coils used in induction heating directed to element (64)), in order to form a plasma (8), inside chamber (40) (of any material, which contains element (62)); or one can form the plasma (8) inside or between electrodes (35) and/or (36), which are connected to a power source (where one or more electrodes can be electrically neutral, positive or negative); were the power source supplies a static voltage (high or low), or a (symmetric or asymmetric) alternating or pulsed current and/or voltage, that operates at any frequency (high or low, including radio frequency, microwave, ultraviolet or higher), with or without any type of modulation (frequency or amplitude modulation, for example); or a power source according to Avramenko's patent (US6104107); or a power source that produces electric or magnetic (symmetric or asymmetric) rotating fields; or a power source that produces one or more frequencies; or by the connection of one or more power sources to the same element (s); or a power source that changes continuously the frequency of the exciting wave (current or voltage) in a sequential, caotic or repetitive manner (chirped excitation), linearly or non-linearly, with or without any type of modulation, or using or not white noise, pink noise, or any type of noise or caotic electromagnetic excitation, or by the use of a power source with a delicate control of the phase; or by the use of any number of these power sources in an isolated or conjugated way; or by the use of any other power source; or by the use of any of these (or other) power sources connected to one or more elements (35) and/or (36), and/or (37) and/or (38), and/or one or more electromagnetic antennas, and/or one or more coils (in order to ionize the medium (64) and make the

plasma (8) that Involves element (62) in a total or partial way) ; or by the possibility of using alternately elements (63) and/or (64) according to the intended purpose.

78. The apparatus according to claims 75 to 77, characterized by the possibility of placing radioactive element (62) at the opposing or attracting, electric or magnetic field points generated according to the apparatus mentioned in claims 10, 42, 56, 57, 58 and 70, but where the opposing or attracting, electric or magnetic field points, are used to place the radioactive element (62), for the purpose of slow down or speed up the radioactive decay of a radioactive element, respectively, instead of being used for antigravity propulsion.

79. The apparatus according to claims 75 to 78, characterized by the possibility of application in nuclear energy sources, such as nuclear batteries (for example) for energy production; or by the possibility of application in the reduction or increase of the lifetime of any radioactive element (62) (including radioactive waste) .

Lisbon, 22 June of 2009

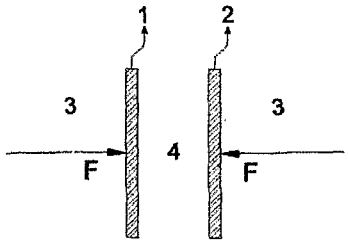


Figure 1.a)

Figure 1. b)

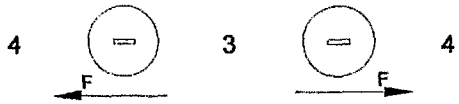


Figure 1. c)

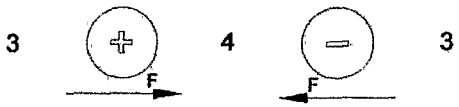


Figure 1. d)

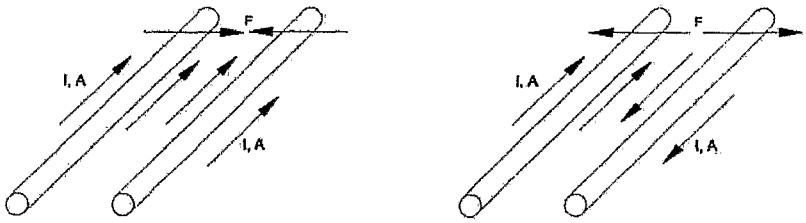


Figure 2. a)

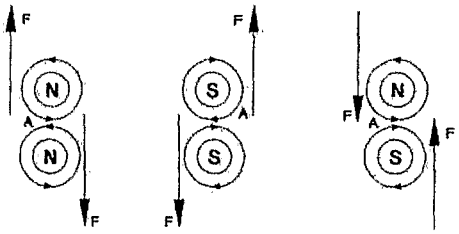
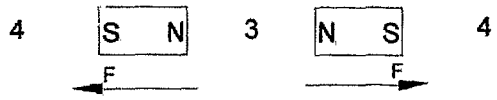


Figure 2. b)

Figure 2. c)



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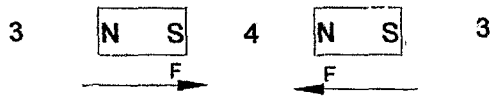


Figure 2. e)

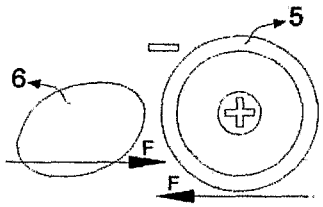
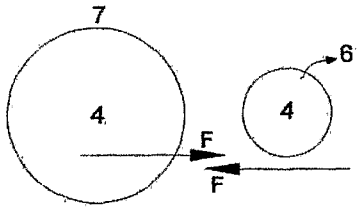


Figure 3. a)



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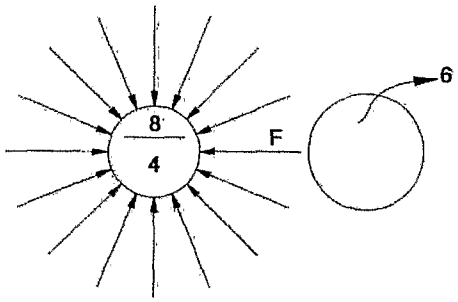

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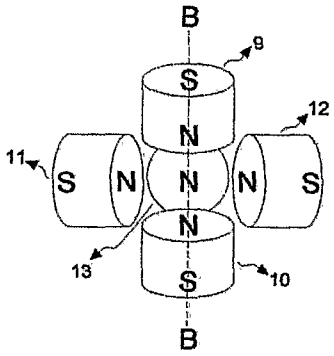
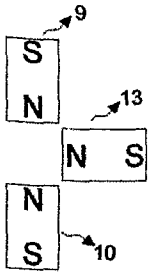


Figure 4.a)



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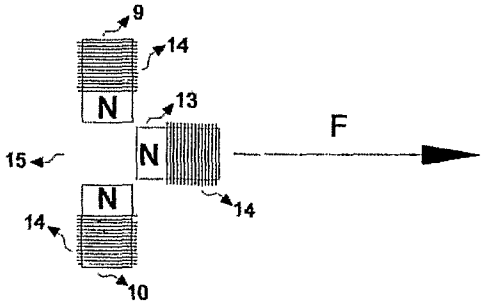

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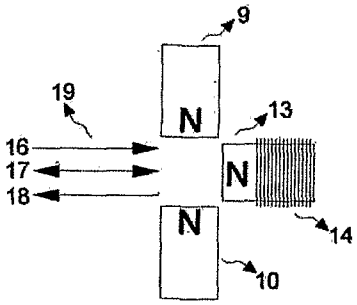

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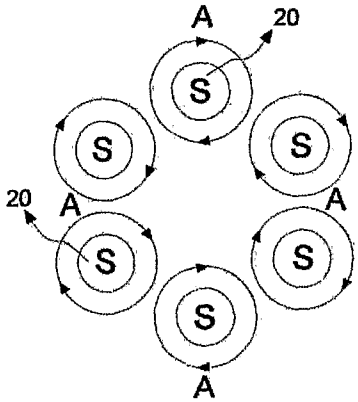

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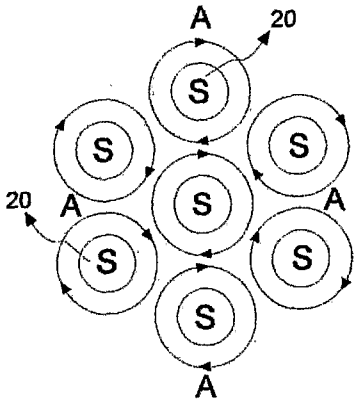

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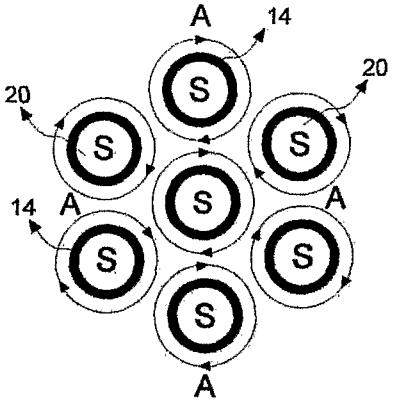


Figure 4.g)

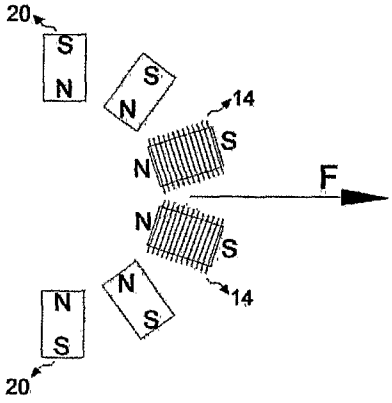


Figure 4.h)

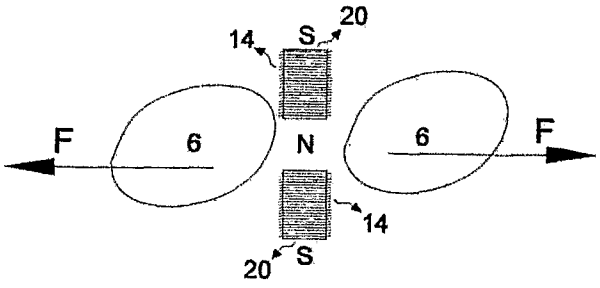


Figure 5. a)

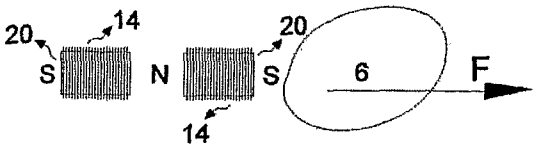
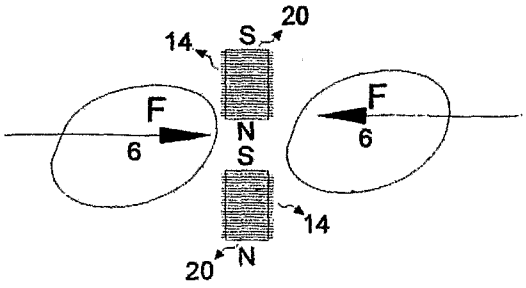


Figure 5. b)



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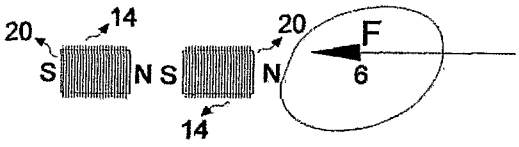

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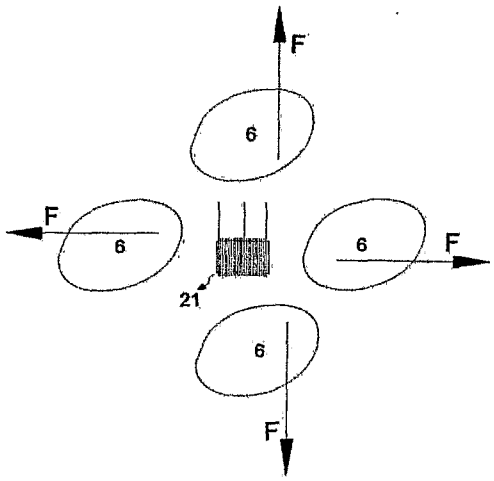


Figure 5. e)

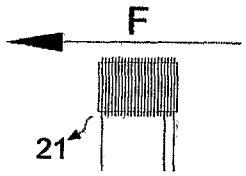


Figure 5. f)

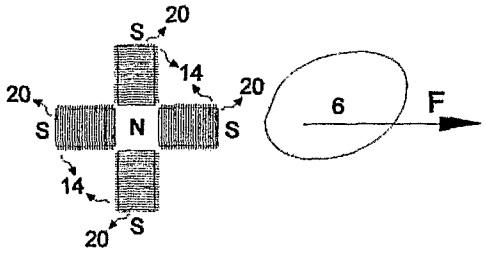


Figure 5. g)

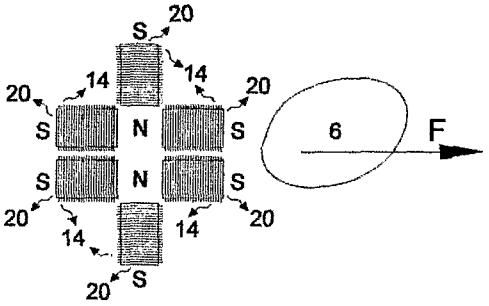


Figure 5. h)

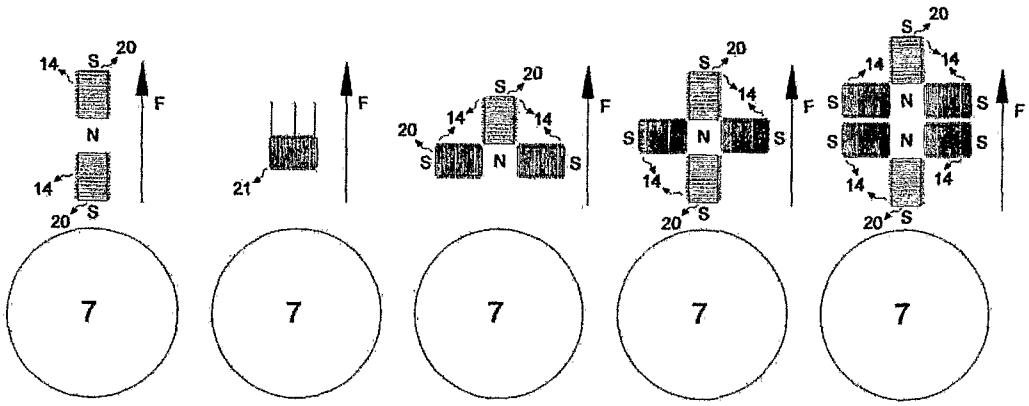


Figure 5. i)

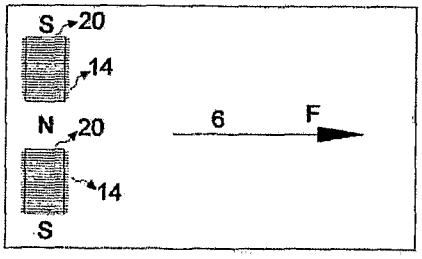


Figure 6. a)

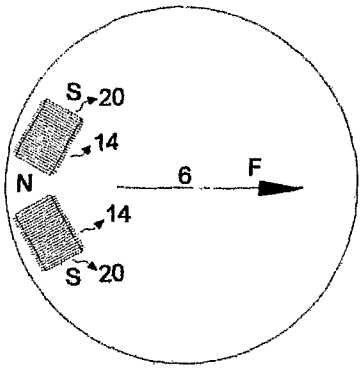


Figure 6. b)

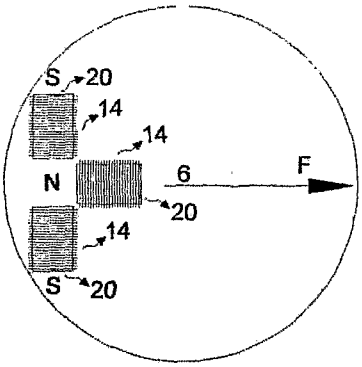
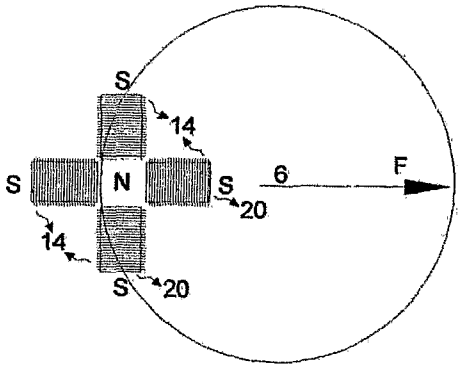


Figure 6. c)



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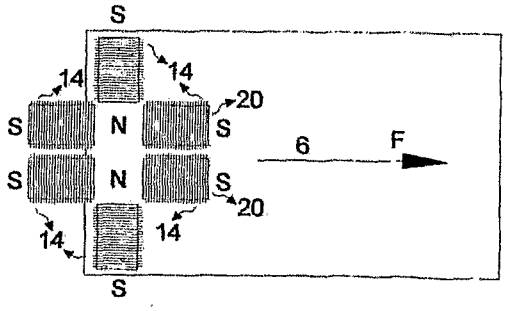

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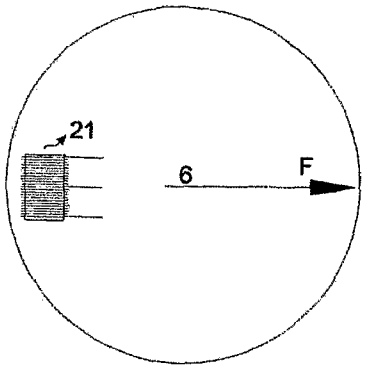

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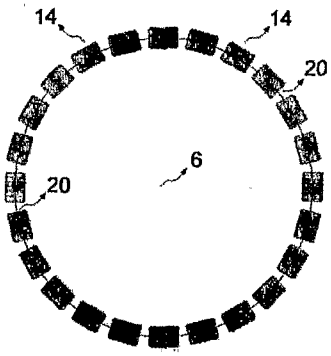


Figure 7. a)

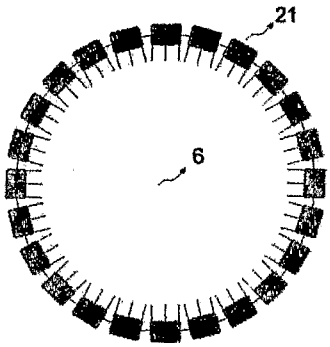


Figure 7. b)

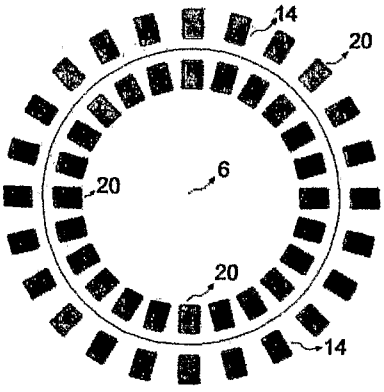
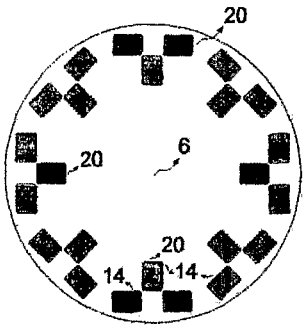


Figure 7. c)



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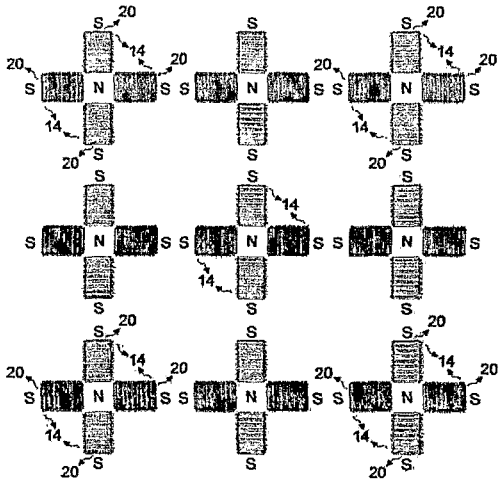

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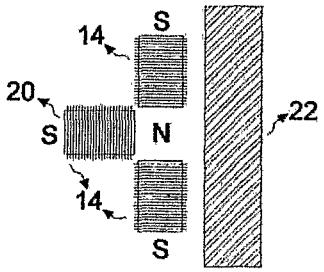
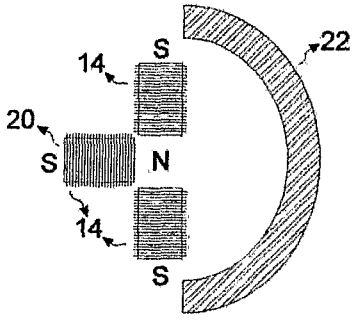


Figure 8. a)



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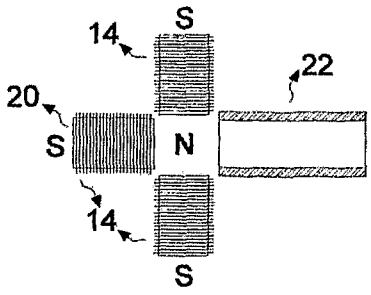

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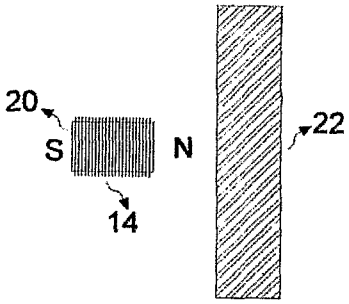
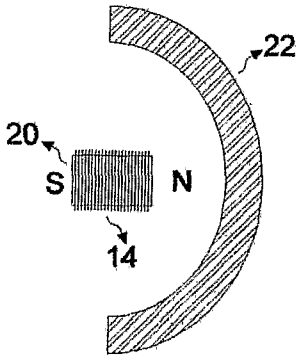


Figure 9. a)



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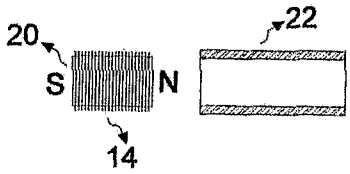
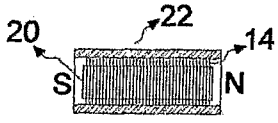


Figure 9. c)



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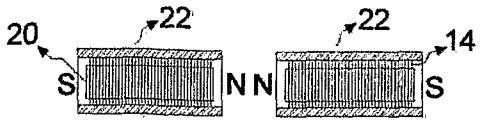

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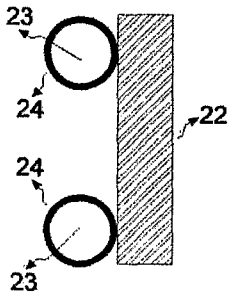


Figure 10. a)

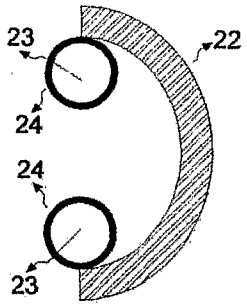


Figure 10. b)

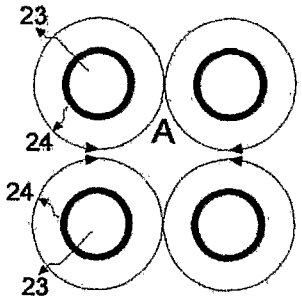
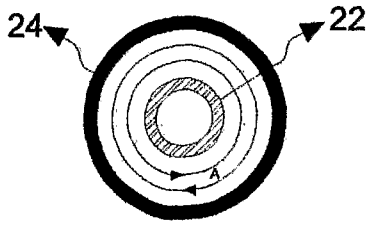


Figure 10. c)



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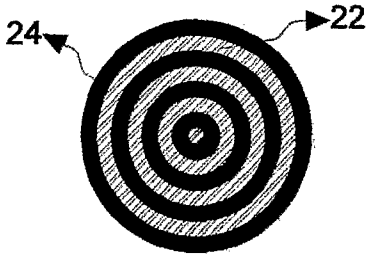

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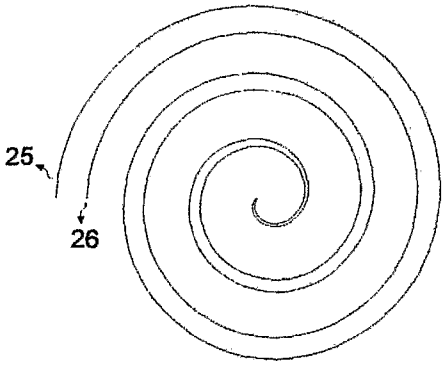

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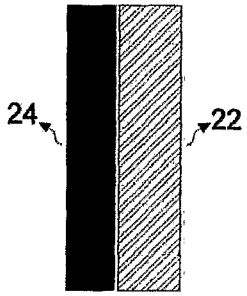


Figure 10. g)

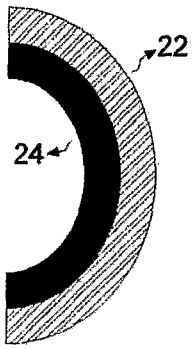


Figure 10. h)

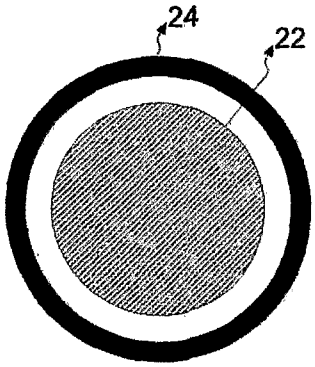


Figure 10. i)

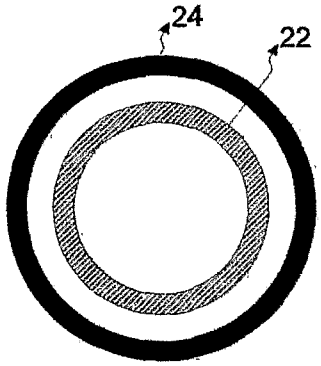


Figure 10. j)

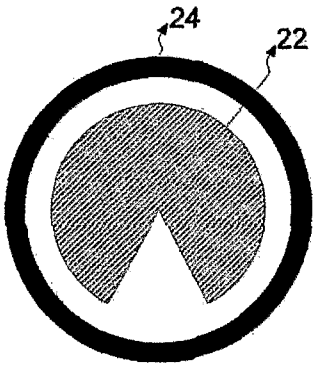


Figure 10. k)

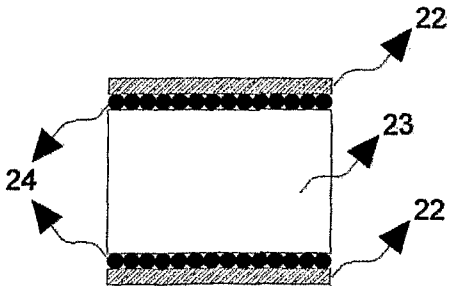


Figure 11. a)

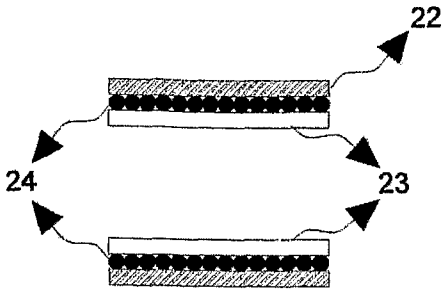


Figure 11. b)

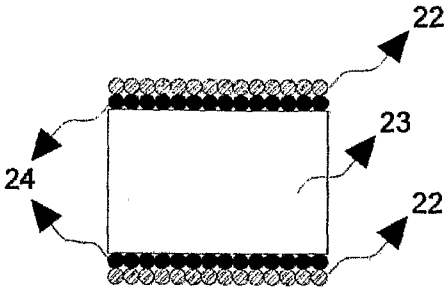


Figure 11. c)

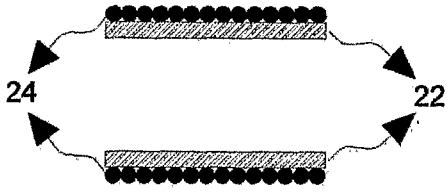


Figure 11. d)

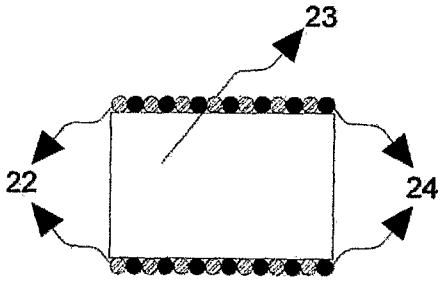


Figure 11. e)

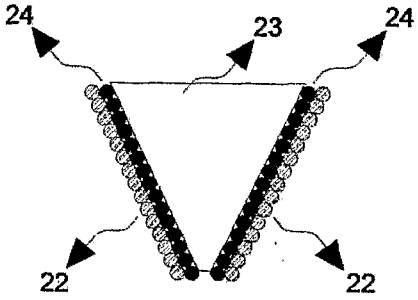


Figure 11. f)

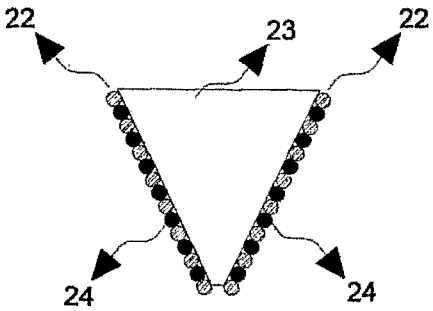


Figure 11. g)

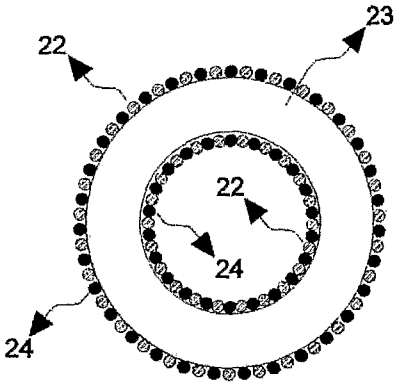
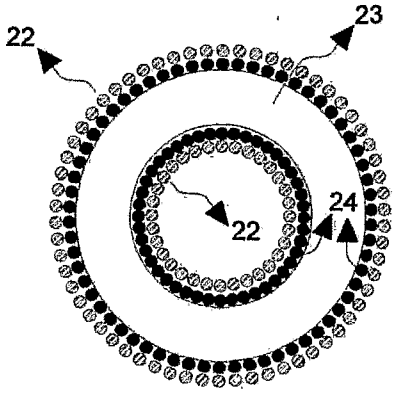


Figure 12. a)



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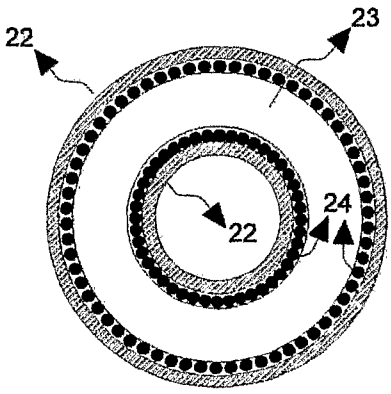

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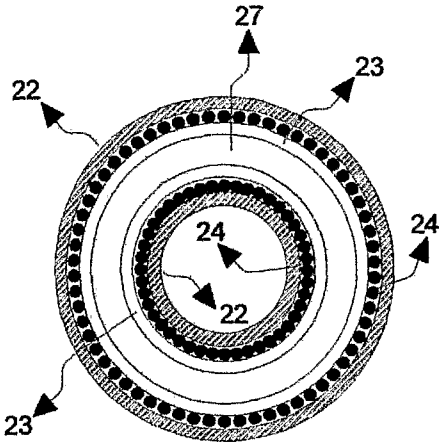


Figure 12. d)

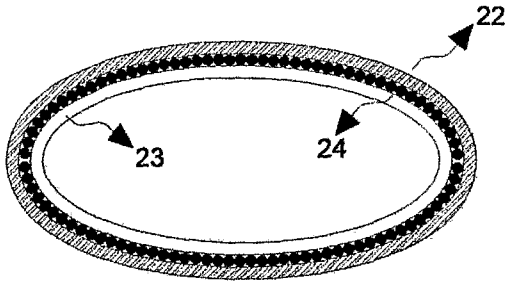


Figure 13. a)

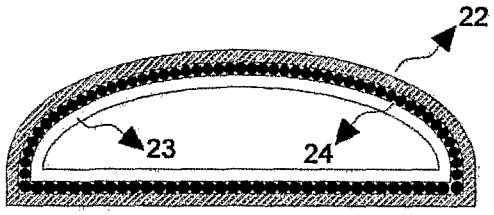
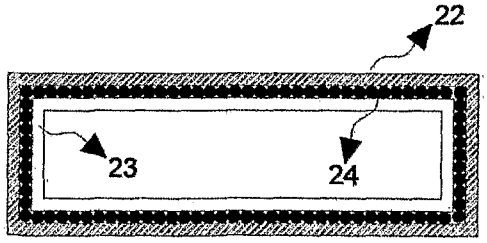


Figure 13. b)



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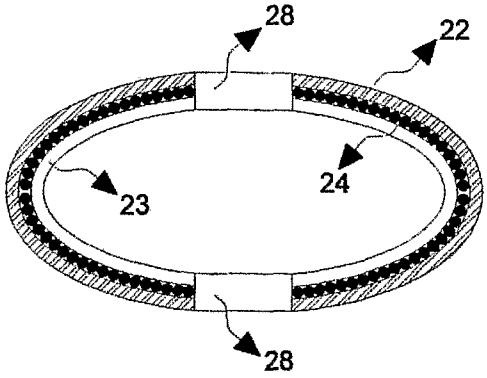

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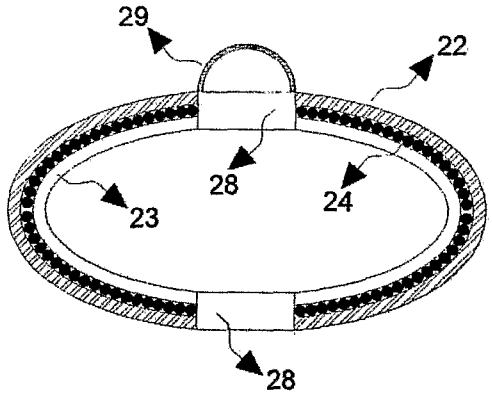


Figure 13. e)

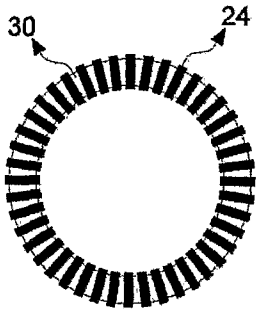
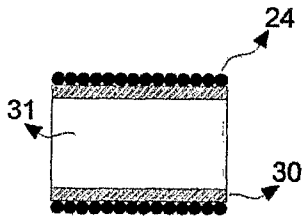


Figure 14. a)



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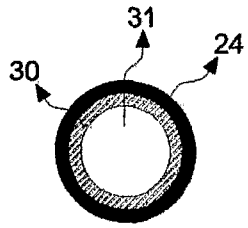

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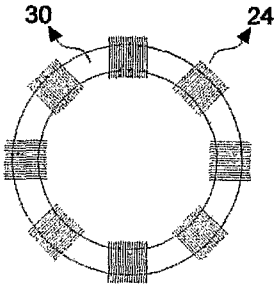

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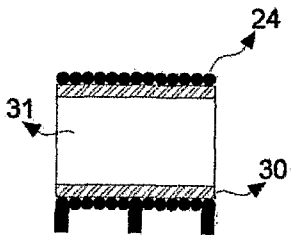

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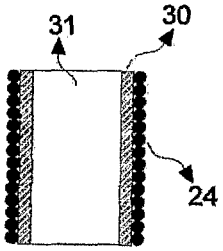

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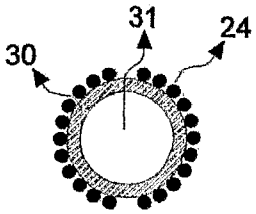


Figure 14. g)

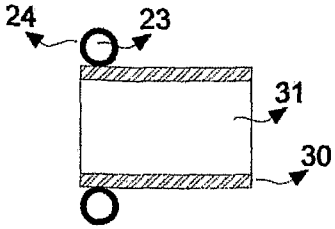


Figure 14. h)

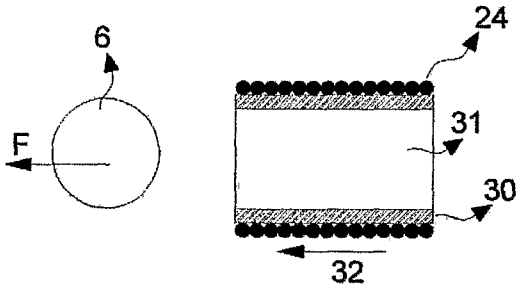


Figure 14. i)

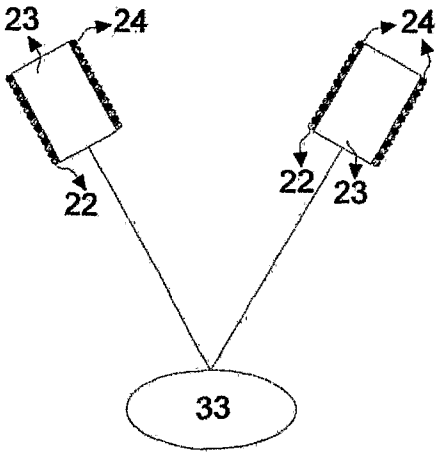


Figure 14. j)

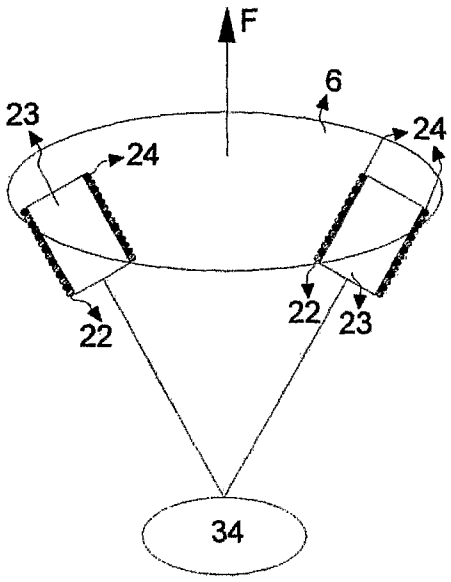


Figure 14. k)

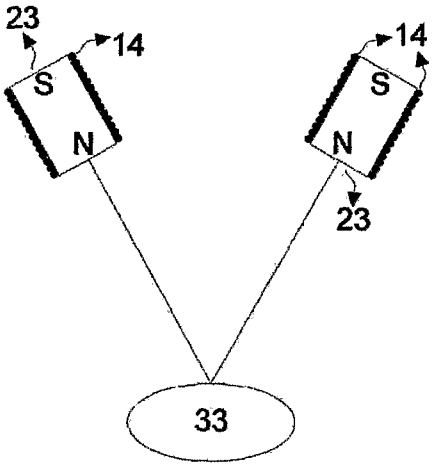


Figure 14. l)

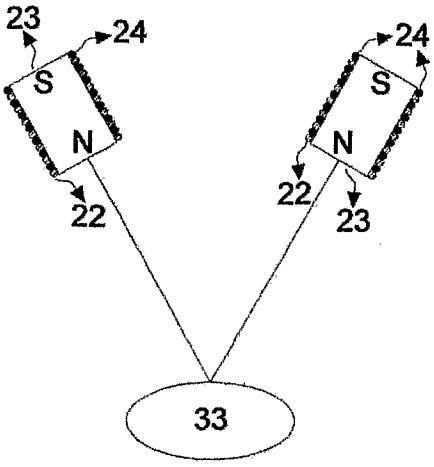


Figure 14. m)

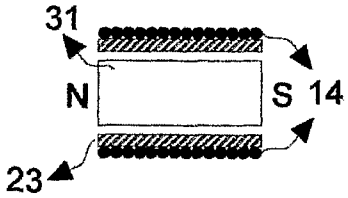


Figure 14. n)

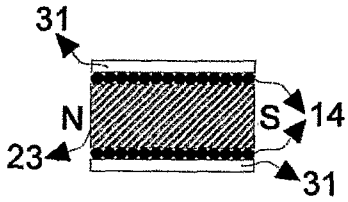


Figure 14. o)

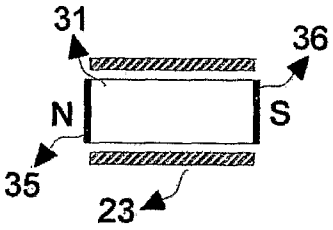
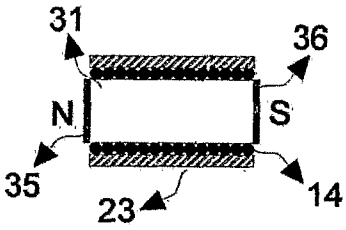


Figure 14. p)



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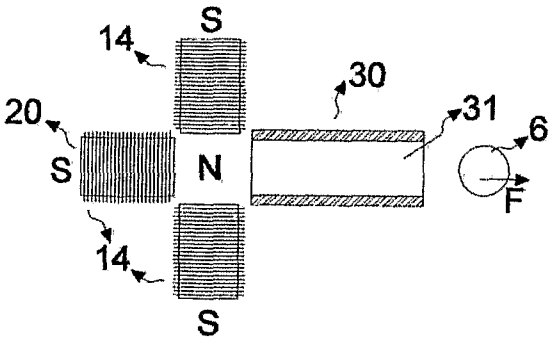

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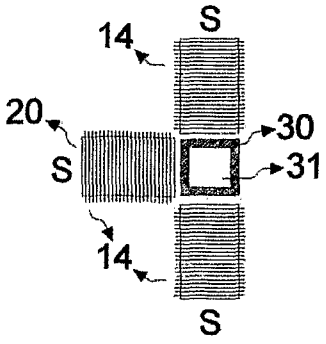

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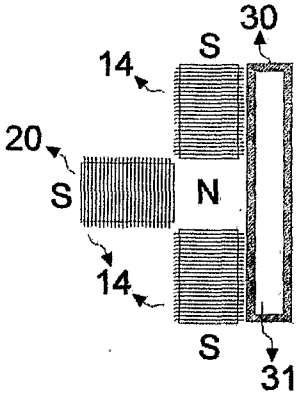

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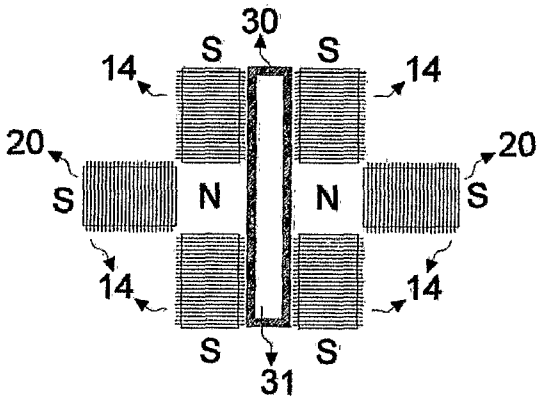


Figure 14. u)

Figure 15. a)

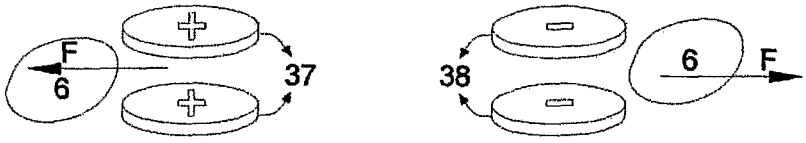


Figure 15. b)

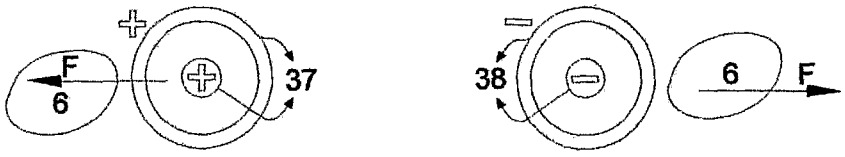
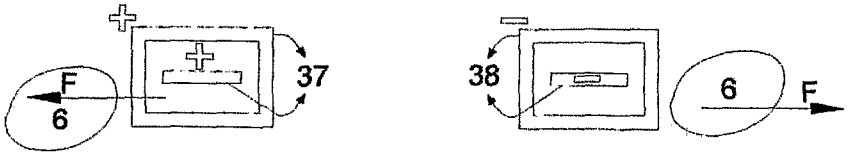


Figure 15. c)



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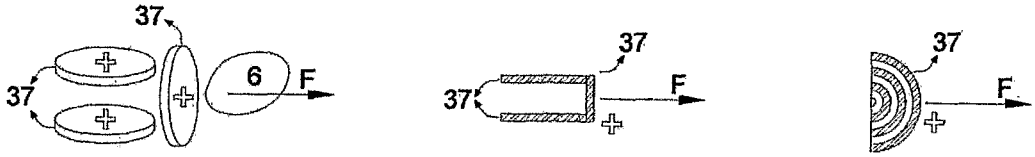

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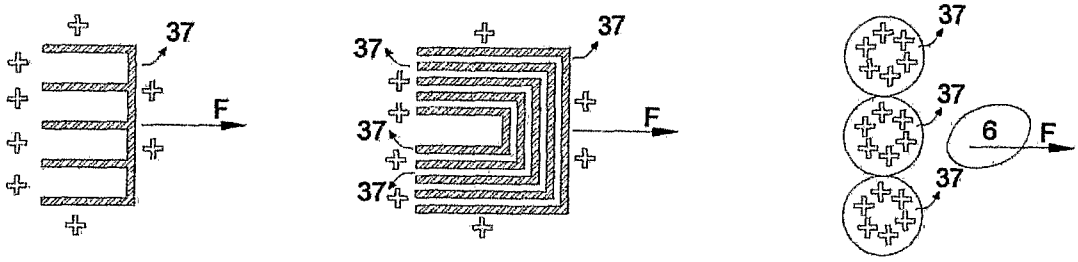
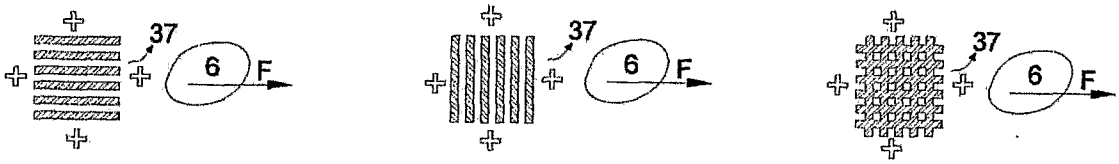


Figure 15. f)



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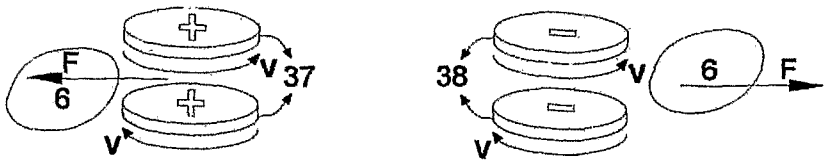


Figure 15. h)

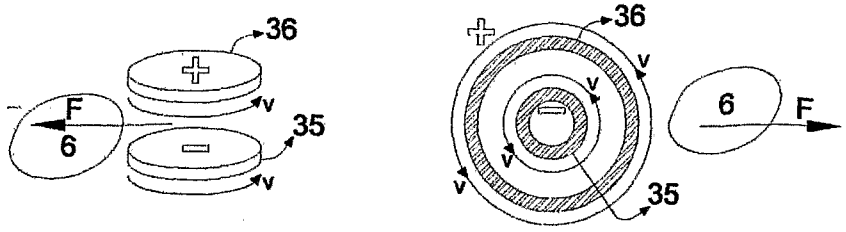


Figure 15. i)

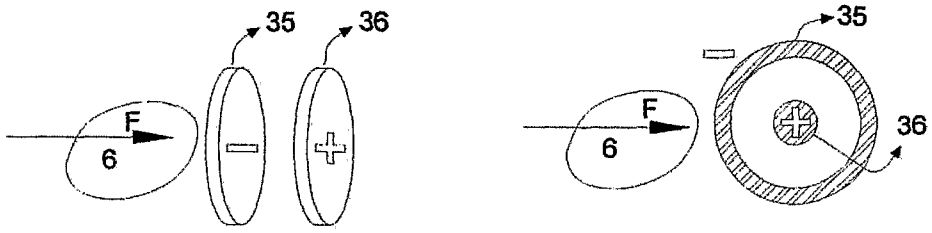
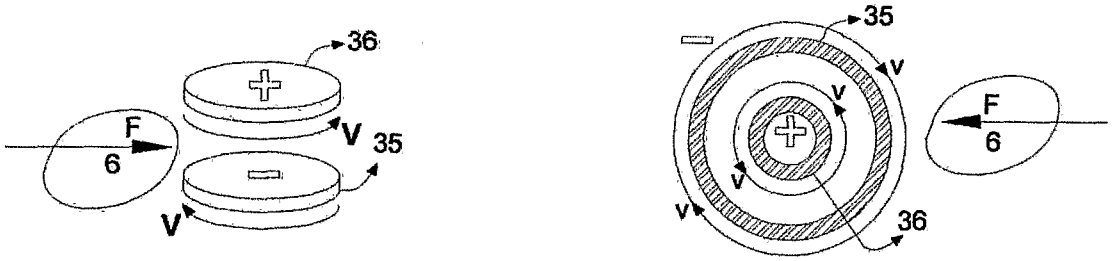


Figure 15. j)

Figure 15. k)



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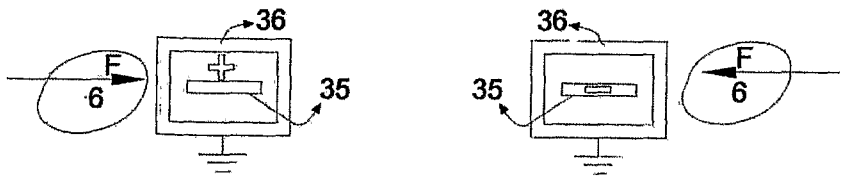


Figure 15. m)

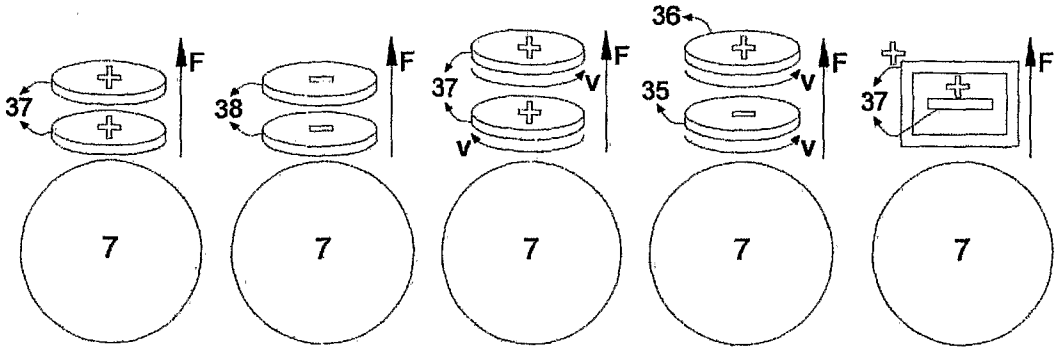


Figure 16. a)

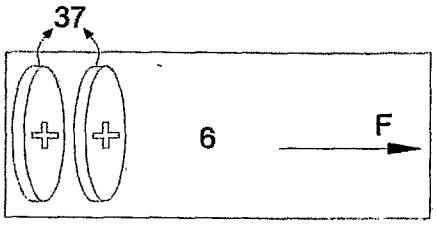


Figure 16. b)

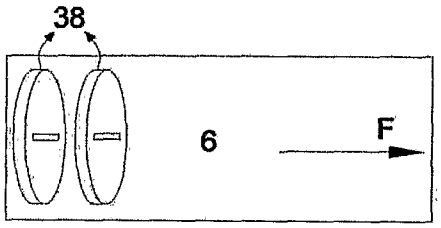


Figure 16. c)

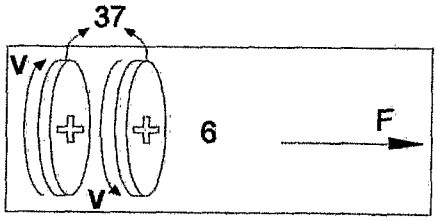


Figure 16. d)

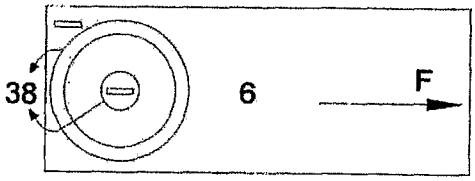


Figure 16. e)

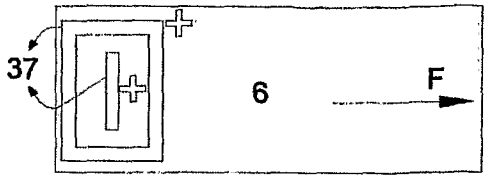


Figure 16. f)

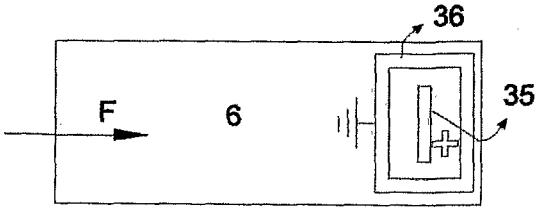


Figure 16. g)

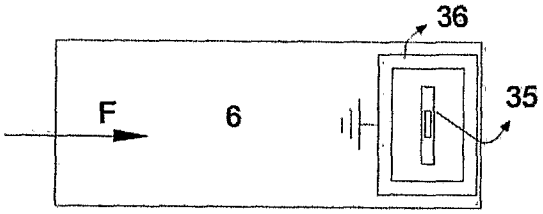


Figure 16. h)

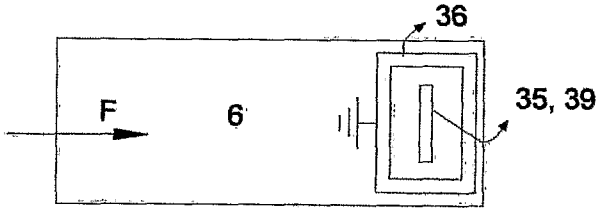


Figure 16. i)

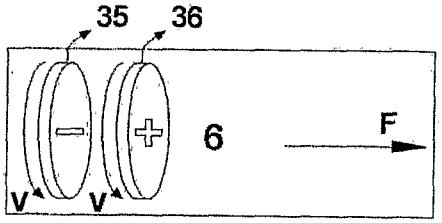


Figure 16. j)

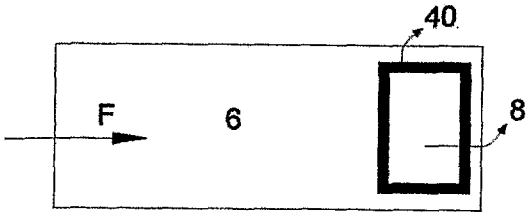


Figure 16. k)

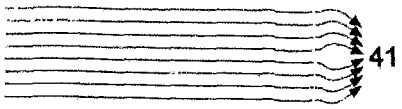


Figure 17. a)

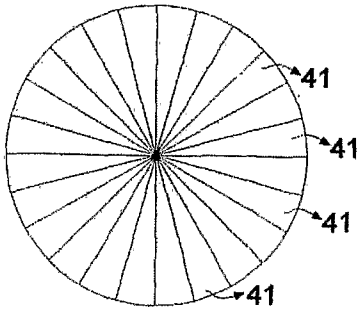


Figure 17. b)

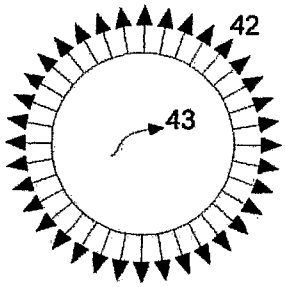


Figure 18. a)

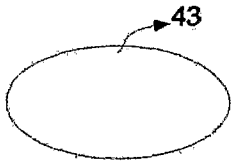


Figure 18. b)

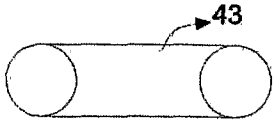


Figure 18. c)

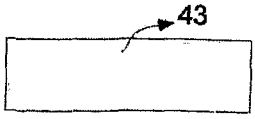


Figure 18. d)

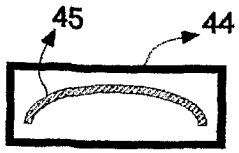
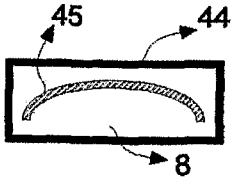


Figure 18. e)



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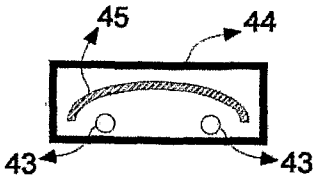


Figure 18. g)

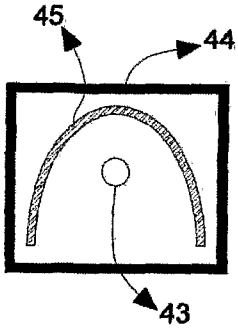


Figure 18. h)

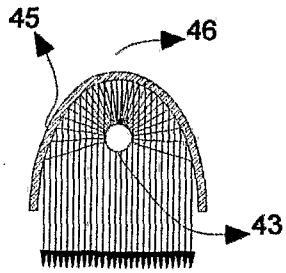


Figure 18. i)

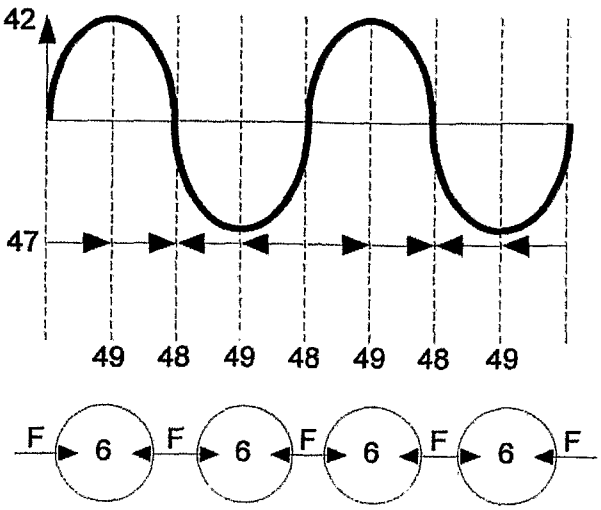


Figure 19. a)

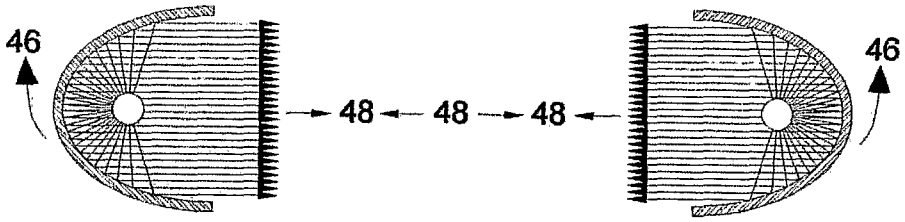


Figure 19. b)

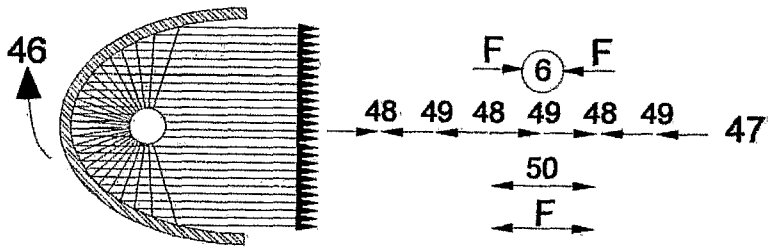


Figure 19. c)

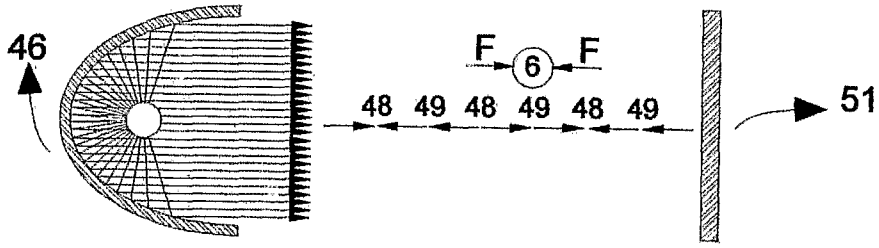
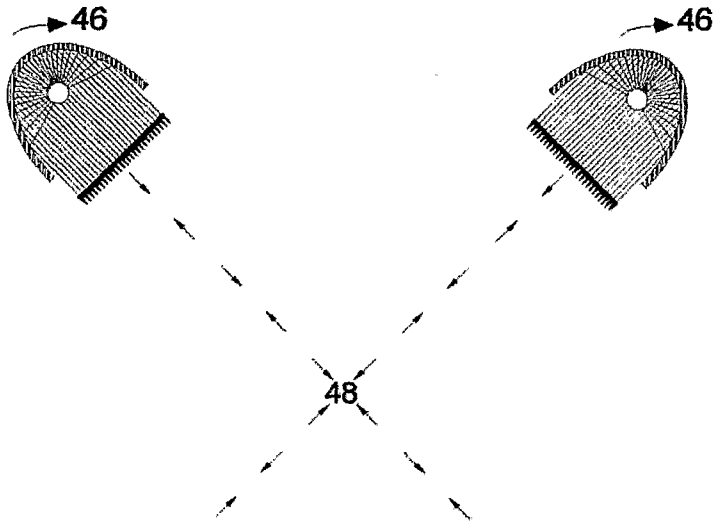


Figure 19. d)

Figure 19. e)



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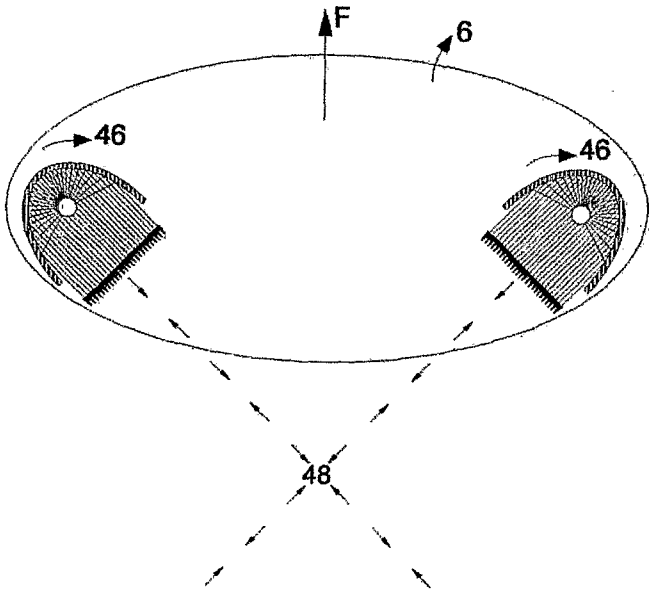

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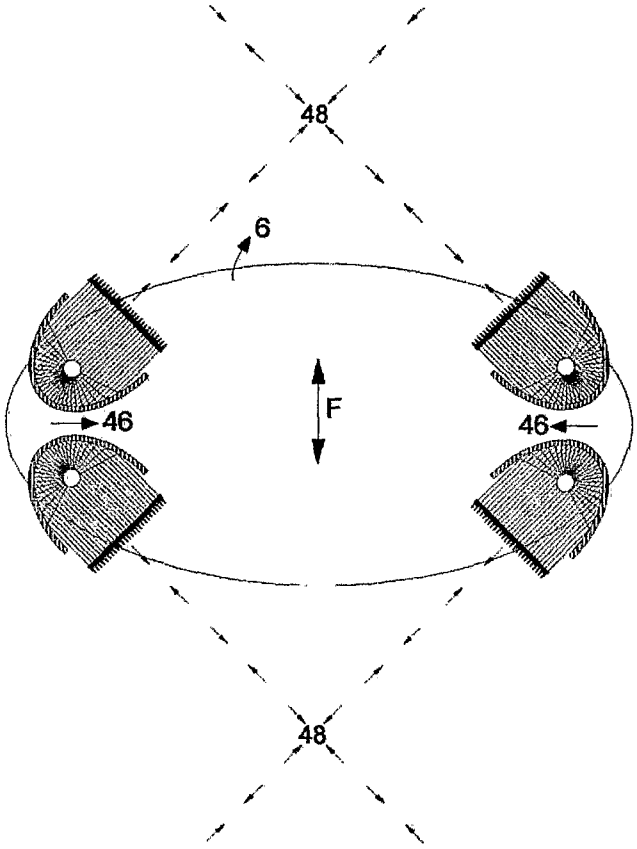

Figure 19. h)

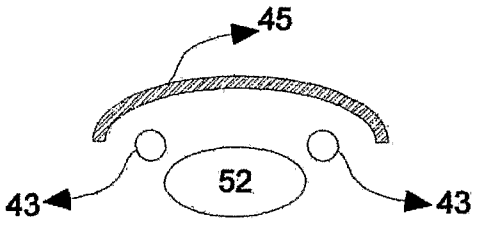

Figure 19. i)

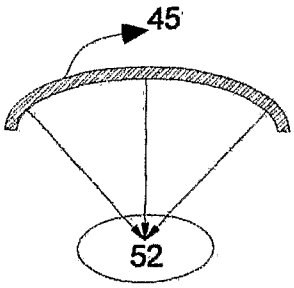

Figure 19. j)

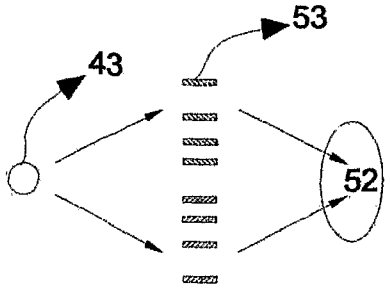

Figure 19. k)

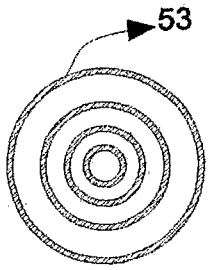

Figure 19. l)

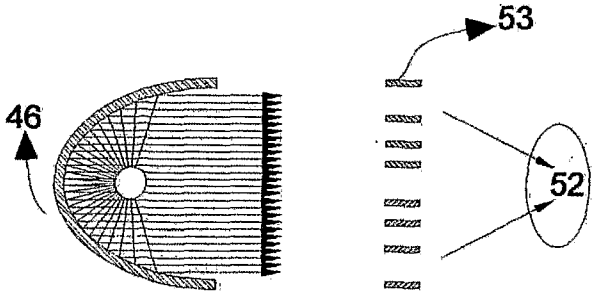

Figure 19. m)

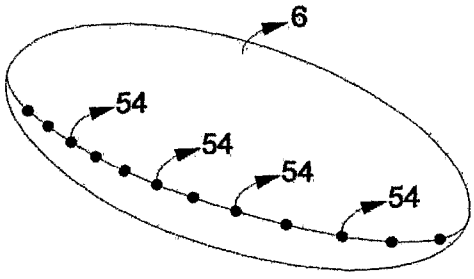

Figure 20. a)

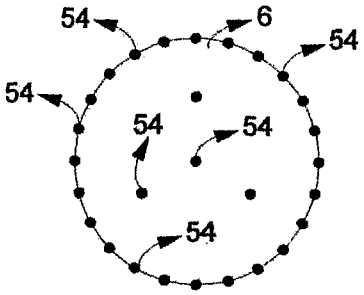

Figure 20. b)

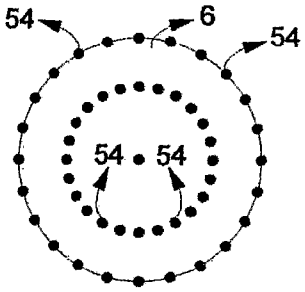

Figure 20. c)

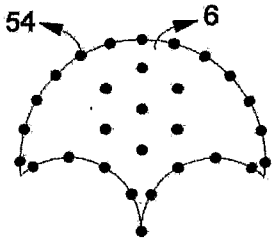

Figure 20. d)

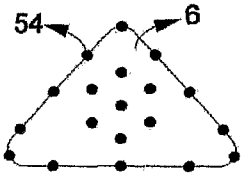

Figure 20. e)

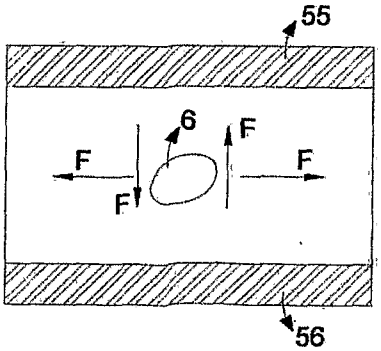

Figure 21. a)

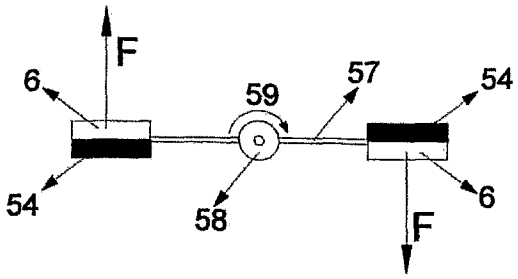

Figure 21. b)

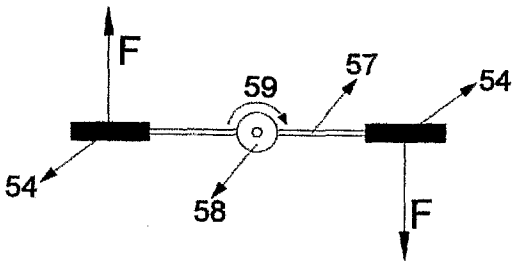

Figure 21. c)

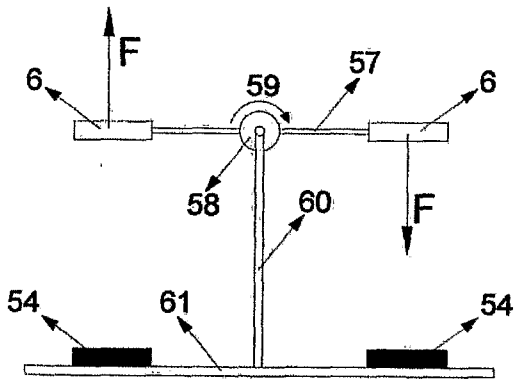

Figure 21. d)

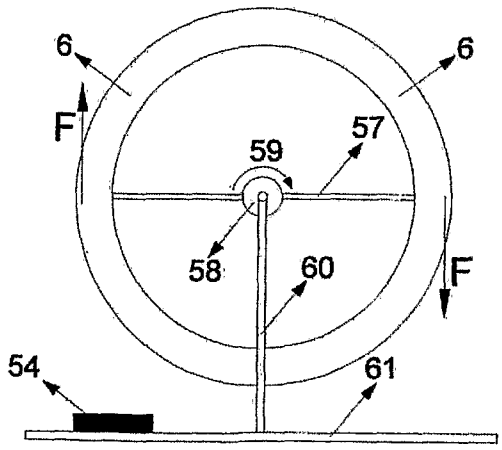

Figure 21. e)

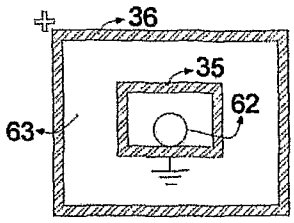

Figure 22. a)

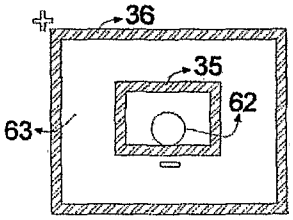

Figure 22. b)

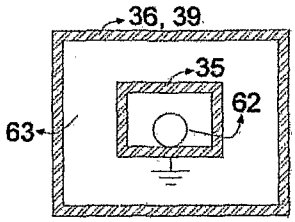

Figure 22. c)

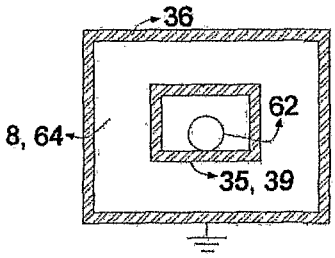

Figure 22. d)

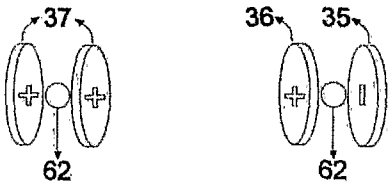

Figure 22. e)

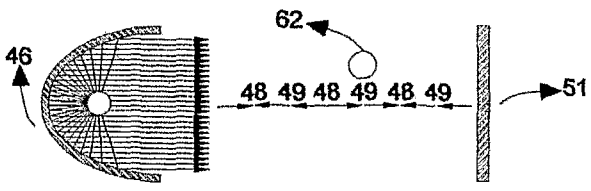

Figure 22. f)

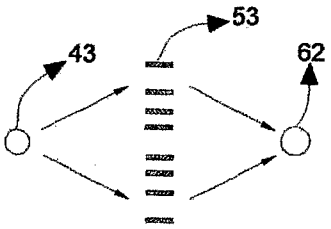

Figure 22. g)

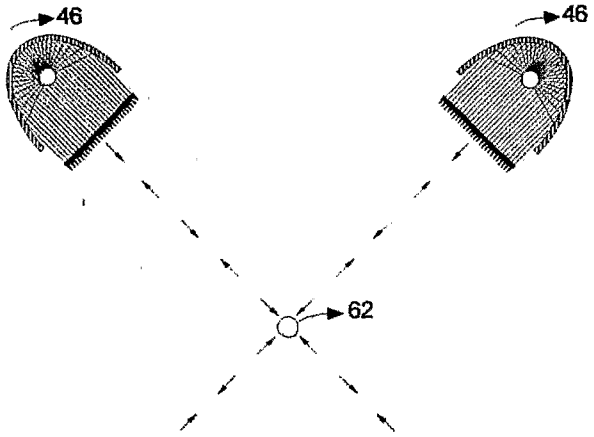

Figure 22. h)

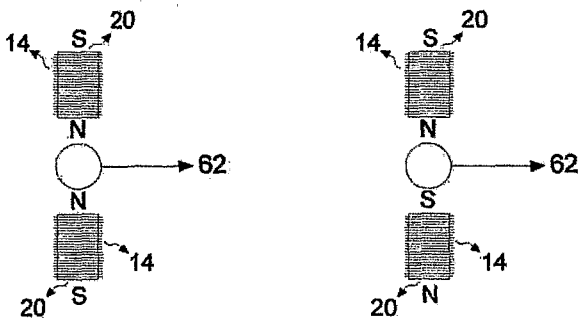

Figure 22. i)

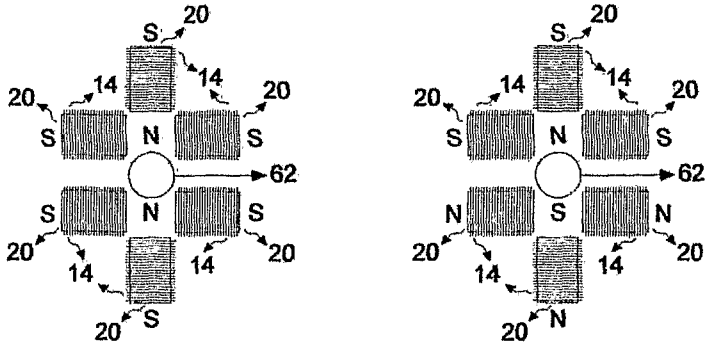

Figure 22. j)