

1. SPECIFICATION
2. TITLE OF THE INVENTION
3. Macro-Quantum Thruster
4.           will replace all other Prime Movers, energy sources, energy generators, mechanical guides and actuators using only the vast Energy of the Quantum Vacuum of Stochastic Dynamics to produce direct thrust, using no-reaction-mass propulsion as defined in NASA's Advanced Propulsion Program, requiring only currently known phenomenon, currently-available materials and technical knowledge from various scientific and technical fields.
5. CROSS-REFERENCE TO RELATED APPLICATIONS
6.           This Non-Provisional application for a Utility Patent claims the benefit of the the filing date of the Provisional Application for a Patent that was filed by this Inventor on 10-2-09, Application Number 61/247,960 which is hereby incorporated by reference in its entirety.
7. STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT
8. NA
9. REFERENCE TO SEQUENCE LISTING, A TABLE, OR A COMPUTER PROGRAM LISTING COMPACT DISC APPENDIX
10. NA
11. BACKGROUND
12. Fields
13.           This relates first, to the general field of extracting energy and motive force from the vast energy of the Quantum Vacuum ~~of Stochastic Dynamics~~, to ~~cause a~~ propel and power a fundamentally new prime mover, a new way to push or pull on anything that needs to be pushed-on and to cause mechanical power for any purpose whatsoever in all known and anticipated applications and push on all moveable objects, Terrestrial or Extraterrestrial, thus replacing all known prime movers, energy sources and energy generators; and is related second, to the field that is exemplified by NASA's Breakthrough Physics Propulsion Program which was created, among other reasons, to identify possible lines of research which might replace rockets with devices, like the proposed or/and implied embodiments that would not need to carry on-board reaction

mass; and is related third, to the fields involved in its implementation, merely requiring currently-available materials and technical knowledge from numerous other scientific fields, including but not limited to, Condensed Matter Physics, Nano-optics, Cavity QED, various Nanotechnologies, Material Science as well as ~~General~~, Relativity, UV, EUV and X-Ray Optics of Materials; every field of engineering that deals with moveable objects of any description whatsoever.

14. 2

15. PRIOR ART

16. Description of Related Art

17. Numerous US Patents purport to make Quantum Vacuum Energy available for use; but the following, US patents are uniquely germane to the present subject matter because they all obtain a mechanical force directly from the radiation pressure of the Quantum Vacuum; These patents prove that inventions claiming to obtain mechanical impetus directly from the momentum and energy of the Quantum Vacuum cannot be denied a patent on that basis.

18. Patent numbers 6,920,032; 6,842,326; 6,665,167; 6,661,576; 6,650,527; 6,477,028 make or lead up to the Claim that a reciprocating Casimir Cavity can be made, wherein a pair of parallel plates consists of one plate that is made of a semiconductor material that is caused to alternate between its conducting state and its dielectric state whereas the opposite plate remains constantly in one state, either conductive or dielectric, so that the first plate alternately matches the electrical characteristics of the second unchanging plate and then has the opposite characteristics. One of its embodiments is premised on the widespread expectation that Casimir plates that are both conducting will move toward each other, and those wherein one is conducting and the opposite plate is a dielectric material will move away from each other--according to Stochastic Dynamics, at the expense of the energy of the Quantum Vacuum. Obtaining net energy from such a system assumes that the switching energy is smaller ~~that~~ than that which can be obtained from the motion of the plates. Other more generalized embodiments are also disclosed.

19. US Patent 7411772 describes a kind of nano-scale rotor that experiences a greater force on the side of a vane that is passing a window that exposes it to the full radiation pressure of the ambient Quantum Flux whereas the opposite side of the vane experiences a reduced radiation pressure that is due to the Casimir Cavity that forms between the other side of the vane and the inside of the rotor housing. The resulting net force moves the rotor.

1. 2

20. US Patent 7,411,772 like the presently proposed, described and implied embodiments of the present invention qualifies as a sort of Prime Mover with Breakthrough Physics Propulsion capabilities; that is, as a Prime Mover that needs no source of energy but the Quantum Vacuum and no reaction mass and needs not to be acted upon by any external force but that of the radiation pressure of the Quantum Vacuum. This patent proves that inventions that in-effect ~~Claim to~~ are alleging to use the momentum of the photons of the Quantum Vacuum in place of reaction mass to cause propulsion cannot be denied a patent on that basis. ~~as~~ As with the previous patents just discussed it also claims to need no outside source of energy but that of the Quantum Vacuum; the electrical controls are not designed to provide motive energy, but is used for control purposes only.
21. It describes an array of non-parallel plates, situated at roughly V-shaped angles that are said to experience a smaller radiation pressure from the Quantum Vacuum on their non-parallel sides that face inward, facing each other at an angle, other than on the opposite, outward-facing sides, resulting in a net force that is transverse to the usual Casimir Force. It claims to be able to vary its thrust output by using semiconductor means to modifying the degree of electrical connection between two sets of plates.
22. The next two following serious scientific proposals all purport to describe propulsion methods that work by some kind of interaction with the Quantum Vacuum and purport to not use reaction mass or other object or substances to push-on or the which to be pushed-on by.

### **23. Adiabatically Vibrating Mirror**

24. Adiabatically vibrating mirror that asymmetrically exchanges momentum with the Quantum Vacuum was proposed as a Breakthrough Physics Propulsion Concept by G. Jordan Maclay and Robert. L. Forward in their paper: A Gedanken Spacecraft That Operates Using the Quantum Vacuum (Dynamic Casimir effect.) Version: Accepted for publication in Foundation of Physics 11/03. Their work was regarded as unproven but plausible by the NASA's Breakthrough Physics Propulsion Program. Again, this lends weight to the clear implications of Relativity that Newton's Laws of Motion are merely a simpler case of a far-more complex reality.
25. It works by moving very suddenly in one direction but more gradually in the opposite direction. On the one hand, it is claimed that the abruptness of the one movement momentarily prevents the Quantum Vacuum from fully adapting to its motion and at least partially prevents the Quantum Flux from inducing a normal inertial response. On the other hand, the more gradual motion is fully normal in its inertial response, thus producing a series

of net accelerations in one direction.

26. This approach is mentioned here because, like the presently claimed and implied embodiments, it gives us another example that conventional science is looking seriously at the possibility that we can get space to exert useful, unexpected asymmetrical forces on matter.

27. **Laser “Pinching” of Space**

28. The goal of this approach is to use special lasers to alter the density of the Quantum Flux so that its radiation pressure will push harder on the back of the vehicle or/and less on the front of the vehicle. Such an approach may also have the effect of increasing the speed of light in the vicinity of the vehicle since recent experiments suggest that  $c$  is an inverse function of Quantum Flux Density.

29. On the one hand, unlike the current disclosed or/and implied embodiments of the proposed invention, this approach is actually altering the energy density of the Quantum Vacuum in front of or/and behind the ship; on the other hand, like the disclosed and implied embodiments of the current invention, it also works by getting the energy of the Quantum Vacuum to push harder on an object in one direction than in another direction.

### **30. CONCLUSIONS, RAMIFICATIONS, AND SCOPE**

31. This section illustrates some but not all advantages of presently-disclosed embodiments, as well as the many implied embodiments. These embodiments represents numerous advantages over previous technologies, in its numerous applications. Again, these include but are not limited to the following:

32. Most sources of energy are subject to ownership, contrived shortages and other manipulations to artificially raise or maintain prices. Most free sources of energy such as wind, solar, hydroelectric do not yet lend themselves to economical use by the average energy consumer. In other words, most existing Prime Movers require the input of energy that must be purchased; in contrast Zero-Point Energy is available at all times, everywhere, for free; access to this power supply is built into all embodiments. Nearly every other source of energy damages the environment physically, or/and biologically or/and aesthetically or/and competes with food crops; these proposed and implied embodiments do none of these disadvantageous things.

33. The disclosed and implied embodiments and their mountings are far simpler than most engines. Their only possible moving parts consist of mechanisms to aim their forces in the desired directions, including the use of combining the forces of two or more thruster to

increase or attenuate their combined total force or to completely negate each others forces as a throttling-mechanism.

34. ~~including Applications include~~ but are not limited to ~~examples such as~~ embodiments such as Cars that will no longer need engines, transmissions, fuel tanks or fuel, cars that can corner, move or stop without pushing on the ground, thus saving many lives and much property in icy weather and other slick conditions. Indeed this removes the final obstacles to practical, quiet, inexpensive flying cars and automated, flying delivery modules.
35. All Existing Prime Movers must push against something or be acted upon by an outside force: This is an especially important aspect for replacing rockets which must carry all the fuel they are going to need on an entire mission, fuel which also serves as reaction mass, must be carried up from the ground, fuel to carry the rest of the fuel has to be brought up and fuel for that and so on; this has lead to absurd fuel-to-cargo ratios, typically 30:1 to LEO, and far worse for interplanetary missions, especially manned missions including a return trip. A round trip to Mars might have ratios closer to a thousand to one. This is a tremendous impediment to economical human travel throughout the Solar System. These problems are intrinsic to any possible chemical rocket and are not likely to be drastically improved, ever. The claimed embodiments herein described or implied do not require any fuel or any on-board reaction mass.
36. Another impediment to interplanetary Space Travel is the human body's need for sufficient radiation shielding, which again, boils down to our ability to economically accelerate large amounts of mass to sufficiently great speeds. It is not merely a matter of weight, the best shielding would be large-volume bodies of liquid hydrogen, or hydrocarbons, or water since they absorb high energy radiation without producing much secondary radiation, as lead and many other heavy materials are prone to when struck by Cosmic Rays.
37. Another impediment to practical long range, long duration Space Travel is the human body's need for air, food, water and other supplies, and seemingly most intractable of all, the need for gravity. The proposed Thrusters, unlike rockets, can operate nonstop, continuously accelerating a spacecraft at one-g o provide a gravity-like acceleration to passengers as well as to reach their destination much sooner.
38. A continuous one-g trip to Mars will be completed in a mere week to ten days, depending on the relative position of the two planets at that time; getting a ship and crew to their destination sooner, greatly reduces the need for air, water, food and supplies; increased shielding that is made possible by heavy-lift capacity; besides, having more room to share with fellow passengers for shorter periods of time will have tremendous psychological and

social benefits. inexpensive, convenient, daily round-trip commutes between Earth and the Moon will be soon be common. Plus, shorter trips means that the same vehicle can complete more missions and carry more people, more cheaply.

39. Rockets are easily the most complex mechanical objects ever conceived; they are expensive to design build and maintain, yet they are still unreliable and hazardous. For example, the current Shuttle fatality rate extrapolates to 15 out of 1000. Hundreds of thousands of components have to be individually flight certified and made as light as possible.
40. In contrast, implied and proposed-embodiments of the present invention when used for most aerospace purposes contain very few parts in comparison; containing just a few thruster panels that can be oriented so as to provide directional and magnitudinal control of thrust and vehicle orientation.
41. Since weight conservation is no longer much of an issue, the use of multiple redundancy of complete flight systems and extra thruster panels will make this the safest transportation technology that has ever been devised. There is no fuel to explode. Expensive, fragile surfaces for dangerous, high temperature aerial braking will be unnecessary since these proposed and implied embodiment can decelerate vehicles as easily as they accelerate them. Launches will be modest affairs that are little more than an increased load for aviation air traffic control, which will probably have to be automated to handle all the flying cars and flying delivery modules, anyway. This is in stark contrast to Shuttle Launches, which are highly complex affairs using hundreds of personnel, and months of maintenance and planning each time and are subject to the mere whims of the weather. Thirty years of two to four Shuttles flying has resulted in fewer than one hundred and forty missions and the loss of two crews and their vehicles.
42. Aerospace embodiments will be safer and cheaper and more convenient than the airplanes of today. They need no airport or spaceport. They need no fuel. Eventually, they will have completely functional, reliable autopilots, hence: Popular flying cars that drive on an invisible Electronic Skyway.
43. Disclosed and Implied embodiments will include but not be limited to replacing all terrestrial transportation with superior air travel. Vertical take off and landing and parking will be possible in most, if not all vehicles. Ships, Water Ports, Canals, Trains, railroads, Trucks and Cars, highways, and bridges will all be obsolete. These parts of the landscape can be turned back to nature, perhaps as wildlife refuge and migratory routes.
44. Free energy for desalination and pumping means inexpensive, abundant water

everywhere, for everyone. This means growing far more food on far less land. Even with population growth we can be returning more land to nature.

45. Devices will be comprised of embodiments that are disclosed or Implied, including but not limited to examples such as devices that can be remotely or automatically guided to move through any environment in any manner whatsoever; for example, surgery could be performed using injectable flying scalpels, cameras, sewing needles, staplers, drug delivery modules, drug delivery devices or removable radiant sources for radiation therapy or imaging.
46. Objects of any size, including but not limited to examples such as Nanobots of every description can move and be guided, automatically or/and remotely, en masse as a group; move individually, each in its entirety; or individual parts of nanobots can be moved using the disclosed and implied embodiments. Some embodiments will perform such tasks including but not limited to examples such as clearing orbital debris, collecting samples throughout the Solar System, including the Earth.
47. ~~including but~~ This includes, but is not limited to examples such as such agricultural purposes as planting, tilling the soil and harvesting with out having to compact it with vehicular wheels. Weeding and infestation control can be automated and chemical weed and pest control will soon be unnecessary. These processes can be more easily automated since there will be no motors to refuel or maintain and there will be no need to drive on the ground. Another great benefit is the reduction in dust and other soil conservation since seeds can be automatically planted with ideal spacing with less, if any plowing.
48. Cattle can be collected and moved by flying modules that pull a rope over the animals and lead them, or automated herding modules will gently push, pull and prod the animals along and will automatically reseed behind them as they move across the land.
49. Automated tree planting could quickly fill the world with trees even in locations where they would have to be automatically watered by flying buckets and automatically defended from foraging by their zealous flying buckets.
50. Pruning, pest control, and harvesting fruits and vegetables will take place by modules that, like all the other modules referred to, will fly and be guided by the disclosed and implied embodiments.
51. In general, machines will no longer need their parts to be physically guided or even connected in order to function. Embodiments including but not limited to examples such as the following example will replace gearing with pushers or rotators that are directly pushed

by the Quantum Vacuum with exactly the desired amount of force, without any need for axles or mechanical guides. The pieces will just fly together and position themselves to act on one another to perform the functions of any mechanical machine or machine part.

52. Lift-boards of various sizes and powers will be slid under furniture or pallets or anything else that needs to be moved and the force can be adjusted to exactly and automatically counter the force of any object's weight.
53. Our favorite restaurants can float in the sky above the clouds so that lunch on a sunny day will be an ever-present opportunity ~~possibility~~.
54. Numerous recreational devices come to mind including but not limited to examples such as devices like the hover-board shown in the Back to the Future movies.
55. Again, claimed and implied embodiments include, but are not limited to any of these examples. These example are given only to suggest the unlimited breadth of proposed and implied embodiments. These embodiments will indeed cover far more major areas than listed and far more applications than is practical to list or even enumerate.

#### **56. Why Was This Overlooked?**

57. It is likely that this was not thought of by the innovators of prior art due to widespread ignorance about many details of the Quantum Vacuum, doubts about Stochastic Dynamics in particular, plus the fact that it is exceedingly out-of-the-box to use some aspect of “empty” space itself to push on something, let alone provide net useful energy. Even the true believers in Stochastic Electrodynamics' Zero-Point Energy are amazingly reluctant to consider the possibility of obtaining a net force from the Quantum Vacuum. Even they seemingly forget all the phenomenon that is thought to be caused by the radiation pressure of the photons of the Quantum Vacuum; these include but are not limited to Van der Waals Forces, the Casimir Effect, Einstein's Brownian Motion, the source of liquid helium's anomalously energetic behavior at thermally-trivial temperatures and it offers a plausible physical mechanism for the uncertainty principle.
58. There is much commentary in the technical literature to the effect that Zero-Point Energy is already at the lowest possible energy level since it can exist at absolute zero-degrees, therefore it is widely assumed to be inaccessible; however, this viewpoint fails to take into account that its non-temperature, its non-thermodynamic behavior arises, not because of a small energy density or null potential, but rather because the transience of each photon's existence renders it unable to act in a thermodynamic manner, nonetheless, its wavelengths are energetic and its energy density is immense and each photon that strikes

an atom affects that atom in exactly the same way as any other photon—of the same wavelength would affect it.

59. Most technically literate people know that Crookes Radiometer actually works because of a weird kind of convection that only takes place in a moderate vacuum, but most are unaware that Nichols Radiometer really does respond to light pressure in exactly the way that is predicted by the theory of elastic and inelastic collisions. Seemingly, everyone has failed to realize that Nichols Radiometer will work even in a light that is uniform from all directions, (as long as that light is sufficiently more energetic than the infrared photons that are characteristic of the ambient temperature of the space that surrounds the vanes of the Radiometer.)
60. The radiation pressure that is caused by visible light acting on Nichols Radiometer is so weak that it is nearly undetectable. Likewise, experiments with the Casimir Effect have used wavelengths of hundreds of nanometers and yielded vanishingly-small forces; therefore, most people are under the impression that the Zero-Point Energy is very weak; they are unaware of the fact that the energy of a given part of the Spectrum of the Quantum Flux increases according to a factor of  $1/d^4$  where  $d$  is the wavelength that is being considered; in other words, decreasing the targeted wavelength by a factor of one hundred, increases its energy by a factor of 100,000,000. These misconceptions about the Casimir Effect tend to be misgeneralized as indicating a generally non-energetic Quantum Vacuum when nothing could be further from the truth.
61. Amazingly, even researchers who subscribe to the Stochastic Electrodynamics interpretation of the Casimir Effect often seem to lapse back into conceptualizations that originally arose from assuming that the electrically neutral objects in a typical Casimir Experiment are electrically attracted to each other because small random charge-fluctuations in one object induce attractive or repulsive forces in the other object—this leads to the assumption that the Casimir Force is two objects electrically repelling or attracting one another when ~~according to Stochastic Dynamics,~~ the objects are doing absolutely nothing to one another; it is the photons of the Quantum Flux that is are pushing them together or apart. What everybody seems to have failed to realize is that Casimir Forces are conservative, (like two magnets) — only if they are moved by electric charges; but if they are moved by collisions with the independent photons of the Quantum Flux, the one-moving object will accelerate until it runs into the other object; which is merely an incidental artifact of that particular geometry—a better geometry a non-colliding arrangement might would show that the Casimir Force is non-conservative, which would bolster other claims of obtaining net forces and net energy from the radiation pressure of the Quantum Flux.

62. In our age of insanely-narrow specialization, much-needed but obscure information is typically scattered across many separate fields, poorly indexed and is unlikely to be compiled and seen as relevant except by someone such as the present inventor who has read widely, for many years, in many diverse fields—someone with considerable imagination, motivation, time and persistence and someone that is actually interested in solving the particular problem for which the information is relevant. Even if this general notion of a Quantum Reflection Macro-Thruster that works on reflecting the photons of the Quantum Vacuum unequally on opposite sides had been considered, the knowledge that is needed to design and fabricate such a device is also scattered across many different fields of Science and engineering. Again, it took someone with an exceptionally broad knowledge ~~of each of these~~ that includes at least some insight into many different fields, fields which include but are not limited to, Stochastic Electrodynamics, Quantum Electrodynamics, Condensed Matter Physics, Nano-Optics, Cavity QED, various Nanotechnologies, Miscellaneous Material Sciences, UV, EUV and X-Ray Optics of Materials—to list just a few ~~of them~~.

63. Finally, there is a mindset that creates an extreme bias against these sorts of proposals. Many experts have been consulted with regard to the Quantum Reflection Thruster; none has found any flaws in the information or reasoning but nearly all cling to a vague apprehension that “Some unknown thing must be wrong with it.” Of course no one can possibly refute this “Hidden Fallacy Objection;” nonetheless, it ties the hands of the people who indulge it—the very people who we would normally expect to jump at an opportunity to investigate something that is potentially so monumental.

#### 64. BRIEF SUMMARY OF THE INVENTION

65. The objectives of the present embodiments include but are not limited to:

66. First, solving the profound problem of obtaining a net force directly from the momentum and energy of the photons or/and other particles of the Quantum Vacuum which constantly shower us more or less uniformly from every direction at all times and places. At first glance this seems as improbable as obtaining a net force from the thermal motions of air molecules; however, we are not dealing with thermal energy.

67. The present disclosed embodiments exploit the difference in radiation pressure between a photon that is reflected from one side of a thruster versus an identical photon that is absorbed on the opposite side of the Thruster since one side of the Thruster is more

reflective than the opposite side, with respect to the energy of the Independent Quantum Vacuum, a Quantum Vacuum that does not depend on matter for its existence.

68. Second, ~~providing this is~~ a new Specie of Prime Mover that includes but is not limited to embodiments that:

69. ~~can be made into embodiments that~~ push on anything, for any purpose;

70. can guide and propel any object through any prescribed path;

71. can be scaled to guide move or stop objects of any size, or hold them stationary in place;

72. need no reaction mass to push against;

73. need no external force to push against it but the radiation pressure of the Quantum Vacuum;

74. need no power source but the Quantum Vacuum

75. ~~provides free energy; just like~~ Like Solar Power, consumers pay only for their equipment; the actual source of the energy is free.

76. provides clean, safe, endless energy and mechanical power for all our civilization's physical needs, both on Earth and as we expand human habitation into Space;

77. has no internally-moving mechanical parts;

78. combine two or more thrusters for any reason, including but not limited to examples such as orienting them to aim, combine or/and attenuate each others forces for directional and magnitudinal force-magnitude control;

79. can be implemented using presently-~~unavailable~~ knowledge, skills, resources and materials.

80. ~~Second, providing a new Specie of Prime Mover that includes but is not limited-  
embodiments that:~~

~~81. can be made into embodiments that push on anything, for any purpose;-~~

~~82. can guide and propel any object through any prescribed path;-~~

~~83. can be scaled to guide move or stop objects of any size, or hold them in place;~~

~~84. need no reaction mass to push against;-~~

~~85. need no external force to push against it but the radiation pressure of the Quantum Vacuum;~~

- ~~86. need no power source but the Quantum Vacuum~~
- ~~87. provides free energy; just like Solar Power, consumers pay only for their equipment;~~
- ~~88. provides clean, safe, endless energy and mechanical power for all our civilization's physical needs, both on Earth and as we expand human habitation into Space;~~
- ~~89. has no internally-moving mechanical parts;~~
- ~~90. combine two or more thrusters for any reason, including but not limited to examples such as orienting them to aim, combine or/and attenuate each others forces for directional and magnitudinal control;~~
- ~~91. can be implemented using presently-unavailable knowledge, resources and materials.~~

92. The technical object of this invention includes but is not limited to numerous methods that are employed in which opposite sides of the Thruster reflect the Electromagnetic Quantum Flux unequally; this difference in reflection properties causes the Thruster to experience a stronger radiation pressure on one side than on the opposite side, despite the fact that the photons of the Quantum Vacuum strike all sides with a uniform electromagnetic flux. Obtaining a net force from a electromagnetic flux that is uniform from all directions has already been achieved in Nichols Radiometer. This is also backed up by the Physics Principle that a given object at a given velocity will impart twice as much momentum to another object if its collision is elastic versus inelastic, or in this case, reflective versus absorptive. In the present invention this is accomplished by using textures and materials that are either more reflective on one side or/and ~~or~~ more absorptive on the other side with respect to the photons of the Zero-Point Energy Field that are striking the two sides.

93. All of its many embodiments employ this Differential Reflection of the Photons of the Quantum Flux for the purpose of causing a useful net force without the use of any other object or substance to push

94. against and without expelling any reaction mass, and without the application of any outside force or energy except for the radiation pressure of the photons of the Quantum Vacuum.

95. In other words, like a Solar Sail it is pushed by the radiation pressure of photons, only in this case, we are using the photons of the Quantum Vacuum. Rather than using a light that is only coming from one direction as is the case with the Solar Sail, we are instead using photons that come uniformly from every direction; we get a net force in this case, not

because the light itself is different on the two sides of an embodiment, but rather because one side reflects the photons of the Quantum Flux better-enough than the opposite side, so as to obtain a practical force. In other words the same magnitude of Quantum Vacuum photon flux is pushing harder on the more reflective side than on the more-absorptive or more-transmissive side; this is standard physics.

96. BEST MODE
97. The effect of obtaining net thrust from the photons of the Quantum Vacuum is best accomplished by using materials, textures and geometries that interact appropriately with the smallest, most powerful wavelengths that can be best reflected on one side of a Thruster yet absorbed on the opposite side of the Thruster. This will vary depending on size, weight and cost constraints for a given application. Some embodiments will use many layers of Thrusters that are separated by optically neutral materials. Some embodiments will work more through an enhanced reflection on one side of the Thrusters whereas others will work more through an enhanced absorption on the opposite side. Yet other embodiments will work by using both approaches.
98. Some embodiments can be imprinted on the surfaces of their applications as textures or coatings. Some embodiments can be applied or mounted to their application, much as a jet engine might be attached to an airplane. Yet other embodiments can be applied to a surface just as one might apply a decal—a bumper sticker might help propel the car or some other object to which a decal could be applied. Most embodiments will consist of attaching a Thruster to the part of an application that needs to be pushed on.
99. In many embodiments, pairs of Thrusters or pairs of Thruster arrays will be mounted on assemblies that allow them to be turned in any direction, so as to permit their individual forces to add-to or subtract-from each other to allow for a continuous range of throttle settings and will also allow the net force to be pointed in any desired direction. In some embodiments it will be desirable to use some Thrusters, to counteract the weight of a vehicle or other object, person, animal or plant while simply aiming another Thruster in the desired direction of motion or acceleration, or to stop an object. as one possible example among many, ground cars will no longer need to push against the ground to accelerate, maintain their motion or to stop. Even cornering a ground car can be aided by thrust from the Thrusters to help keep the car on the road.
100. Many different modes of fabrication and manufacture are the best for their particular applications. At present, methods of selectively etching one component out of a metal alloy such as is done with Raney Nickel is looking especially promising for the purpose of increasing absorptivity

on one side of thrusters; however, many other methods will be nearly as important, perhaps, eventually, more important. This will probably be done, in many cases, in conjunction with making an opposite surface optically flat using methods and materials known to those who make especially optically-flat surfaces for X-ray reflection. These other methods include but are not limited to using other alloys and various other materials and chemical processes, techniques such as bombarding surfaces with charged particles; Coatings can be applied to surfaces that are porous, wrinkled or otherwise suitably textured. The purpose of these methods is to introduce precisely sized, nanoscopic holes, pores or textures to effectively absorb especially small, very powerful parts of the Quantum Vacuum Photon Spectrum. Organic structures can serve as scaffolding that can be coated with more suitable materials.

101. Methods that are already in use to make X-Ray mirrors are currently most suitable, to improve the reflectivity of the target wavelengths on the opposite side of thrusters, which, in addition to enhancing absorptivity on the opposite side of the thruster, is also important to achieving a net force. Other important methods include but are not limited to nanoscopic particles that are precisely oriented in an inertial, electrical or magnetic field so as to present atomically precise flat surfaces horizontal to the plane of the more-reflective surface. A laser can be tuned so as to precisely remove individual crystals from a surface until only a flat surface remains. These methods and others will become increasingly important as they are further-improved; nonetheless, they can already be used in their current, early state of development.

102. As with the reflection of conventional X-Rays and EUV, the design goal for many embodiments will largely consist of simply ~~increase~~ increasing the angle at which most of the targeted wavelengths reflect off the surface, on one side; then to decrease this angle on the opposite side.

103. The best or at least the most exquisite overall embodiment includes but is not limited to replacements for Newtonian Reaction Engines such as Rockets. This embodiment is arguably the most important since as of this writing, there are no other presently practical Advanced Propulsion Methods wherein no energy source is carried aboard the vehicle and no energy is sent to it except the photons of the Quantum Vacuum and no reaction mass is needed. Its value as a safe, clean energy source is a close second priority set of embodiments. Its value as a superior general-purpose prime mover represents a giant step forward in the electrical and mechanical arts, both for its simplicity of form and for its ever-present energy supply. ~~as~~ As already stated, many applications will have their own, separate “Best Embodiment” along with their own best modes of

design, fabrication and manufacture.

104. Finally, nanometer-sized cavities are thought by some to have relativistic properties wherein, entrained processes (*and light*) experience an accelerated reaction time wherein[,] molecular processes occur faster in these cavities (hence the catalytic properties that are associated with some of them.)

105. Lower wavelengths are up-shifted to higher wavelengths inside the cavities [(]from our perspective.[)] Therefore, in some applications the reflective-emissive side will be nanoporous or otherwise filled with nanoscopic cavities that are engineered to use these Relativistic effects to cause extra photon pressure on the “floors” inside the cavities. Again, this will result in a net light pressure.

#### **106. Detailed Explanation of Drawings**

107. Overview

108. According to a large body of orthodox current Scientific thinking we are bathed at all times by the energy of the Quantum Vacuum. Many Scientist regard the Casimir Effect Experiments as proof of its existence. Indeed many phenomenon are widely thought, by many in the professional Scientific Community, to be caused by it. It is thought to consist of electromagnetic radiation and possibly of other particles, as well. The Quantum Vacuum is made of Free Energy in the limited sense that Sunlight is also Free Energy; that is, universally-available and is free for the taking; Consumers must only purchase and maintain the equipment; but there is a problem.

109. It is widely assumed that this energy is inaccessible to us, assumed in large part because, as seen in Figs. 1a, b and c), most kinds of objects are struck equally from all directions by the radiation pressure of the Quantum Vacuum. Fig. 1a) The all-black object, represents objects that absorb more of this radiation than they reflect. The white object represents objects that reflect more than they absorb. The shaded object reflects and absorbs this radiation equally. These three examples illustrate that most objects naturally reflect the same amount in every direction, or/and they absorb the same amount of the Energy of the Quantum Vacuum that is coming from every direction; therefore, they cannot experience a net force. So how can we possibly obtain a net force from this energy that is approaching every object, uniformly from every direction?

110. According to the conventional physical laws of Elastic and Inelastic Collisions, and the conventional physical laws that govern the Reflection and Absorption of Electromagnetic Radiation, the more-reflective side of an object will experience more radiation pressure than

its opposite, more absorptive or/and more transparent side. This occurs even when the Electromagnetic or particulate Radiation bathes the device uniformly from all sides. This has been repeatedly demonstrated with Nichols Radiometer for many decades and is in all modern Freshman Introductory Physics Books.

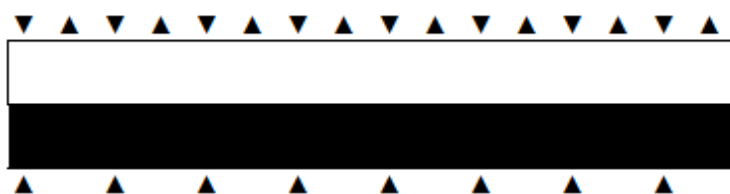
111. **Bi-lateral Differential Reflection Principle**

112. In principle, the present disclosed or/and implied embodiments of this invention are doing exactly the same thing, as Nichols Radiometer: they experience a net radiation pressure; but, in contrast to Nichols Radiometer, they are fashioned so as to more strongly interact with the electromagnetic- or/and particulate-radiation of the Quantum Vacuum, instead of merely differentially-reflecting conventional radiation sources, such as the Sun. This is the underlying concept behind all disclosed or implied embodiments of the herein-disclosed invention as disclosed and or implied in the various Claims

113. Fig. 1d) shows an embodiment wherein one side, portrayed as white, is specially-crafted to reflect the Energy of the Quantum Vacuum better than the opposite which is portrayed as black, which is specially-crafted to absorb the Energy of the Quantum Vacuum better than the first, more reflective side, so as to cause the entire embodiment to experience a net force that acts toward the more reflective side. Notice how photons or particles act on a surface only once when they are absorbed, but the reflective surfaces receive momentum twice each reflection, once as the particle strikes and a second time as it departs.

114. DESCRIPTION OF DRAWINGS [The Drawings themselves, will be removed from the specification and placed in its own section of this application.]

Fig. 1e



115. Fig. 1e) shows an object wherein one side, portrayed as white, is specially crafted to reflect the Energy of the Quantum Vacuum better than the opposite which, this time, is portrayed as shaded. This shading signifies that nothing special was done to enhance the absorptivity of the less-reflective side; nonetheless, this other, more reflective side still experiences a net force since it, after all, is still reflecting more of the Quantum Vacuum energy than the opposite, more-absorptive side, so as to make the object still experience a net force that acts toward the more reflective side or sides. If side, portrayed as black, is

specially crafted to absorb the Energy of the Quantum Vacuum better than the opposite side which is portrayed as shaded. This shading signifies that nothing special was done to enhance the reflectivity of the more-reflective side; nonetheless, this more reflective side still experiences a net force since, after all, it is still reflecting more of the Quantum Vacuum energy than the especially absorptive side.

116. Fig. 2) illustrates some but not all disclosed or implied examples of embodiments wherein any or all said first and second principal sides or/and principal pluralities of sides and any parts thereof are directly connected to each other.

117. Fig. 3) illustrates some but not all disclosed or implied examples of embodiments wherein any or all said first and second principal sides or/and principal pluralities of sides or/and parts thereof are separated from each other, in any manner, by any part of any object to which they are attached or substance or medium within which they are attached or any object or substance or medium within which they are contained.

118. Fig. 4) illustrates some but not all disclosed or implied examples of combinations comprised of combining any number of force-producing embodiments so that they are incorporated with- or attached to- or act on- one or more other objects, devices or substances.

119. Fig. 5) illustrates some but not all disclosed or implied examples of embodiments wherein said combinations include but are not limited to any sort of array or combination of arrays, or dispersion or dispersions of tiny embodiments or/and said objects, devices or substances in any substance or medium, including but not limited to the mediums of space or/and air, suitable means that are known to persons skilled in the pertinent sciences and technical fields are used for orientation and control means, but are not illustrated but are implied.

120. Fig. 6) illustrates some but not all disclosed or implied examples of embodiments wherein said combinations include but are not limited to two or more said embodiments or sets of embodiments that are oriented in the same linear vector direction or/and in opposite linear vector direction or directions, or/and in any intermediate orientation or orientations, or/and can be moved between any of these orientations, suitable means that are known to persons skilled in the pertinent sciences and technical fields are used for orientation and control means, but are not illustrated but are implied.

121. Fig. 7a Two embodiments are oriented to combine their forces to generate the full sum of their individual forces to produce the strongest possible net linear force, suitable means that are known to persons skilled in the pertinent sciences and technical fields are

used for orientation and control means, but are not illustrated but are implied.

122. Fig. 7b Two embodiments are oriented so that each force entirely cancels the other force to produce a net force of zero-magnitude, suitable means that are known to persons skilled in the pertinent sciences and technical fields are used for orientation and control means, but are not illustrated but are implied.
123. Fig. 7c Two embodiments can be oriented in any intermediate position to produce any intermediate linear force magnitude, suitable means that are known to persons skilled in the pertinent sciences and technical fields are used for orientation and control means, but are not illustrated but are implied.
124. Fig. 7d Four embodiments are oriented to combine their forces to generate the full sum of their individual forces to produce the strongest possible torque force, suitable means that are known to persons skilled in the pertinent sciences and technical fields are used for orientation and control means, but are not illustrated but are implied.
125. Fig. 7e Four embodiments are oriented to combine their forces to generate the full cancellation of their individual forces to produce a torque force of zero-magnitude, suitable means that are known to persons skilled in the pertinent sciences and technical fields are used for orientation and control means, but are not illustrated but are implied.
126. Fig. 7f Four embodiments are oriented to attenuate each others forces, thus producing a torque force of any intermediate magnitude, a torque force that can be changed from clockwise to counter-clockwise. At least four embodiments are used in some but not all torque-producing combinations of embodiments, to facilitate the cancellation of undesirable linear forces, suitable means that are known to persons skilled in the pertinent sciences and technical fields are used for orientation and control means, but are not illustrated but are implied.
127. Fig. 8b) Illustrates an embodiment that is mounted on a motor, one of many possible means of mounting a force producing embodiment or combination of embodiments so its force can be aimed in any desired direction. Suitable means of control or/and remote control or/and automatic control are implied but not illustrated.
128. Fig. 9) illustrates some but not all disclosed or implied examples of embodiments wherein said combinations include but are not limited to any sort of embodiment or embodiments of any size that include but are not limited to combinations that control positions and orientations of particles that serve as pixels for two dimensional or/and three dimensional video displays including but not limited to examples such as moving images

or/and stationary images, including but not limited to examples such as holographic images or/ and non-holographic images, including but not limited to examples such as still-picture displays including but not limited to examples such as images that are permanently set into some clear material including but not limited to examples such as liquid or soft plastic that hardens and immobilizes all pixel particles before or after all guiding particles exit the clear material, suitable means that are known to persons skilled in the pertinent sciences and technical fields are used for orientation and control means, but are not illustrated but are implied.

129. Fig. 10) illustrates some but not all disclosed or implied examples of embodiments wherein said combinations include but are not limited to any sort of embodiment or embodiments of any size that include or/and incorporate or/and otherwise act on combinations that include but are not limited to means to vibrate any medium, including but not limited to examples of combinations such as sound producing means, heat producing means, ultrasonic producing means, abrasive means, polishing means, cleaning means, painting means, fabrication means, pulverizing means, mixing means, separating means, suitable means that are known to persons skilled in the pertinent sciences and technical fields are used for orientation and control means, but are not illustrated but are implied.

130. Fig. 11) illustrates some but not all disclosed or implied examples of embodiments wherein said combinations include but are not limited to incorporating said embodiments with conveyance means including but not limited to examples such as tubes or ducts or channels of any kind, shipping containers or smaller shipping modules or boxes or envelopes, stickers or/and stamps that physically deliver items including but not limited to mail, moving belts or moving sidewalks or escalators or elevators, furniture, appliances, machinery, furniture dollies, forklifts, cranes, elevators, ramps, hoists, pallets, shelving, shipping containers, trailers, railroad cars, luggage wagons, suitcases, containers of water, riot control gear including but not limited to examples such as rubber bullets, bean bags and water hoses and batons, suitable means that are known to persons skilled in the pertinent sciences and technical fields are used for orientation and control means, but are not illustrated but are implied.

131. Fig. 12) illustrates some but not all disclosed or implied examples of Combinations wherein said embodiments are incorporated or added to the structure of objects to relieve all or part of their weight, combinations including but not limited to objects such as furniture, appliances, machinery, suitable means that are known to persons skilled in the pertinent sciences and technical fields are used for orientation and control means, but are not illustrated but are implied.

132. Fig. 13) illustrates some but not all disclosed or implied examples of embodiments wherein Combinations wherein said embodiments are incorporated to comprised to support part or all of a structure, including but not limited to examples that include but are not limited to bridges, walkways, pipelines, cables, buildings, tunnels, underground chambers, suitable means that are known to persons skilled in the pertinent sciences and technical fields are used for orientation and control means, but are not illustrated but are implied.
133. Fig. 14) illustrates some but not all disclosed or implied examples of embodiments wherein Combinations wherein said embodiments are incorporated to comprised to support part or all of a structure, including but not limited to examples such as pressure vessels of any sort, whether the pressure is directed inward toward the vessel or outward from within the vessel including but not limited to specific examples such as bathyspheres, pressurized tanks, research devices, cryonics applications, suitable means that are known to persons skilled in the pertinent sciences and technical fields are used for orientation and control means, but are not illustrated but are implied.
134. Fig. 15) illustrates some but not all disclosed or implied examples of embodiments wherein embodiments and combinations including but not limited to those embodiments and combinations use relativistic temporal distortions in cavities or porous surfaces, suitable means that are known to
135. Fig. 16) illustrates some but not all disclosed or implied examples of embodiments wherein shows how two or more of disclosed or/and implied force-producing means can be reoriented on a moment by moment basis to direct an object on an irregular path using mechanically Suitable Means known to persons skilled in the mechanical, electrical, electronic, sensor technology, manual and automated control methods arts.
136. Fig. 17) illustrates some but not all disclosed or implied examples of embodiments wherein shows how two or more of disclosed or/and implied force-producing means can be reoriented on a moment by moment basis to continuously oppose forces that are acting on an object that are irregular in magnitude or in direction, so as to hold an object motionless while it is being acted upon by, using mechanically Suitable Means known to persons skilled in the appropriate mechanical, electrical electronic sensor technology and automated control-method arts.
137. Miscellaneous Considerations
138. One end of its Spectrum, the Quantum Vacuum Radiation is composed of extremely high-energy, high energy-density radiation that mostly passes through most matter, or is entirely absorbed by it and re-emitted as part of an object's Black-Body Radiation, uniformly

in all directions. At the other end of its Spectrum is extremely low-energy, low energy-density radiation that is primarily reflected from matter equally in all directions; but, it interacts with matter very weakly. Most Casimir Effect Experiments have been performed in this weaker range; therefore, the forces have been vanishingly-small. In fact they were not accurately measured until 1996, by Steve Lamoureux, then of the University of Washington. The forces interact more powerfully with matter in the smaller of the EUV wavelengths on into the soft X-Ray wavelengths.

139. There is a very small intermediate Spectrum where extremely smooth flat or convex surfaces will reflect moderately small, reasonably powerful wavelengths, but mostly at very shallow angles. Therefore Design-considerations revolve around finding: the optimum wavelengths of this intermediate part of the Spectrum, the most reflective- and least-reflective materials and surface-preparations for these wavelengths, so as to achieve the optimum contrast in critical angles, meaning those angles of incidence to the surface at which more Quantum Vacuum Radiation Energy is reflected from the one side, versus from the opposite side, while using optically suitable materials that can be economically made or otherwise acquired, and optically-suitable surfaces can be economically fashioned.
140. The many embodiments will replace prime movers of every description, including but not limited to- any kind of motor, including but not limited to examples such as electrical motors, piston motors, Rocket Motors, turbine motors including but not limited to examples such as Jet Engines; mechanical- guides, actuators and controls, hydraulics;
141. Various embodiments include but are not limited to moving, accelerating, stopping, guiding, or holding in place virtually any movable object, including but not limited to examples such as NEMs (Nano-Electromechanical Machines), Thrusters or substances for medical procedures inside the body of people or animals, or to do other remote-controlled or robot-controlled tasks, to redirect dangerous as teroids and comets.
142. Most embodiments provide free energy in the same sense that Solar Power Technology provides free energy since, as with Solar Technology, the consumer only has to pay to purchase and maintain the equipment; no other power source or fuel is needed except the photons of the Quantum Vacuum, which have a far higher energy density than raw sunshine. Like sunshine, these photons of the Quantum Vacuum cannot be bought, sold, taxed, neither can anyone cause contrived shortages or otherwise manipulate this energy, Some embodiments would provide decentralized, consumer-owned power systems that will reduce the blackout hazards of centralized power distribution and eliminate unsightly power lines.

143. Various embodiments will include but not be limited to applying forces to object of every size, shape, temperature, and composition, applications ranging from nanoscopic machine parts to continuously-accelerating Spacecraft, and embodiments of ever intermediate scale. They are a vast improvement on current technologies since they do not pollute, they do not use materials that are in short-supply; they do not use use fuel,
144. Since they do not expel reaction mass or push or pull on anything else to generate energy or thrust. Quantum Reflection Thrusters, like Solar Sails are a form of Propellant-less Drive, a General Purpose Prime Mover that is powered by the energy and momentum of the photons of the Quantum Vacuum. They can rotate, push, pull or guide anything that can be rotated, pushed, pulled or guided or moved in any manner whatsoever, or held stationary in place, using only the radiation pressure that can be obtained from the photons of the Quantum Flux
145. This approach is especially ideal for Space Travel since ~~they need~~ it needs no fuel or reaction mass. ~~But~~ Instead, their energy source is environmental; it is external to the Thruster system; in other words: Energy is crossing the Quantum Reflection Macro-Thruster system Boundaries, which exist right at the surfaces of the two opposite sides, passing from the photons of the Quantum Flux to the Thruster Sail.
146. This is no more contrary to the Laws of motion than a Solar Sail because it does not push or pull on anything containing mass. Like the Solar Sail, the Quantum Reflection Macro-Thruster does not emit any of the photons that are acting on it; therefore, the Quantum Reflection Thruster, like a Solar Sail, does not cause both its own action and reaction. Instead, like the Solar Sail, it is illuminated by an external light-source, namely, The Quantum Vacuum.
147. Unlike experiments with the Casimir Effect, a Quantum Thruster does not alter the energy density of the Quantum Flux; instead we are altering the manner in which the opposing surfaces of the Thruster interact with the photons of the Quantum Vacuum.
148. Like Nichols Radiometer, it experiences a net radiation-pressure force even though it is bathed equally, from all directions on all sides because, like Nichols Radiometer, the net force arises because opposite sides reflect many wavelengths of photons unequally. This is possible because elastic collisions such as the reflection of a photon impart more momentum and energy to a surface than inelastic collisions such as occur when a photon is absorbed.
149. ~~———— To increase the net force, Quantum Reflection Thruster[']s can be stacked as long~~

~~as they are separated by materials that are transparent to the targeted wavelengths.~~

150. The action and reaction are as follows:
151. A) The Quantum Vacuum itself is a natural Unmoved Mover when its underlying process sets photons in motion. In other words, the Independent Quantum Vacuum, when it emits photons, does not cause any material object to recoil.
152. B) Some of these photons then reflect off of or absorb into the Quantum Reflection Thruster---This is the Newtonian Action.
153. C) The Newtonian Reaction is when the Quantum Reflection Macro-Thruster accelerates.
154. D) In other words, like a Solar Sail, Thrusters do not initiate a nullifying equal and opposite reaction, as would any closed system that was merely absorbing photons that it emitted in the first place.
155. Quantum Reflection Thrusters, like all matter, must perfectly re-radiate all energy that is received from the photons of the Quantum Vacuum back to the Quantum Vacuum to maintain equilibrium; therefore, we must examine carefully how net kinetic energy, can seem to be left behind.
156. We must recall that Larmor Radiation is produced every time a charged particle is accelerated; this also applies to all the charges that constitute an atom, probably even the components of a neutron. Therefore, every time a photon of the Quantum Flux is absorbed, emitted or reflected, each of these actions accelerates some or all of the charges in the atom which causes causes Larmor Radiation to be emitted, thus restoring energy to the Quantum Vacuum. (To explain how electrons and protons seem to have the same total charge but tremendously different inertial masses, and neutrons seem to have no charge but much inertial mass, this theory of inertial mass posits that neutrons and protons are composed of many constituent charges that mostly cancel-out each others net charge; nonetheless, each these charges still emit inertia-causing Larmor Radiation when they are accelerated in any direction.)
157. Like nuclear energy, perhaps the Quantum Vacuum is a finite resource that is slowly being depleted. If so, then maybe the “books” don't need to balance.
158. A General Purpose Prime Mover
159. Superficially, a Quantum Reflection Macro-Thruster will resemble a magnet. If one were to hold an especially strong one in their hands, it would pull or push on their hand as

though it were a magnet that was being attracted to- or repelled-from another magnet; however, no second object is needed because it is not pushing or pulling on another object; in fact, it is not propelling itself at all; instead, like a Solar Sail, it is being continuously pushed-on by the radiation pressure of photons, except it has the advantage of being pushed-on and energized by the momentum and energy of the Photons of the Quantum Vacuum which are much more abundantly available at all times, everywhere, even in Interstellar Space; no other energy source is needed.

160. As the Photons of the Quantum Vacuum push on the thruster, it can push on other objects; thus, it is a prime mover that does not need the opposite momentum of a material reaction-"mass" except for the momentum of the photons of the Quantum Flux. In other words, it will lift and accelerate an object, but it will not need to expel any mass in the opposite direction or to push against or pull on any other object or substance because it is using the momentum and energy of these independently-generated photons. This is because it is already being pushed on by a net, outside force, a force that originates from collisions with the energy and momentum of the photons of the Quantum Flux that act its one side more energetically than on its other side because one side is more reflective than the opposite side. That is, one side experiences more elastic collisions than the other side.

161. Quantum Reflection Thrusters will operate machines on any scale from the nanoscopic scale to operate NEMs on up to massive Spacecraft that, like a Solar Sail, can slowly steer a hazardous comet or asteroid away from a collision with the Earth, powered by the energy and momentum of the photons of the Quantum Vacuum

162. Quantum Thrusters will be used to push, pull or provide energy for nearly every application where pushing, pulling and the energy that is transferred by pushing or pulling can be used as long as the Radiation Pressure of the Quantum Flux is sufficiently strong for that application. Applications are only limited by the strength of the light pressure of the photons of the Quantum Vacuum that can, in practice, be utilized.

163. Design and Fabrication Considerations

~~164. At present, methods of selectively etching one component out of a metal alloy such as is done with Raney Nickel is looking especially promising for the purpose of increasing absorptivity on one side of thrusters; however, many other methods will be nearly as important, if not more important. These other methods include but are not limited to using other alloys and various other materials and chemical processes, techniques such as bombarding surfaces with charged particles; Coatings can be applied to surfaces that are porous, wrinkled or otherwise suitably textured. The purpose of these methods is to introduce~~

~~precisely sized, nanoscopic holes, pores or textures to effectively absorb especially small, very powerful parts of the Quantum Photon Spectrum. Organic structures can serve as scaffolding that can be coated with more suitable materials.~~

165. ~~Various methods that are already in use to make X-Ray mirrors are currently most suitable, to improve the reflectivity of the target wavelengths on the opposite side of thrusters, which, in addition to enhancing absorptivity on the opposite side of the thruster, is also important to achieving a net force. Other important methods include but are not limited to nanoscopic particles that are precisely oriented in an inertial, electrical or magnetic field so as to present atomically precise flat surfaces horizontal to the plane of the more-reflective surface. A laser can be tuned so as to precisely remove individual crystals from a surface until only a flat surface remains. These methods and others will become increasingly important as they are further-improved; nonetheless, they can already be used in their current, early state of development.~~

166. As with a low Torque electric motor, weaker thrusters can be geared to run very fast in order to provide high Torque. This sort of gearing can also produce high power from a low input Torque.

167. **It is probably impossible to list every potentially moveable object that could be in some way or another moved or held in place or energized by the disclosed or/and implied embodiments of this invention; accordingly, the scope of this invention and its many possible embodiments should be determined not merely by the embodiments illustrated or listed, but by the appended claims and their legal equivalents.** The spirit of the present invention provides a breadth of scope that includes all methods of designing, fabricating, manufacturing and using any Thrust Producing mechanism that exploits the principle of reflecting more of the energy of the photon-flux of the Quantum Vacuum from one side of the thruster than from the other side of the Thruster. Any variation on the theme and methodology of accomplishing the same that are not described herein ~~would be considered~~ are under the scope and in the spirit of the present invention.

168. ADDITIONAL DESCRIPTION

169. ~~——— An apparatus comprised of optical properties that render its backside more reflective of the particles or/and photons of the Quantum Vacuum, than its front side; thus converting the radiation pressure of the Quantum Vacuum into a mechanical force by using the reflecting particles of the Quantum Vacuum as reaction-mass or/and by using the the momentum of the reflecting photons of the Quantum Vacuum as a reaction-mass proxy, transmitting said mechanical force to another object or/and substance; — or/and said~~

~~apparatus converting the radiant energy of the Quantum Vacuum into useful kinetic energy when said mechanical force is allowed to perform work on itself or/and on another object or/and substance.~~

170. ~~————— A new embodiment comprised of a first apparatus or/and first plurality of apparatuses and a second apparatus or/and second plurality of apparatuses; said first apparatus or/and first plurality of apparatuses comprised of optical properties that render its backside more reflective of the particles or/and photons of the Quantum Vacuum than its front side; thus converting the radiation pressure of the Quantum Vacuum into a mechanical force, using the reflecting particles of the Quantum Vacuum as reaction-mass or/and by using the the momentum of the reflecting photons of the Quantum Vacuum as a reaction-mass proxy; said first apparatus or/and first plurality of apparatuses greatly transforming usefulness of said second apparatus so that said new embodiment is comprised of some or and all of the normal functional characteristics of the second apparatus or/and second plurality of apparatuses combined with the self-energy acquisition characteristics or/and self-powering characteristics or/and extraordinary self-moving properties such as needing no normal reaction mass or fuel characteristics of the first apparatus or/and first plurality of apparatuses; value of said embodiment greatly exceeding value and usefulness of second apparatus without the first apparatus; and surprisingly, value of said new embodiment still far exceeding value and usefulness of said first apparatus or/and first plurality of apparatuses not having any second apparatus or/and second plurality of apparatuses.~~

171. ~~————— A new embodiment comprised of a first apparatus or/and first plurality of apparatuses and a second apparatus or/and second plurality of apparatuses; said first apparatus or/and first plurality of apparatuses comprised of optical properties that render its backside more reflective of the particles or/and photons of the Quantum Vacuum than its front side; thus converting the radiation pressure of the Quantum Vacuum into a mechanical force, using the reflecting particles of the Quantum Vacuum as reaction-mass or/and by using the the momentum of the reflecting photons of the Quantum Vacuum as a reaction-mass proxy; said first apparatus or/and first plurality of apparatuses greatly transforming usefulness of said second apparatus so that said new embodiment is comprised of some or and all of the normal functional characteristics of the second apparatus or/and second plurality of apparatuses combined with the self-energy acquisition characteristics or/and self-powering characteristics or/and extraordinary self-moving properties such as needing no normal reaction mass or fuel characteristics of the first apparatus or/and first plurality of apparatuses; value of said embodiment greatly exceeding value and usefulness of second apparatus without the first apparatus; and suprisingly, value of said new embodiment still far~~

~~exceeding value and usefulness of said first apparatus or/and first plurality of apparatuses not having any second apparatus or/and second plurality of apparatuses.~~

~~172. ————— Including but not limited to a first embodiment comprised of a self-powering, self-moving axle, comprised of said first apparatus or/and first plurality of apparatuses, said second new embodiment comprising a rotary motor with exceedingly more value than any apparatus without any other apparatus.~~

~~173. ————— Including but not limited to a second new embodiment comprised of a self-powering, electrical generator or/and pump comprised of said first apparatus or/and first plurality of apparatuses, said second new embodiment having exceedingly more value than any apparatus without any other apparatus.~~

~~174. ——— Including but not limited to a third new embodiment comprised of said first apparatus or/and first plurality of apparatuses and a second apparatus or/and second plurality of apparatuses comprised of suitable control means and mounting means to orient two or more first apparatuses to combine their forces, so that said combined forces can augment or attenuate each other, adding together for a maximum possible force or/and their forces opposing each other so that no net force occurs; or/and being thus oriented in any intermediate position to thus attenuating each others forces in such a way as to attain any intermediate force magnitude in any desired direction, said third new embodiment comprised of exceedingly more value than any apparatus without any other apparatus.~~

175. Including but not limited to a fourth new embodiment comprised of said first apparatus or/and first plurality of apparatuses and a second apparatus or/and second plurality of apparatuses comprised of one or more first new embodiments so arranged as to impart a torque force or torque forces to orient any independently-moving object including but not limited to any vehicle, any device for collecting or delivering any object or/and substance, said second new embodiment having exceedingly more value than any individual apparatus without any other apparatus.

~~176. ————— Including but not limited to a second new embodiment comprised of a self-powering, self-moving axle, comprised of said first apparatus or/and first plurality of apparatuses, said second new embodiment comprising a rotary motor with exceedingly more value than any apparatus without any other apparatus.~~

177. Including but not limited to a second new plurality of embodiments characterized by self-powering, self-moving, levitating skyhooks comprised of said first apparatus or/and first plurality of apparatuses, said second new embodiment comprising a means of supporting structures including but not limited to suspension-engineered building, bridges, highways,

cranes, said with exceedingly more value than any apparatus without any other apparatus.

178. ~~Including but not limited to a second new plurality of embodiments characterized of a self-powering, self-moving aerospace vehicles, comprised of said first apparatus or/and first plurality of apparatuses, said second new embodiment comprising an aerospace motor with exceedingly more value than any apparatus without any other apparatus.~~

179. A new embodiment wherein said first apparatus or/and first plurality of apparatuses applies a varying force or/and a static force or/and a kinetic force and/or supplies momentum and kinetic energy to any machine part including but not limited to a shaft or/and wheel, or/and sliding part, mechanical guide, lever, inclined plane, crank, connecting rod.

180. A new embodiment wherein said first apparatus or/and first plurality of apparatuses applies a static force or/and applies a kinetic force or/and applies a torque force or and supplies generates and transfers kinetic energy to any independently flying and/or floating and/or apparatus comprised of wheels, including but not limited to vehicles.

181. New embodiments including but not limited to those wherein said first apparatus or/and first plurality of apparatuses comprised of small or/and microscopic or/and nano-scale controllable flying or/and levitating particulate apparatuses vibrate so as to produce sound, cutting effects, abrasive effect, orient physical pixel element to form moving or/and stationary element, including but not limited to image pixels place into a clear plastic or other soft clear material that hardens, small probes for performing medical procedures inside the human or animal or plant body such as medication delivery, biopsy, surgical procedures, imaging.

182. A new embodiment wherein said first apparatus or/and first plurality of apparatuses applies a static force or/and applies a kinetic force or/and applies a torque force or and supplies generates and transfers kinetic energy to power or/and to guide any actuator application currently perform by any means including but not limited to electromechanical means or/and cables.

183. A Force-producing embodiment is comprised of a backside that is, relatively speaking, more reflective of the photons or/and particles of the Quantum Vacuum than its front side.

184. Said means, include but are not limited to knowledge, methods, materials, textures, and effects that are known to persons skilled in the pertinent sciences and technical

fields.

185. Embodiments including but not limited to examples such as embodiments wherein any or all said first and second principal sides or/and principal pluralities of sides and any parts thereof are directly connected to each other.
186. Embodiments including but not limited to examples such as embodiments wherein any or all said first and second principal sides or/and principal pluralities of sides or/and parts thereof are separated from each other, in any manner, by any part of any object to which they are attached or substance or medium within which they are attached or any object or substance or medium within which they are contained.
187. Embodiments and Combinations including but not limited to those Embodiments and Combinations using Relativistic Temporal Distortions in cavities or porous surfaces.
188. Certain combinations of one or more force-producing elements that derive their motive force and energy from the Quantum Vacuum, said combinations with each other and with other objects, said elements, objects and combinations comprised of and made by means, including but not limited to knowledge, methods, materials, textures, and effects that are known to persons skilled in the pertinent sciences and technical fields.
189. Comprised of certain kinds of combinations of Quantum Thrusters and certain kinds of other objects, that use suitable means to render a first principal side or first principal plurality of sides more reflective of the photons or/and particles of the Quantum Vacuum than a second principal side or second principal plurality of sides, or/and any one or more of which said embodiments are incorporated with- or attached to- or act on- one or more other objects, devices or substances, using suitable means.
190. said combinations include but are not limited to any sort of array or combination of arrays, or dispersion or dispersions of tiny embodiments or/and said objects, devices or substances in any substance or medium, including but not limited to the mediums of space or/and air.
191. said combinations include but are not limited to two or more said embodiments or sets of embodiments that are oriented in the same linear vector direction or/and in opposite linear vector direction or directions, or/and in any intermediate orientation or orientations, or/and can be moved between any of these orientations.
192. said combinations include but are not limited to two or more said embodiments or sets of embodiments that are oriented to apply a force along one or more

circular paths surrounding a center of rotation of any rotating object or surrounding center of torque for any object that experiences static torque forces, positioned and oriented to apply either static- or/and dynamic- torque in the same rotational direction or/and in an opposite rotational direction, or/and in any intermediate orientation, or/and can be moved between any of these positions.

193. said combinations include but are not limited to any sort of embodiment or embodiments of any size that are combined with any known control or/and remote control or/and automatic control means.

194. said combinations include but are not limited to any sort of embodiment or embodiments of any size that include but are not limited to combinations that control positions and orientations of particles that serve as pixels for two dimensional or/and three dimensional video displays including but not limited to examples such as moving images or/and stationary images, including but not limited to examples such as holographic images or/ and non-holographic images, including but not limited to examples such as still-picture displays including but not limited to examples such as images that are permanently set into some clear material including but not limited to examples such as liquid or soft plastic that hardens and immobilizes all pixel particles before or after all guiding particles exit the clear material.

195. said combinations include but are not limited to any sort of embodiment or embodiments of any size that include or/and incorporate or/and otherwise act on combinations that include but are not limited to means to vibrate any medium, including but not limited to examples of combinations such as sound producing means, heat producing means, ultrasonic producing means, abrasive means, polishing means, cleaning means, painting means, fabrication means, pulverizing means, mixing means, separating means.

196. said combinations include but are not limited to incorporating said embodiments with conveyance means including but not limited to examples such as tubes or ducts or channels of any kind, shipping containers or smaller shipping modules or boxes or envelopes, stickers or/and stamps that physically deliver items including but not limited to mail, moving belts or moving sidewalks or escalators or elevators, furniture, appliances, machinery, furniture dollies, forklifts, cranes, elevators, ramps, hoists, pallets, shelving, shipping containers, trailers, railroad cars, luggage wagons, suitcases, containers of water, riot control gear including but not limited to examples such as rubber bullets, bean bags and water hoses and batons.13)12) Combinations wherein said embodiments are incorporate or added to the structure of of objects to relieve all or part of their weight, combinations including but not limited to objects such as furniture, appliances, machinery.

197. Combinations wherein said embodiments are incorporated to comprised to support part or all of a a structure, including but not limited to examples that include but are not limited to bridges, walkways, pipelines, cables, buildings, tunnels, underground chambers.
198. Combinations wherein said embodiments are incorporated to comprised to support part or all of a structure, including but not limited to examples such as pressure vessels of any sort, whether the pressure is directed inward toward the vessel or outward from within the vessel including but not limited to specific examples such as bathyspheres, pressurized tanks, research devices, cryonics applications.
199. Embodiments and Combinations including but not limited to those Embodiments and Combinations including remote-controlled tools or instruments, scalpels or/and any or all other medical devices, or/and attach or/and detach paint or/and other substances or/and objects
200. Embodiments and Combinations including but not limited to those Embodiments and Combinations using as embodiments where in part of a motor or actuator is comprised of permanently set particles that exert a continuous for in whatever direction the parts are pointed, said11
201. including but not limited to examples such as embodiments wherein quantum energy reflective particles are introduced to a gas including but not limited to examples such as air, liquid or particulate mix for any purpose whatsoever, including but not limited to examples such as purposes such as introducing or/and removing chemically reactive surfaces into and out of said liquid or mix, for any purpose whatsoever, including but not limited to examples such as removing unwanted contaminants or byproducts, mixing liquids or/and particles together or moving them through a pipe, vent or channel of any kind, including but not limited to examples such as passages vessels and tissues and any other liquid or particulate medium, said suitable means including but not limited to examples such as suitable means known to persons skilled in the sciences and technical fields that are necessary to designing and building any and all said force-producing embodiments, no preceding paragraph being intended to limit the possible scope of any other paragraph that is part of this Claim or these Claims.
202. Embodiments and Combinations including but not limited to those Embodiments and Combinations using including but not limited to examples such as embodiments wherein quantum energy reflective particles are continuously re-orientable so as to produce a maximum net force or range of forces in any desired direction or directions,

by means of the manner in which more or less energy of the

203. Like a dust cloud that can stop or move a speeding car
204. quantum vacuum is, moment by moment caused to reflect in a direction that is opposite the direction of the desired radial or linear force or forces, or irregular succession of applied forces, including but not limited to examples such as when an object is either guided along a complex path or is being held stationary against forces that vary in strength or/and direction.
205. Embodiments and Combinations including but not limited to those Embodiments and Combinations using including but not limited to examples such as embodiments wherein quantum energy reflective particles are moved in such a fashion so as to vibrate them to cut items or sculpt or fabricate items subtractively or additively.
206. including but not limited to examples such as embodiments such as medical procedures and industrial cutting this Claim or these Claims.
207. Embodiments and Combinations including but not limited to those Embodiments and Combinations using any said static irregular force or/and forces act in any direction or/and set of directions, or/and with any magnitude or/and variable magnitudes including but not limited to examples such as embodiments that keep a levitating object stationary, despite irregular forces from a direction or set of directions, including but not limited to examples such as such forces as variable winds or/and people walking around on it so to constantly redistribute the total weight in unpredictable ways.
208. Embodiments and Combinations including but not limited to those Embodiments and Combinations using any said dynamic irregular force or/and forces act in any variable direction or set of directions, or/and with variable magnitude, including but not limited to examples such as any embodiments that keeps a moving object following some intended path in a smooth fashion despite constantly or occasionally irregular opposing forces, possibly of varying magnitude and or from any direction or set of directions, including but not limited to examples such as such forces as variable winds that are buffeting a vehicle or forces from suddenly shifting cargo or passenger weight. including but not limited to examples such as keeping an object on a smooth path through any varying environment, including but not limited to examples such as using control means to vary or maintain or adjust an object's course or orientation.
209. Embodiments and Combinations including but not limited to those Embodiments and Combinations using any said dynamic irregular force or/and forces act in

any variable direction or set of directions, or/and with variable magnitude, including but not limited to examples such as embodiments that cause a moving object to follow some highly-irregular course or courses of movement, possibly at constant or variable speeds and acceleration. including but not limited to examples such as embodiments that move themselves in, on or through any environment, or/and deliver or/and move, or/and collect other objects or/and substances or/and information despite constantly or occasionally irregular forces, possibly of varying magnitude from any direction or set of directions.

210. Embodiments and Combinations including but not limited to those Embodiments and Combinations using force-producing embodiment or combination of force-producing embodiments, comprised of any suitable means including but not limited to examples such as embodiments that vary the magnitude of torque force that is imparted to any object by means that include but are not limited to turning said force-producing embodiment or combination of force-producing embodiments in and out of those orientations that direct their individual forces to be parallel to the over-all axis of rotation when it is desirable to cause a net zero torque and to act radially, in either radial direction or set of directions, with respect to the axis of rotation for maximum torque, or to be turned so as to deliver some intermediate magnitude of torque.

211. Embodiments and Combinations including but not limited to those Embodiments and Combinations using including but not limited to examples such as embodiments such as brakes for a car or for any other mechanism whose rotation must be reduced or stopped, including but not limited to examples such as any instance of inducing said torque that is done in a manner that also cancels any undesirable forces using that are well known to persons who are skilled in the engineering, mechanical, electrical and electronic arts.

212. Embodiments and Combinations including but not limited to those Embodiments and Combinations using said torque force can be applied to a force-producing embodiment or combination of force-producing embodiments, including but not limited to examples such as any object, including but not limited to examples such as any axle, vehicle, or flying or/and floating object whatsoever.

213. Embodiments and Combinations including but not limited to those Embodiments and Combinations using said force producing embodiments including but not limited to examples such as singular embodiments and or combinations of singular embodiments that are specially-designed to exert a force or forces for any particular, categorical or general purpose, or *can* be used for any particular, general or categorical

purpose, device, application, object or substance to which any person or persons will want to apply the said net force from said embodiments or combinations of embodiments, including but not limited to examples such as replacements for any particular kind of part, including but not limited to examples such as replacements for motors, airplane wings, engines of any kind,

214. a including but not limited to examples such as suitable means for effecting the disclosed and or implied embodiments contained in this paragraph,

215. Embodiments and Combinations including but not limited to those Embodiments and Combinations using said force-producing embodiment or/and combination of force-producing embodiments, combined or applied to any devices that produce, transmit or store energy or power of any description, including but not limited to examples such as generators, alternators, pumps, hydraulics, gears, cogs, propulsion,

216. Embodiments and Combinations including but not limited to those Embodiments and Combinations using said embodiments including but not limited to examples such as those embodiments that are comprised of said differentially reflecting force producing means only, or/and said differentially reflecting force producing means that are or can be- incorporated into or onto other any other object for any purpose whatsoever.

217. Embodiments and Combinations including but not limited to those Embodiments and Combinations using using suitable means that are well known to persons who are skilled in the mechanical, electrical and electronic arts, means that can orient the individual embodiments, using means including but not limited to examples such as gimbals, combinations of gimbals along with stepper motors and or actuators, sensors, computer guidance systems and or other suitable means to properly orient and hold some or all individual components in place, so as to combine these separate said embodiments and their forces to attain a maximum net force in any desired direction, or a zero-magnitude net force, or any intermediate magnitude of net force in any desired direction,

218. Embodiments and Combinations including but not limited to those Embodiments and Combinations using including but not limited to examples such as those combinations of embodiments that vary the torque that is imparted to any rotatable-object by means that include but are not limited to turning such embodiments in and out of those orientations that direct their individual forces to be parallel to the over-all axis of rotation when it is desirable to cause a net zero torque and to act radially with respect to the axis of rotation for maximum torque, or to be turned so as to deliver some intermediate magnitude of torque, but in a manner that also cancels any undesirable forces

219. Embodiments and Combinations including but not limited to those Embodiments and Combinations using said force-producing embodiments, including but not limited to examples such as into any embodiments that can push, pull or apply torque or irregular forces to anything, for any purpose, said suitable means including but not limited to, suitable means known to persons skilled in the sciences and technical fields that are necessary to designing and building any and all said force-producing embodiments

220. Embodiments and Combinations including but not limited to those Embodiments and Combinations using comprised of knowledge, methods and materials including but not limited to examples such as those methods, materials and knowledge that are presently well known to persons skilled in high frequency optics of materials, material science and nanotechnology, to enhance reflectivity or/and to decrease reflectivity or/and to increase transparency of a material a material or materials, or substance or substances with respect to portions of the quantum flux energy, portions that are both strong enough to be useful, and that interact appropriately with the specific material characteristics of a given embodiment, and to arrange such materials or/and substance or substances so as to cause the net force disclosed in Claim one, that needs no external force to push against it but the radiation pressure of the quantum vacuum, said suitable means.