Study of Electromagnetic Gauges for Determining In-Place HMA Density

[1]Prince Kumar Bansal, [2]Dr.Jaya Prakash Sinha
Research Scholar, SSSUTMS,
Research Guide, SSSUTMS

Abstract

Asymmetrical regauging and multivalued potentials (MVPs) occur widely in nature and may involve fields that are non-conservative, i.e., the free production of excess force fields. Yet conventional electric and magnetic engines are designed with gauge frozen and utilizing conservative fields and single-valued potentials. Self-induced change of potential, as by an MVP, can be utilized to accomplish asymmetrical self-regauging (ASR) (A-regauging) of the engine's stored energy at a certain point or sector. This is equivalent to free "refueling" of the engine, at each regauging position in its cycle, with excess energy furnished from the vacuum. During asymmetrical regauging, the system is an open system receiving excess energy from a known external source, so it can exhibit a COP>1.0 without violating the laws of physics. One or more additional force fields will appear, and they may be used to assist the operation of the system, by deliberate design.

Keywords: HMA, electromagnetic, electromagnetic gauges , asymmetrical self-regauging

Introduction

An electromagnetic engine and method capable of producing a high amount of mechanical power at a high efficiency. An electromagnet or piston operates within a cylinder having a stepped bore therein. The cylinder reciprocates while the piston only pivots. The power stroke occurs for a short duration midway between a top dead center position and a bottom dead center position. Axial magnetic forces are used to impart axial motion to the cylinder which causes rotation of the crankshaft. A plate is positioned within the cylinder up against the step. When the plate is in close proximity to the piston or electromagnet, and the centerline of the cylinder is at a right angle to the throw of the crankshaft, the electromagnet is energized. Sequential energization of each of a plurality of piston-cylinder combinations occurs during each crankshaft rotation.

Recently three developments of note have become important in research for over-unity electromagnetic engines. These are (a) the Johnson magnetic propulsion gate, (b) the magnetic Wankel engine, and (c) the Kawai engine. The over-unity operation of the propulsion mechanism for these devices has aroused considerable controversy among scientists and engineers, who have begun to debate them with vigor. Yet none of the debating scientists and engineers seem to have grasped the principles of operation that are employed by these devices in order to permissibly achieve a coefficient of performance (COP) greater than unity.

Related Works

The density of HMA is an important construction variable in the long-term durability of paved surfaces. Significant information exists regarding the important effect that in-place density (or air void content) has on the performance of HMA pavements. Whether the in-place density is specified as a percent of laboratory, control strip, or maximum theoretical density, it is well known and documented that density that is either too high or too low can lead to premature pavement failure (Killingsworth 2004). Lower percentages of in-place air voids can result in rutting and shoving, while higher percentages allow water and air to penetrate into a pavement, leading to an increased potential for water damage, oxidation, raveling, and cracking. Low in-place air voids are generally the result of a mix problem, while high in-place voids are generally caused by inadequate compaction (Brown et al. 2004).

Bulk specific gravity (Gmb) is defined as the ratio of the mass of a given volume of material at 25°C to the mass of an equal volume of water at the same temperature. The proper measurement of Gmb for compacted HMA samples is a major concern for the HMA industry, and this issue has become an even bigger problem with the increased use of coarse gradations. The volumetric calculations used during HMA mix design, field control, and construction acceptance are based upon bulk specific gravity measurements. During mix design, volumetric properties such as air voids, voids in mineral aggregates, voids filled with asphalt, and percent theoretical maximum density at a certain number of gyrations are used to evaluate the acceptability of mixes. All of these properties are based upon Gmb. Furthermore, an erroneous Gmb can lead to incorrect pay bonuses or penalties (Brown et al. 2004).

Gauge Transformations and Gauge Symmetry

A gauge transformation in electro-magnetic is conventionally taken to be the addition of the gradient of some function of space and time to the magnetic vector potential -- and simultaneously the addition of the negative of the partial derivative of the same function with respect to time, divided by the speed of light, to the electric scalar potential. This procedure gives different potentials but leaves the electric and magnetic fields unchanged. In short, it has restricted gauge transformation to net symmetrical gauge transformation.

Gauge symmetry is the abstract mathematical symmetry of a field related to the freedom to re-gauge, or re-scale, certain quantities in the theory (potentials) without affecting the values of the observable field quantities. Again, this "standard definition" restricts the gauge transformation to a net symmetrical transformation -- and thus restricts the sum of a series of such transformations to a net symmetrical transformation.

A gauge theory is a field theory based on the use of a field that possesses one or more gauge symmetries. Here again is the net symmetrical regauging restriction. Electro-magnetic was the first gauge theory. Gauge theory is widely utilized in particle physics, accounting for the Standard Theory by which all other competing theories are judged.

Regauging and Multivalued Magnetic Scalar Potential

This is a flash release of information on the operational principles of three over unity electromagnetic engines that are in the successful prototype stage or advanced engineering development. This purpose is to provide an explanation of the master over unity mechanisms utilized by these devices, and to alert researchers and experimenters that the mechanisms are well-established in the conventional scientific literature, though still but little known to the majority of electrical engineers.

Normal engine designers work with conservative fields, which require single-valued potentials. They consider A-regauging operations, as well as the multivalued potential (MVP), to be nuisances, since A-regauging may immediately involve no conservative electromagnetic fields. Most of the favored "engine design" laws and trusted circuit laws "blow up" during A-regauging, whether by electrical injection or the MVP region. So electrical power engineers just design conventional electromagnetic engines to avoid the MVP or eliminate it. On the other hand, if one deliberately evokes and properly uses the free "jump" of stored potential energy that occurs in an MVP-containing sector of an engine, a standard gauge-theoretic analysis will show that one can legitimately have over unity coefficient of performance from that engine. I first pointed this out in 1980.

The multivalued potential occurs widely in nature, and particularly in magnetics. In fact, it is quite often the rule rather than the exception. Still, the MVP is usually ignored by conventional engine designers, and many electrical engineers have hardly heard of it. S-regauging of the magnetic potential changes only the magnetic potential; the force fields themselves need not be changed. A-regauging also creates additional force fields, which may be used to assist the system's operation.

It is easiest to A-regauge a magnetic scalar potential on a rotary electromagnetic engine by simply energizing a coil. If the coil is oriented radially, its associated B-field will not perform radial work on the rotor. Any tangential field resulting from creation of the magnetic scalar potential will either be (i) rotor-accelerating, or (ii) rotor decelerating. Obviously one wants the A-regauging of the magnetic scalar potential to either (iii) accelerate the rotor, or (iv) go to zero so as to zero out the back-drag. So one will adjust the polarity and strength of the magnetic scalar potential created by the radial coil accordingly.

Regauging Produce Additional Orthogonal Fields

Work requires the translation of a force through a distance. Since the A-regauging change creates additional forces, the change in the force fields already present can be helpful. Rigorously it does not require extra work to A-regauge the system. However, the regauging is free to create any number of additional force fields at right angles to those already present before the regauging, depending upon the relationships between the regauged potential and various potentials in adjacent locations at right angles nearby.

A-regauging a sector of a rotary electromagnetic engine is just like refueling a car by putting gas in its gas tank: During the regauging operation, the system is an "open" system receiving an injection of excess potential (stored) energy from the surrounding vacuum except in the electromagnetic case the refueling is free. The excess stored energy injected into the system from the "refueling" jump due to A-regauging, can then be dissipated in the load during the remainder of the rotary cycle just as a refueled automobile can dissipate its additional fuel energy in powering the car, until it is time for refueling again.

By using one or both of these two master principles (i) A-regauging the potential energy of the system, and (ii) use of a multivalued potential for A-regauging, electromagnetic engines can permissibly exhibit COP>1.0, without any violation of the laws of physics, thermodynamics, Maxwell's equations, or advanced electrodynamics. And a totally-permanent-magnet motor can power itself and its load.

THE KAWAI ENGINE

Figure shows eight snapshots of the rotor advance of a typical Kawai engine, taken from Kawai's patent. This is one end rotor/stator side of a two rotor device, where a similar rotor/stator device is on the other end of the central shaft 11. In Figure A, pole piece 14 has three outward teeth 14b dispersed equally around the circumference, alternated with three notches. An end magnet 13 provides the source of flux passing through the pole piece. With the electromagnets de-energized, their core materials 16c, 16d, 16e, 16f are shown shaded, by flux from central magnet 13 outwards through teeth 14b.

Fig. A

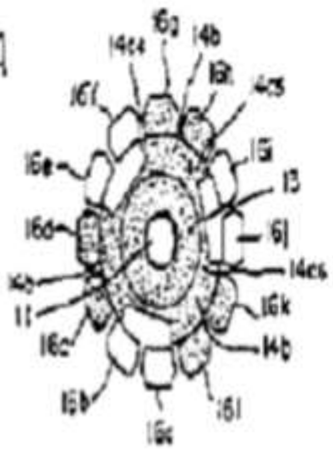
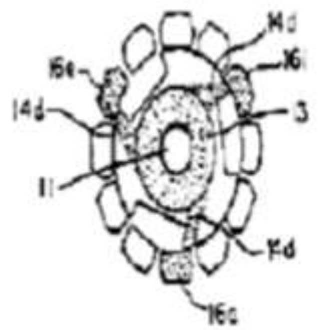


Fig. B



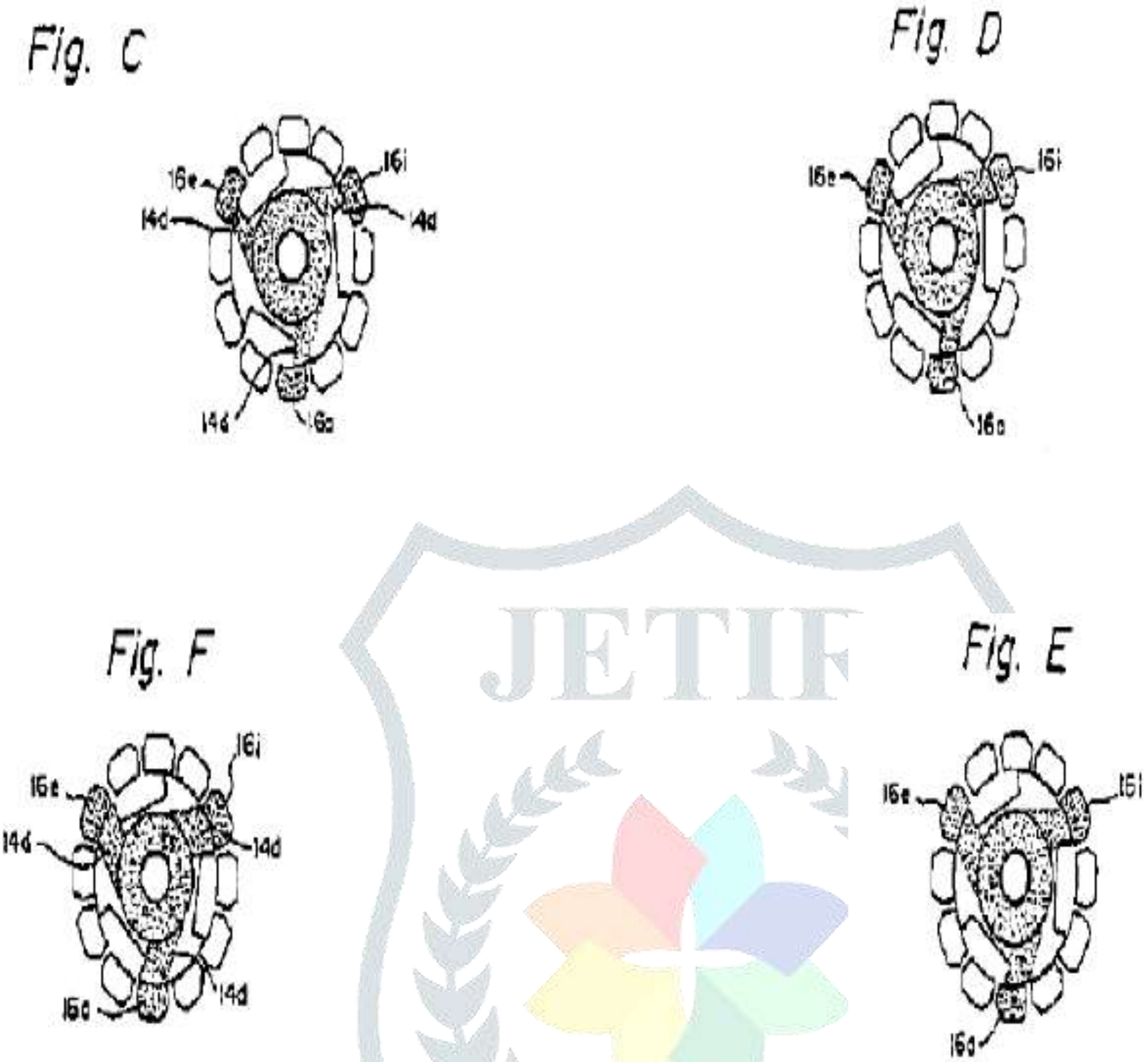


Figure 1. Rotor Advance and Asymmetrical Self-Regauging in A Typical Kawal Engine

For appreciable power and smoothness, the Kawai engine uses an extensive number of A-regaugings per axle rotation, being 36 times on each end, or a total of 72 for the two ends. The force field of each coil, accompanying its increased magneto static scalar potential, is oriented radially inward, so that radial work cannot be done by the coil on the rotor because the rotor does not translate radially. Advantage is taken of the initial clockwise acceleration force initially produced, and A-regauging eliminates the counterclockwise drag or "decelerating" force that would be produced without the A-regauging.

Conclusion

When Maxwell's equations are expressed in (A, Ò) form, two equations result in which A and Ò are coupled and the variables are not separated. Electro dynamicists then arbitrarily alter these equations by making two simultaneous asymmetrical regaugings, designed so that the net regauging is symmetrical, i.e., the net force fields are unchanged.

The variables are separated by this net symmetrical transformation. These regauged Maxwell equations are then widely utilized in the literature, without further regauging. The net symmetry of the overall regauging curtails and closes Maxwell's EM model and the operation of any designed Maxwell Ian system to further regauging, particularly asymmetrical self-regauging. In short, it eliminates the system's permissible free collection and use of potential energy from the external environment (i.e., the vacuum), by asymmetrical self-regauging.

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