Extracting energy from the movement of atomic electrons

1. Introduction

This paper looks at the persistent quantized motion of orbital electrons within atoms or the spins of conduction electrons between atoms as a source of energy. Instead of the usual approach looking at what electrical signals persistently emanate (or can be made to emanate) from matter, we look at the electron movements themselves as quantum dynamos and consider what we need to do to "load" those dynamos. If we can impress a load onto those persistent motions so that they give up energy then we should see that energy manifest within our system and hopefully have a limitless supply of energy supplied by whatever quantum forces keep those electrons in motion.

One feature of the electrons within matter that we all can know and feel is magnetism, so we start with that. We consider first permanent magnetism, and to appreciate what we need to do "load" the electron movements responsible we use the surface current equivalent for magnets.

2. Surface Current Equivalent

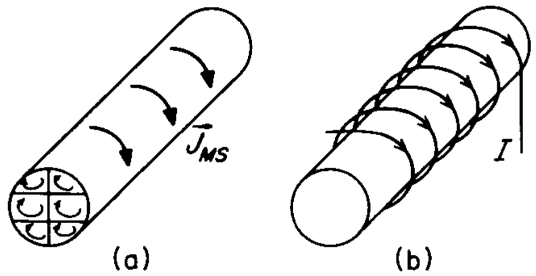

Figure 1. The Amperian surface current for the cylindrical magnet

Figure 1 (taken from [1]) shows the surface current J_{MS} equivalent for a cylindrical magnet. This effective current flows in an infinitely thin sheet but may be conveniently modelled by a close wound solenoidal coil of N turns covering the surface of the magnet. The equivalent ampere-turns NI is given by $NI = Ml$ where M is the magnetization and l is the length of the magnet. For modern rare-earth magnets M may be obtained from the known remanence B_R by $M = {B_R}/{\mu_0}$ where μ_0 is free space permeability. We can imagine a current generator I connected to the coil in figure 1, and clearly to apply a load to the current I we need to induce a voltage V into the coil that opposes the current source. Power VI will then be delivered to "somewhere". That "somewhere" is easily identified when the voltage is induced into the coil by an applied time-changing magnetic field B_A (perhaps from current in a real coil wound onto the magnet) to be added to the static field B_M already existing in the coil. When this is done we find that the magnetic energy density W stored in the inter-atomic space within the magnet as given by $W = {B^2}/{2\mu_0}$ has three components from the square of the sum $B_M + B_A$ yielding $B_M{}^2 + 2B_M B_A + B_A{}^2$. The first of these is the magnetic energy density already existing from the static field. The third is the magnetic energy density supplied. The second term is magnetic energy density supplied from the surface current source I, i.e. energy supplied from the atomic current circulations responsible for the magnet's property. So here the "somewhere" is the inter-atomic space, often referred to as the "air space occupied by the magnet" as used in determining magnetic load-lines. The fact that in this situation the induced voltage into the imaginary coil carrying current I correctly accounts for the magnetic energy within that internal space is a good omen that this approach is good for a correct energy audit. However that energy is not accessible to us, and in any case with a cyclic applied field that energy gets fed back to the quantum domain over each full cycle. To continually extract energy from the imaginary atomic current generator I we need a static (DC) voltage to be induced into the coil.

Current theory tells us that voltage induction V around a closed loop (known as volts per turn) can have only two values, either $V = {}^{d\Phi}\!/_{dt}$ as in the case above or $V = 0$ if there is no time-changing flux Φ present. That first V (transformer induction) actually stems from the magnetic vector potential **A** field that forms circles around the flux where the closed line integral of **A** is equal to the enclosed flux Φ. We then have a time-changing **A** field that yields an electric field $\mathbf{E} = -\dfrac{d\mathbf{A}}{dt}$ where its closed line integral yields that V value. To continually apply a load to the *static* current I we need a *static* electric field that creates a non-zero closed line integral. Current teaching tells us that is impossible, but that is based on the perception that the *only* method of creating such a static field is the Coulomb electric field where field lines start and finish on electric charges. For such fields **E** is the spatial gradient of the potential distribution where any closed integral yields zero, and current science does not recognize any other static **E** field distribution. We challenge that perception and in the next section offer a static **E** field distribution that does yield a finite closed integral value. We then suggest methods for achieving this **E** field.

3. Static E field with non zero closed integral

We start by assuming a small region of space as a source that emanates a static **E** field that everywhere points in the same direction and reduces in value with distance r from the source following a $1/r$ range law. This is shown in Figure 2 where the small circle at the centre is the source with its arrow depicting the field direction (here in the y direction). For this type of field we cannot use continuous lines with line spacing depicting field strength (as is common in many magnetic field images) so we show the field by arrows where the length of the arrow depicts field strength.

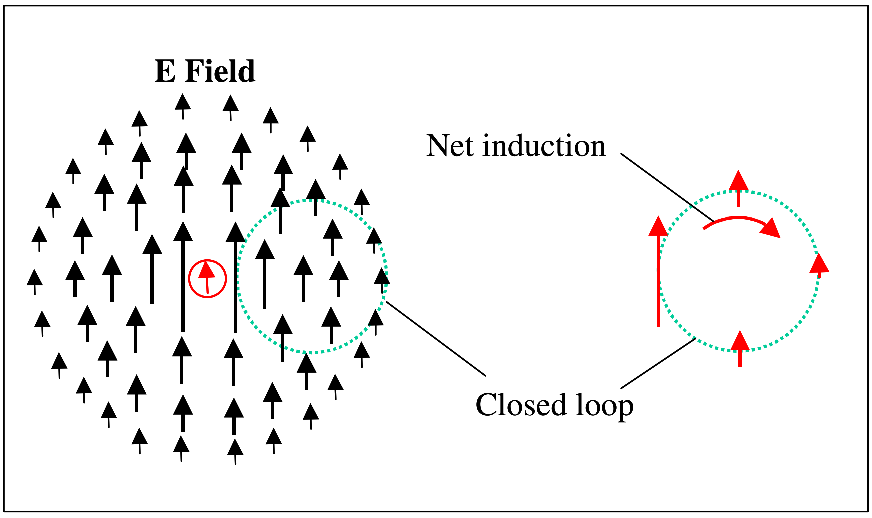

Figure 2. Proposed E field

With the source of the **E** field alongside the closed loop it is clearly seen that the induction into that loop at the closest point is much greater than the inverse induction at the opposite side of the loop, while the induction at the 90 degree points is zero. The result is a net voltage induction around the closed loop that is non zero. This is easily checked by calculation. If it is possible to create this type of static **E** field then clearly we have a means for applying a load to the moving electrons that are responsible for permanent magnetism, and of possibly continually extracting energy from those quantum dynamos. The next section suggests how this might be achieved.

4. Proposed Solution

Figure 3 shows a single accelerating electron alongside a circular conductor. Also shown is a single conduction electron within the conductor. It is known that the accelerating electron radiates an EM field that includes an electric **E** field that will penetrate the conductor and impose a force on conduction electrons. That **E** field and the force on that local conduction electron are shown. Also indicated are the **E** fields at different parts of the conductor loop, they diminish in magnitude following a $1/r$ range law.

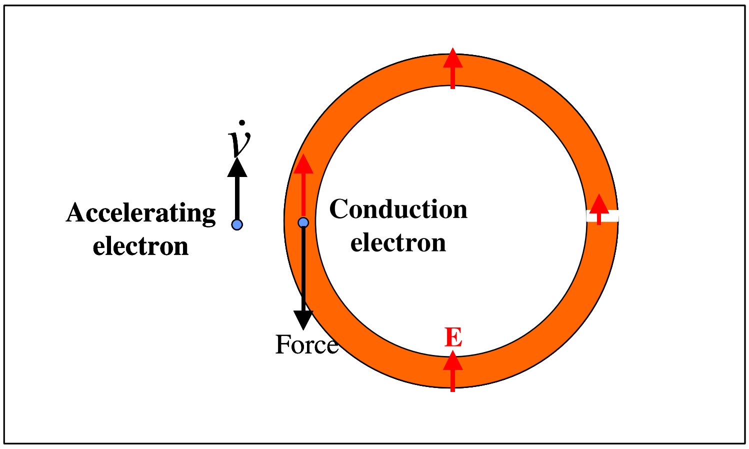

Figure 3. Force on conduction electron

Now consider a stream of electrons moving at a constant low velocity towards a small region of space within which they are accelerated up to high velocity. They leave that region of space at a constant high velocity, as depicted in Figure 4.

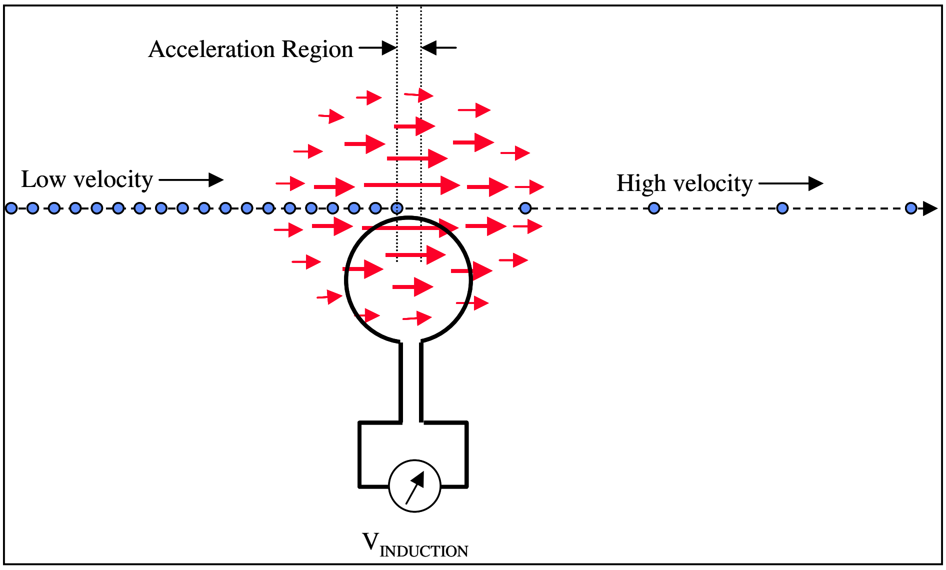

Figure 4. Electron acceleration

It is the near-field that is of interest to us where each moving electron creates all around it at a radial distance r an $\mathbf{A}$ field parallel to its velocity vector $\mathbf{v}$ of magnitude $\mathbf{A} = \dfrac{\mu_0 Q\mathbf{v}}{4\pi r}$. Then since $\mathbf{E} = -\dfrac{\partial \mathbf{A}}{\partial t}$ we obtain the near-field from the accelerating charges as $\mathbf{E} = -\dfrac{\mu_0 Q}{4\pi r}\dot{\mathbf{v}}$ producing the field as shown in Figures 1 and 4. Note that for each electron this is a unidirectional impulse whose pulse width is the time taken for the electron to cross the acceleration region. For the constant stream of electrons these impulses merge to form a static electric field. At first sight this seem impossible since the electron flow is a constant line current everywhere and such an infinite line is known to yield a constant $\mathbf{A}$ field. However that perception is based on an integration from -∞ to +∞ of the $\mathbf{A}$ field from each current element $I d\mathbf{l}$ as given by $\mathbf{A} = \dfrac{\mu_0 I}{4\pi}\int \dfrac{d\mathbf{l}}{r}$. What is missing from that integration is the fact that each individual charge approaching the acceleration region creates a rising $\mathbf{A}$ field while those moving away create a falling $\mathbf{A}$ field. With regard to those rise and falls creating $\mathbf{E}$ fields the symmetry produces pairs of terms that cancel, hence there is no $\mathbf{E}$ field created in the case of an infinite line current where the electron velocity is constant along the line (a hidden assumption). In our case this symmetry also applies to the electrons approaching the acceleration region and those moving away, and although there is a velocity difference this is countered by the change in electron distribution so that $\mathbf{E}$ field cancellation remains valid. This symmetry does not apply to the electrons within the acceleration region, so we do get from them the shown $\mathbf{E}$ field distribution. It appears that this (static) $\mathbf{E}$ field is now separated from the static $\mathbf{A}$ field as determined from the line current, which perhaps is the reason the $\mathbf{E}$ field radiates into the far field while the $\mathbf{A}$ field doesn't.

5. Practical embodiments

The Wimshurst machine is one example where electrons travel at trivial drift velocity along the wire feeding the emitting electrode tip where they then transfer to the belt and travel away from the tip at the belt speed. Thus the static $\mathbf{E}$ field distribution described above is to be expected, but with the low currents involved the relatively small levels are unlikely to be detected against the high static applied voltages and their fields there.

An arrangement similar to the Wimshurst machine could use a conductive belt with brush contacts where high current at low voltage could drive electrons onto the belt,

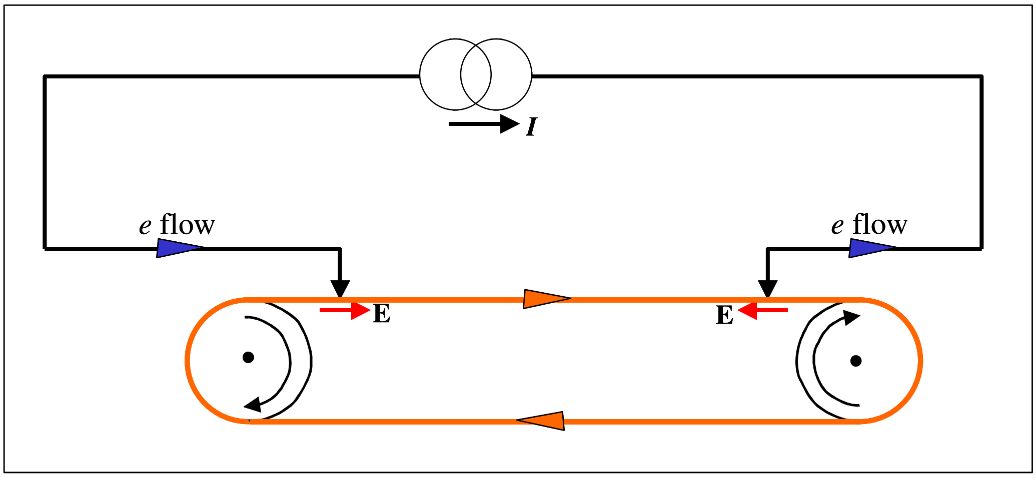

Figure 5. Conducting belt

Electrons at the first brush tip are accelerated up to belt speed then at the second brush are decelerated down to drift speed. Localized static **E** fields should be seen close to each brush tip, although no evidence can be found that anyone has ever tried to look for this.

An alternative embodiment uses a simple slip ring having two brushes situated at diametrically opposite positions, Figure 6. Again localized static E fields should be seen near each brush tip.

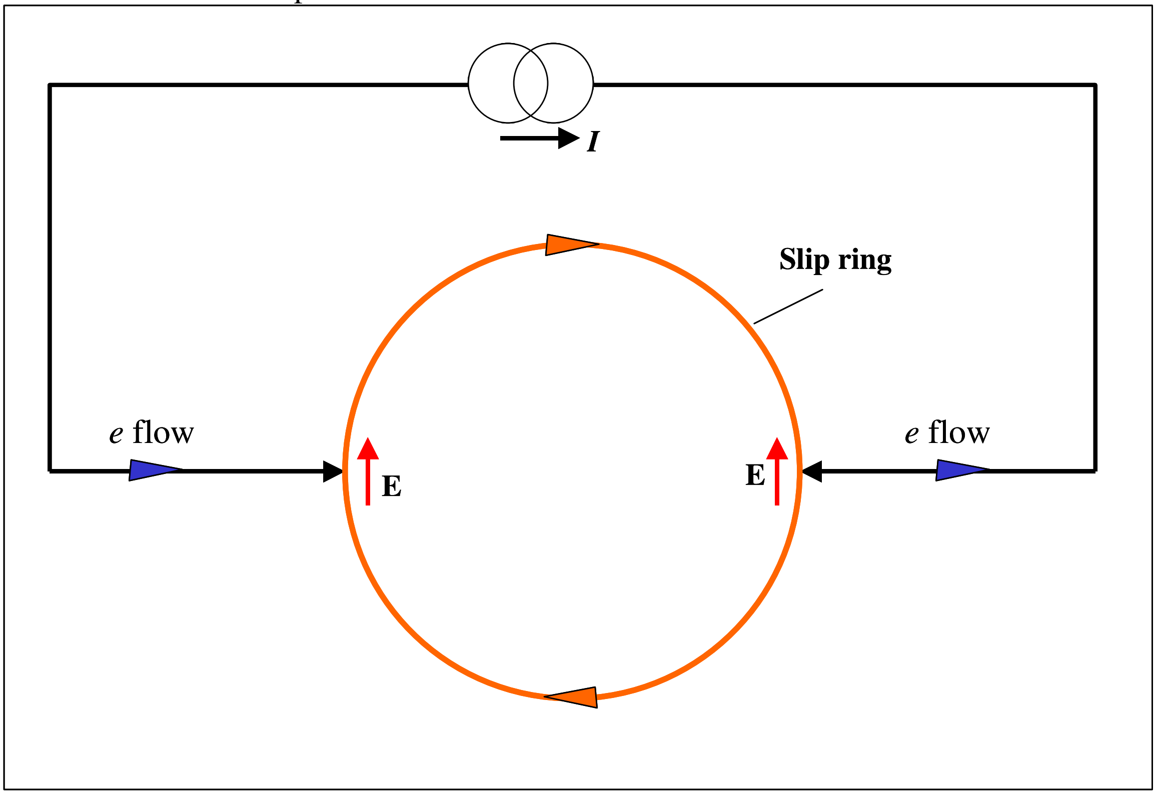

Figure 6. Slip ring embodiment

If we place magnets close to the brushes orientated such that the static **E** field does indeed apply a load to the quantum dynamos, we must ask the question *where does the supplied energy appear*? This is answered in the next section.

6. Where does the energy appear?

Magnets placed close to the brushes create localized non-uniform static **A** fields, and the moving conductor carries its conduction electrons and positive ions through those non-uniform fields. Thus each electron or ion sees an **A** field that changes magnitude and direction due to that movement. That time-changing **A** field imposes forces onto the particles such that the electrons obtain a classical driving force relative to the lattice ions. A potential difference proportional to the conductor velocity occurs between the brush contacts that is of a polarity to support the current *I*, the current generator sees a negative load resistance. Alternatively the induced potential difference can be used to drive current into a load, the system becomes a generator. This is summarized in Figure 7 that shows just one magnet close to a brush contact. Having two magnets, one at each brush contact, creates twice the voltage. This is a known as a Marinov motor driven as a generator, after the late Stephan Marinov who spent a lot of time and effort trying to persuade the scientific establishment that his motor (that he bizarrely called Siberian Coliu) did indeed create torque.

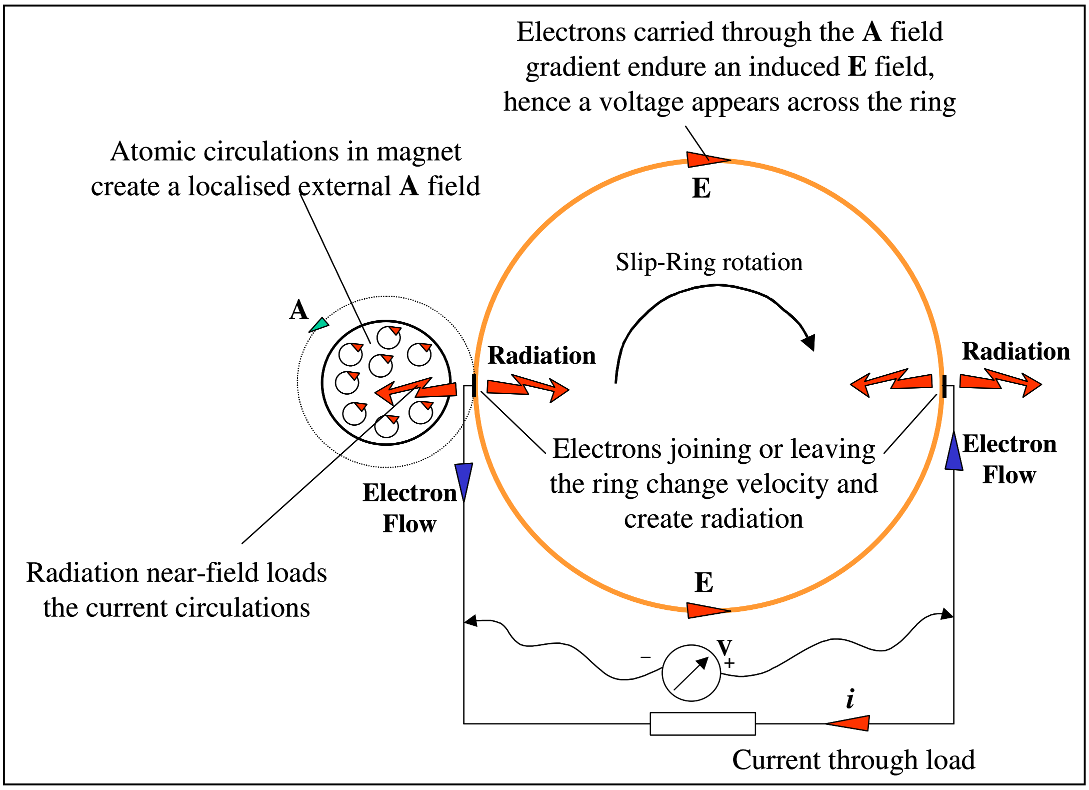

Figure 7. Marinov Generator

Since the electrical output from this generator is accounted for by the load imposed onto the magnet's quantum dynamos, the system should not impose a load onto the mechanical drive shaft. Analysis of the all the **E** forces imposed onto the whole conductor, and of the mechanical forces needed to accelerate and decelerate the electrons, supports this conclusion. This generator system extracts it energy from the forces of Nature that keep the magnet's atomic particles in perpetual motion, not from the drive shaft, hence offers the intriguing possibility of a free running machine that does not require fuel. What is not known is whether applying this type of load to the magnet's particles will cause the magnet to run down.

7. Why hasn't this been done before?

Induction due to charge movement through a non-uniform **A** field is the subject of much debate and is not covered in standard teachings. Thus there have been few experiments on which to base a true understanding of the subject. The slip ring version is the Marinov motor driven as a generator, and although there have been numerous experiments of the motor few people have attempted to examine it as a generator.

Robert Distinti [2] discovered the generator effect creating microvolts that he considered as an anomaly, he called it Paradox 2, see Figure 8. In this version the magnets and the brushes rotate around a fixed slip ring hence it requires two more brushes to get the voltage out.

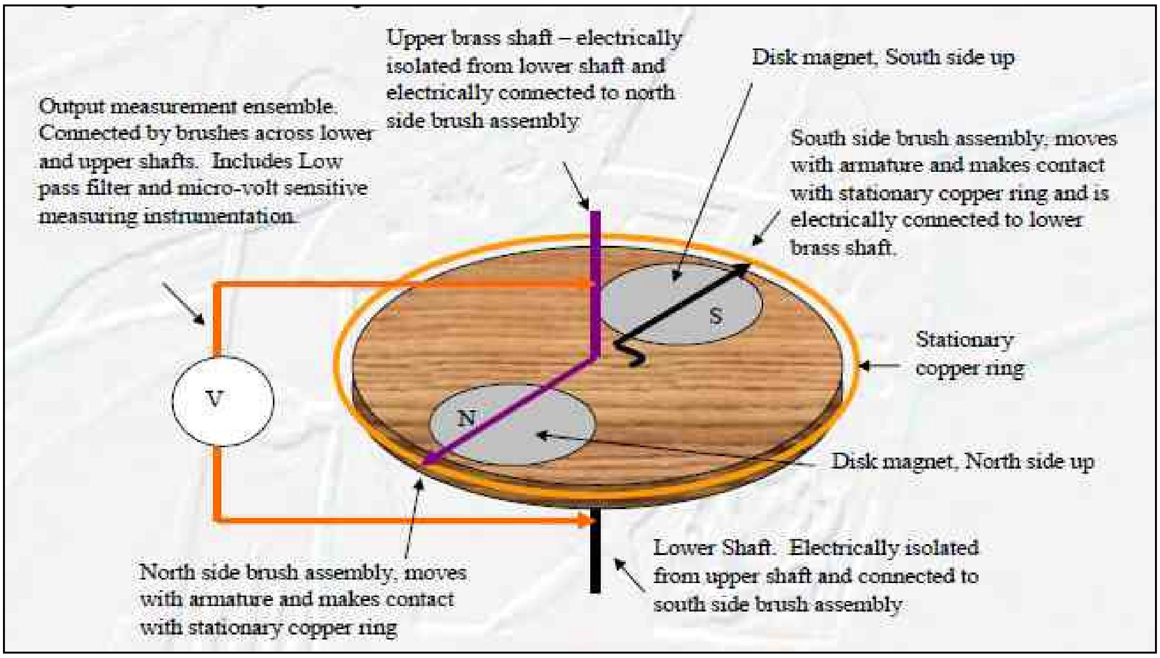

Figure 8. Distinti Paradox 2

The author of this paper, with the help of a UK slip ring manufacturer, carried out experiments between 2004 and 2010 to demonstrate the Marinov generator producing voltages up to 3mV [3], see Figure 9.

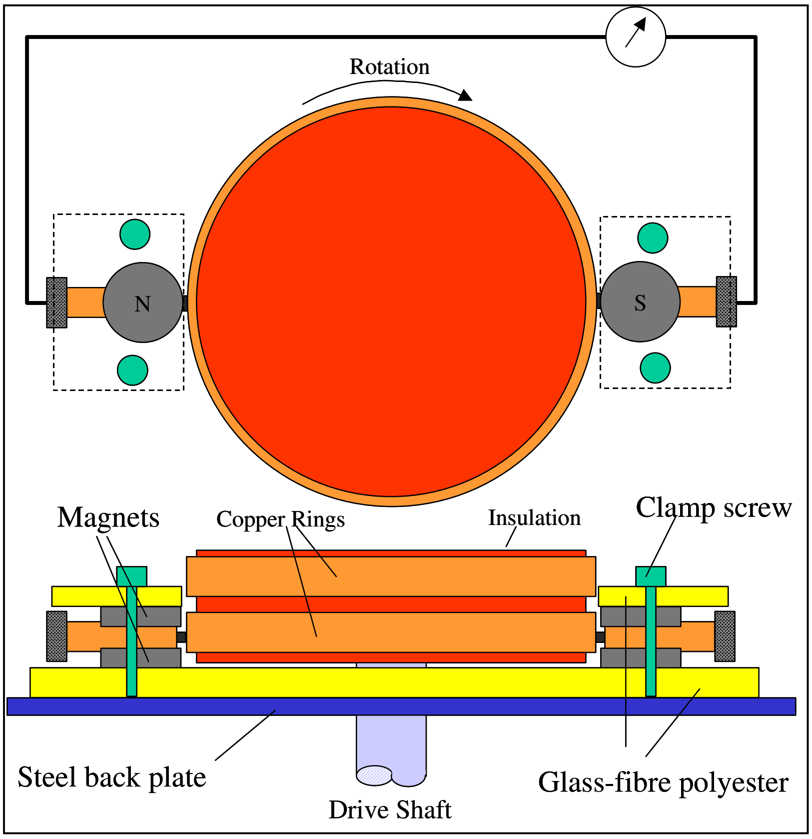

Figure 9. The Author's attempt

Following this a colleague in the USA performed a similar test generating 2mV [4], see Figure 10.

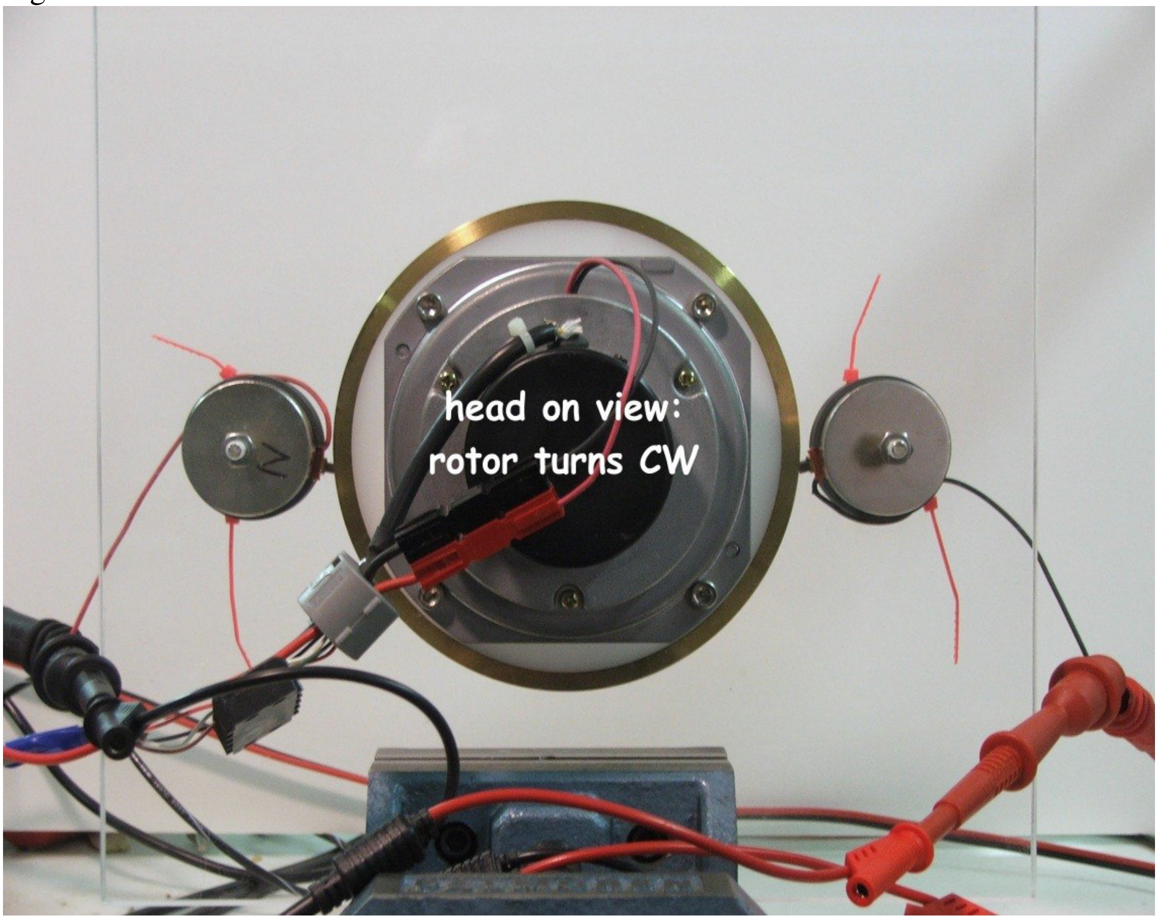

Figure 10. Colleague's attempt

To date there seems to be no interest in continuing this work, despite the obvious potential benefits for the planet of an alternative form of energy that harnesses Tesla's "Wheelworks of Nature".

Although these attempts produced very low voltage in agreement with the theory, they do indicate that the theory is correct. However critics (usually without in-depth study of the experiments) will claim that the rings rotate in a magnetic field and the voltage comes from classical $\mathbf{E} = \mathbf{v} \times \mathbf{B}$ motional induction. It would take very little effort to create an experiment where the slip ring rotates in a non-Curl **A** field (i.e. where there is no magnetic **B** field) to dispel this criticism. In view of the present scientific controversy that would be an important milestone in resolving this, and would open the door to a new chapter in renewable energy that is so badly needed today.

References

[1] Electromagnetic Theory for Engineers and Scientists, Allen Nussbaum, Prentice-Hall Inc.

[2] Home of Ethereal Mechanics, www.distinti.com

[3] The Marinov Generator https://www.overunityresearch.com/index.php?action=dlattach;topic=2470.0;attach=13897

[4] Private correspondence