A New Design for the Gravelectric Generator

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In a previous paper, we have proposed a system called *Gravelectric Generator* to convert *Gravitational Energy* directly into *Electrical Energy* [1]. Here we show a new design for the *Gravelectric Generator*. This system can have individual outputs powers of several tens of kW. It is easy to be built, and can easily be transported.

Key words: Gravitational Electromotive Force, Gravitational Energy, Electrical Energy, Generation of Electrical Energy.

INTRODUCTION

The electrical current arises in a conductor when an outside force acts upon the free electrons of the conductor. This force is called, in a generic way, of *electromotive force* (EMF). Usually, it has *electrical* nature. In a previous paper we have shown that this force can have *gravitational* nature (*Gravitational Electromotive Force*), and we have proposed a system to produce Gravitational Electromotive Force, called *Gravelectric Generator*, which converts *Gravitational Energy* directly into *Electrical Energy* [1].

A new design for the *Gravelectric Generator* is shown in this paper. This system can have individual outputs powers of several tens of kW. It is easy to be built, and can easily be transported.

THEORY

Consider *a coil with iron core*. Through the coil passes a electrical current i, with frequency f_H. Thus, there is a magnetic field with frequency f_H through the iron core. If the system is subject to a gravity acceleration g, then the *gravitational forces* acting on *electrons* (F_e), *protons* (F_p) and *neutrons* (F_p) of the Iron core, are respectively expressed by the following relations [2]

$$F_e = m_{ge}a_e = \chi_{Be}m_{e0}g \qquad (1)$$

$$F_p = m_{gp}a_p = \chi_{Bp}m_{p0}g \qquad (2)$$

$$F_n = m_{gn}a_n = \chi_{Bn}m_{n0}g \qquad (3)$$

m_{ge}, m_{gp} and m_{gn} are respectively the *gravitational* masses of the electrons, protons and neutrons; m_{e0}, m_{e0} and m_{e0} are respectively the *inertial* masses at rest of the electrons, protons and neutrons.

The expressions of the *correlation factors* χ_{Be}, χ_{Bp} and χ_{Bn} are deduced in the paper [3] and Appendix of [1], and are given by

$$\chi_{Be} = \left\{1-2\left[\sqrt{1+\frac{45.56\pi^2 k_{xe}^{22} r_e^4 B_{rms}^4}{\mu_0^2 m_e^2 c^2 f^2}}-1\right]\right\} = \left\{1-2\left[\sqrt{1+1.5\times10^{23}\frac{B_{rms}^4}{f^2}}-1\right]\right\} \qquad (4)$$

$$\chi_{Bp} = \left\{1-2\left[\sqrt{1+\frac{45.56\pi^2 r_p^4 B_{rms}^4}{\mu_0^2 m_p^2 c^2 f^2}}-1\right]\right\} \qquad (5)$$

$$\chi_{Bn} = \left\{1-2\left[\sqrt{1+\frac{45.56\pi^2 r_n^4 B_{rms}^4}{\mu_0^2 m_n^2 c^2 f^2}}-1\right]\right\} \qquad (6)$$

where $k_{xe} \cong 1.9$ (See Appendix [1]) ; $r_e \cong 1.4\times10^{-10}m$; $r_p = 1.2\times10^{-15}m, r_n \cong r_p$. [1].

Note that χ_{Bn} and χ_{Bp} are negligible in respect *to* χ_{Be}.

It is known that, in some materials, called *conductors*, the free electrons are so loosely held by the atom and so close to the neighboring atoms that they tend to drift randomly from one atom to its neighboring atoms. This means that the electrons move in all directions by the same amount. However, if some outside force acts upon the free electrons their movement becomes not random, and they move from atom to atom at the same direction of the applied force. This flow of electrons (their electric charge) through the conductor produces the *electrical current*, which is defined as a flow of electric charge through a medium [4]. This charge is typically carried by moving electrons in a conductor, but it can also be carried by ions in an electrolyte, or by both ions and electrons in a plasma [5].

Thus, the electrical current arises in a conductor when an outside force acts upon its free electrons. This force is called, in a generic way, of *electromotive force* (EMF). Usually, it is of *electrical* nature $(F_e = eE)$. However, if the nature of the electromotive force is *gravitational* $(F_e = m_{ge} g)$ then, as the corresponding force of *electrical* nature is $F_e = eE$, we can write that

$$m_{ge} g = eE \qquad (7)$$

According to Eq. (1) we can rewrite Eq. (7) as follows

$$\chi_{Be} m_{e0} g = eE \qquad (8)$$

Now consider a *wire* with length l; cross-section area S and electrical conductivity σ. When a voltage V is applied on its ends, the electrical current through the wire is i. Electrodynamics tell us that the electric field, E, through the wire is uniform, and correlated with V and l by means of the following expression [6]

$$V = \int \vec{E} d\vec{l} = El \qquad (9)$$

Since the current i and the area S are constants, then the current density $\vec{J}$ is also constant. Therefore, it follows that

$$i = \int \vec{J}.d\vec{S} = \sigma ES = \sigma (V/l) S \qquad (10)$$

By substitution of E, given by Eq.(9), into Eq.(8) yields

$$V = \chi_{Be} (m_{e0}/e) gl \qquad (11)$$

This is the voltage V between the ends of a metallic cylinder, when it has conductivity σ and cross-section area S, and it is subjected to a uniform magnetic field B_H with frequency f_H, and a gravity g (as shown in Fig.(1)) (The expression of χ_{Be} is given by Eq. (4)).

Substitution of Eq. (11) into Eq. (10), gives

$$i = \chi_{Be} (m_{e0}/e) \sigma g S \qquad (12)$$

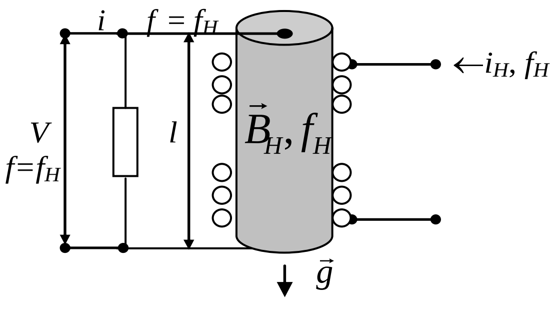

Fig. 1 – The voltage V between the ends of a metallic cylinder when it is subjected to a uniform magnetic field B_H with frequency f_H, and gravity g (as shown above).

Substitution of Eq. (4) into Eq. (11) and Eq.(12) yields respectively

$$V = \left\{1 - 2\left[\sqrt{1 + 1.5\times 10^{23}\frac{B_{rms}^4}{f^2}} - 1\right]\right\}\left(\frac{m_{e0}}{e}\right) gl \qquad (13)$$

and

$$i = \left\{1 - 2\left[\sqrt{1 + 1.5\times 10^{23}\frac{B_{rms}^4}{f^2}} - 1\right]\right\}\left(\frac{m_{e0}}{e}\right) \sigma gS \qquad (14)$$

If $B_{rms} = B_{H(rms)} = 1.2T$ and $f = f_H = 60Hz$, then Eq. (13) and (14) give, respectively

$$V \cong 1.03\, l \qquad (15)$$

$$i = 1.03 \sigma S \qquad (16)$$

For *iron* wire # 12 BWG, ($\phi = 2.77mm$; $\sigma = 1.04\times 10^7 S/m$), with length l (See Fig. 2) given by

$$l = 2\times 76[(2\times 0.55) + 2\times 0.15] + 2\times(0.55 + 0.15) = = 212.8 + 1.4 = 214.2 \ m$$

the Eq. (15) and Eq. (16) give, respectively

$$V \cong 220 volts \qquad (17)$$

and

$$i_{\max\,(theoretical)} = 8.4\times 10^6 \phi^2 = 64.4A \qquad (18)$$

However, the maximum current supported by an iron wire # **12** BWG, $\phi = 2.77mm$ is approximately $13\ A$, i.e., $i_{\max(real)} = 13A$. Consequently, in this case, the *maximum output* power of the Gravelectric Generator is *

$$P_{\max(real)} = V i_{\max(real)} \cong 2.8\ kW \cong 3.7HP \qquad (19)$$

Note that, if the diameter of the iron wire increases up to $\phi = 13mm$ the value of $i_{\max(theoretical)}$ increases up to $1419.6A$ (See Eq. (18)) and the power would increase up to $312kW$. However, the maximum current supported by an iron wire with diameter $13mm$ is approximately 360A. Thus,

$$P_{\max(real)} = 220V \times 360A = 79.2kW \cong 106HP \qquad (20)$$

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This power *is sufficient to feed the electric motor of most electric cars.*

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* In the US *typical household* power *consumption* is about 1.3 kW per hour. In 2013, the average *annual* electricity consumption for a U.S. *residential* utility customer was 10,908kWh [7]. Then, in order to provide the amount energy of 1.3 kWh it is necessary that the electric generator has power $P = 1300kWh/720h = 1.8kW$. Equation (19) shows that the Gravelectric Generator is able to produce a much more than this value.

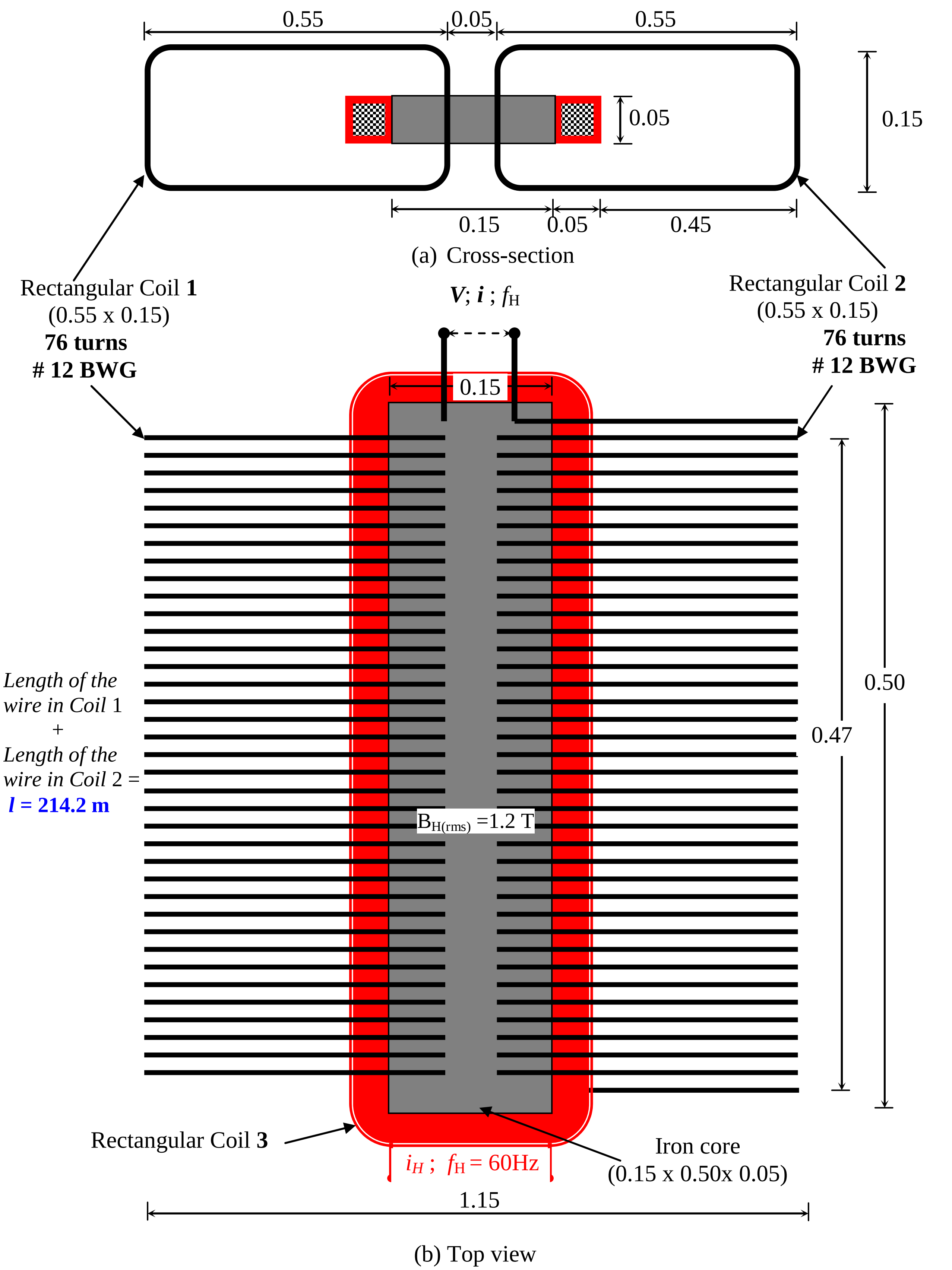


Fig. 2 – Schematic diagram of the Gravelectric Generator as energy source up to $2.8\ kW \cong 3.7 HP$

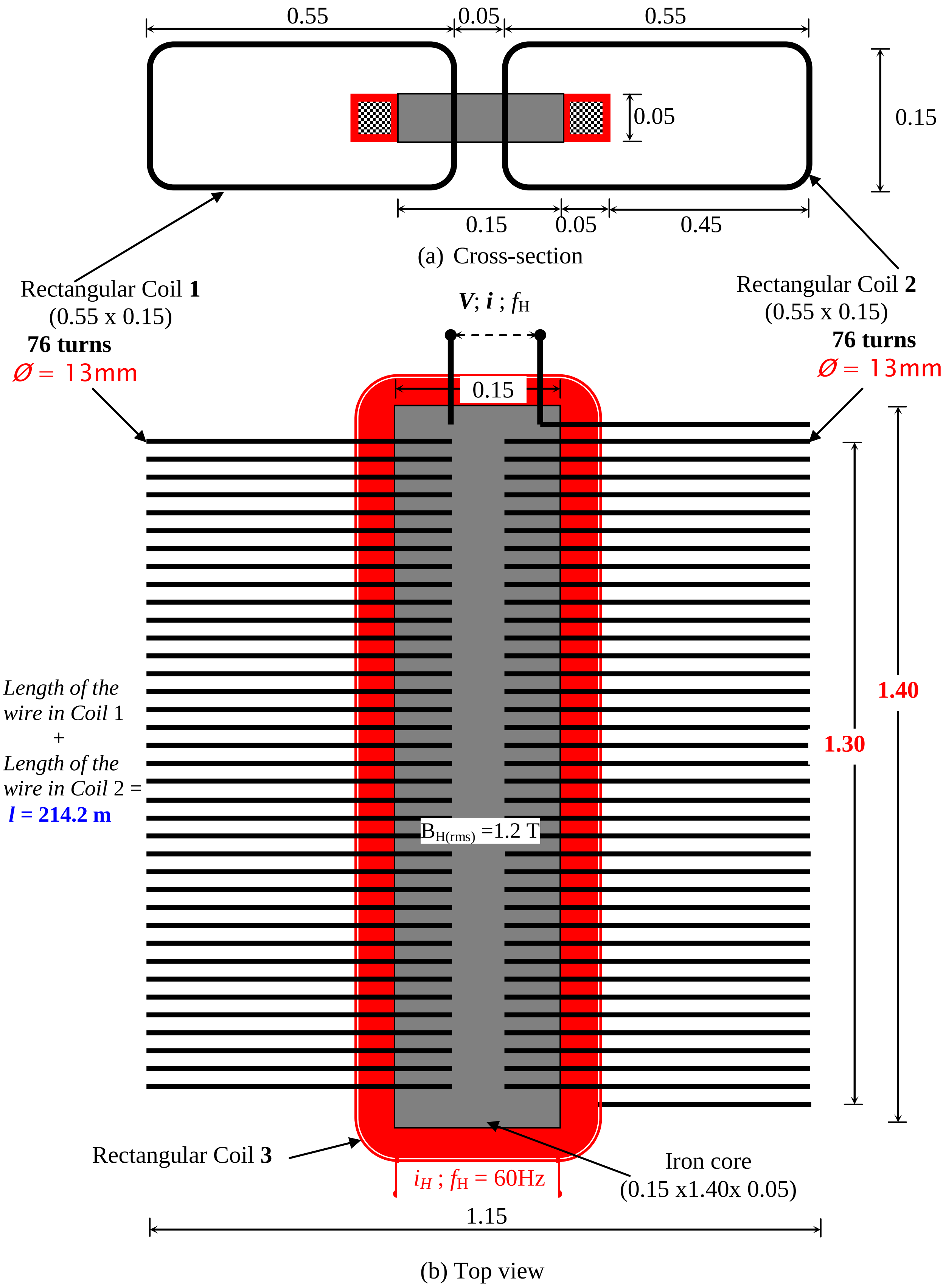


Fig. 3 – Schematic diagram of the Gravelectric Generator as energy source up to $79.2kW \cong 106HP$

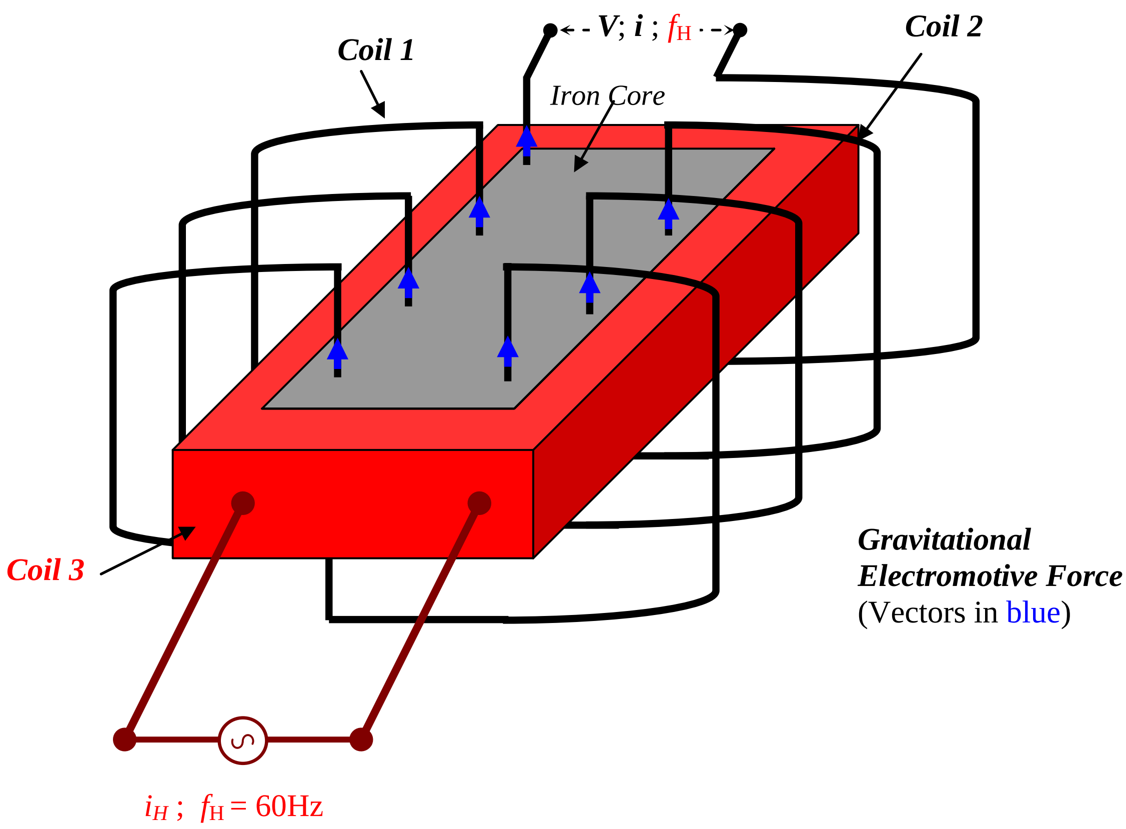
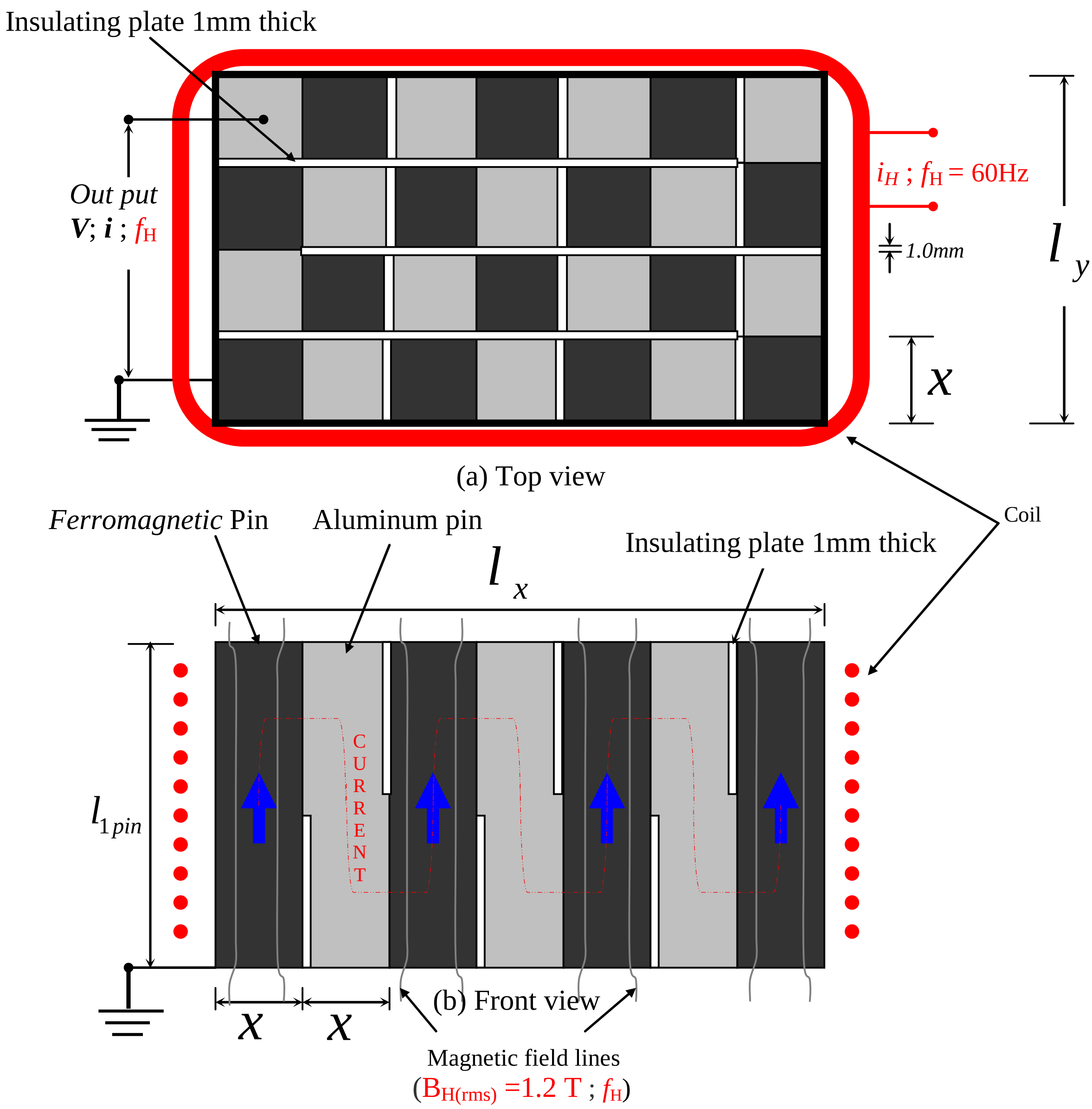


Fig. 4 – Perspective (Schematic Diagram)



(*Gravitational* Electromotive Force, G emf; The G emf produced in the Aluminum pins have opposite direction to the produced in the ferromagnetic pins. But, it is negligible in comparison with this one. See Eqs. (13) and (14)).

+ Number total of *ferromagnetic* pins: $N \cong l_x l_y / 2x^2$

+ Total length of the ferromagnetic pins: $l = N l_{1pin} = l_x l_y l_{1pin} / 2x^2$ (l_{1pin} is the length of 1 pin). Then for $l_{1pin} = 0.18m$, $l_x = 0.46m$, $l_y = 0.52m$ and $x = 10mm$, we get $l = 215.2m$. Thus, Eq. (15) shows that $V \cong 220 volts$. Then, Eq. (16) gives $i_{\max(theoretical)} = 1.04\times 10^7 x^2 = 1040\ A$. However, the maximum current supported by a 10 *mm* square pin is approximately 300A. Consequently, we can write that $P_{\max(theoretical)} = 220\times 300 = 66kW \cong 88.5HP$. Using two of this Gravelectric Generator in *parallel* it is possible to obtain an out put of **220V**; **60Hz**; **177HP.**

Fig. 5 - Schematic diagram of a more compact and powerful type of Gravelectric Generator.

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