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THE PATH TO FUEL-FREE ENERGY LAYS THROUGH UNDERSTANDING THE OPERATION OF THE MAGNETIC CIRCUIT OF ELECTRICAL MACHINES

Ruchkin V. A. *(Kiev, Ukraine)*

It seems that textbooks, including those for universities, are permeated with a very plausible idea that energy (meaning the same portion) from the input of electric machines is transferred to their output using a magnetic circuit. AND

it seems that this idea is firmly rooted in the minds of the vast majority of specialists, including those who participate in management decision-making at one or another hierarchical level.

Since the invention of electric machines and to this day, all of them have had a significant drawback: as the load increases, it is necessary to increase the power that must be supplied to their input, compared to the amount of power they consume when there is no load, that is, at idle. . Even certified scientists are deeply convinced that this is not **a consequence of a significant design defect** in modern generators, electric motors and transformers, but **a natural, logical and fundamentally irremovable phenomenon,** which in electrical engineering corresponds to Lenz's rule, and in a broader sense corresponds to the law of conservation of energy. Therefore, the authors of the Great Soviet Encyclopedia classify electric machines not as energy sources, but as devices of a lower rank -

only to energy converters from one type to another [1], in full accordance with the law of conservation of energy and the quantitative equivalent of one type established by scientists

energy to another.

In 1878, when A.G. Stoletov first studied the magnetization of soft iron and constructed a permeability curve [2, p. 298], the use of the term "magnetic permeability" was completely justified and met the requirements of practice. But when experimental evidence was obtained that **there are sources of magnetomotive force inside ferromagnets**

forces (the Barkhausen effect (1919), methods of powder figures developed by Francis Bitter in 1931 and independently by Nikolai Akulov in 1934) - it was no longer possible to continue to consider the magnetic circuit as just a passive element of electrical machines; and the term “magnetic permeability”, in relation to ferromagnets, turned into an analogue of “phlogiston”, which survived into the 21st century.

“When a ferromagnet is introduced into an external magnetic field begin to turn and orient themselves along the field... immediately entire areas of the so-called spontaneous (spontaneous) magnetization. Therefore, with increasing H, the magnetic induction B increases very quickly, and the relative magnetic permeability has very high values even in weak fields. In sufficiently strong magnetic fields, all domains will rotate along the field, and magnetic saturation will occur” [3, p. 298].

Since the direction of the external magnetic field lines and the direction of the magnetic field lines generated by the uniform orientation of the magnetic fields of the domains in the ferromagnetic sample coincide, the magnetomotive force (MF) generated by the uniform orientation of the magnetic fields

domains, compensates for a significant portion of the drop in the magnetic voltage of the external field in the ferromagnet. This fraction is the (1–1/ÿ)th part of the magnetic voltage applied to the ferromagnetic layer. (This is why the relative “magnetic permeability” of a ferromagnet is ÿ times greater than the magnetic permeability of a vacuum.) In turn, this means that the entire energy of the magnetic field inside the ferromagnet consists of two components: the energy of the uncompensated part of the external magnetic field field, and significantly greater energy, which is generated by the uniform orientation of the magnetic fields of the domains.

That is, the energy that arises in the magnetic circuit of electric machines under the influence of current passing through the winding consists of two components: the energy remaining in the magnetic circuit from an external source of magnetic field (the uncompensated part of the external magnetic field) and much greater energy that is generated uniform orientation of the magnetic fields of the domains. Therefore, the EMF in the generator, the EMF in the secondary winding of the transformer at idle or rotating

the moment in the electric motor when it is braked, and the back EMF when the electric motor rotates - all these EMFs are created mainly by the magnetic field component generated by the uniform orientation of the magnetic fields of the domains, and not by the energy
falling from the network.

The immediate reason for the increase in power that must be supplied to the input of the generator or to the primary winding of the transformer when the load increases is not the law of conservation of energy or Lenz's rule, but the influence of the load current on the magnetic circuit. Therefore, it is more correct to say not that the energy supplied to the input of electric machines **is transferred** to their output using a magnetic conductor, but that **the output of modern electric machines produces the same amount of energy as it is consumed from the network** (including losses). In this case, the main share of energy at the output of electric machines is obtained from the energy of the magnetic fields of the domains.

When designing electrical machines, it is fundamentally important what position we adhere to: 1) we consider ferromagnets only as a
passive element that has a certain magnetic permeability ÿ, similar to the conductivity of metals for electric current;

2) we take into account the appearance of internal sources of magnetomotive force in the magnetic circuit when a ferromagnetic
tick in an external magnetic field.

The consequences of the first position is the idea of the all-encompassing nature of the total current law:

$$\oint_{\ddot{y}L} H dl = \frac{4\ddot{y}}{c}\ddot{y}\int_{S\ddot{y}} j_n\ddot{y} - \frac{1}{4\ddot{y}}\frac{dD}{dt}{}_n\ddot{y}\,dx$$

and the absolute confidence of specialists that *"If a circuit located in a magnetic field does not cover the current, then the circulation of the magnetic field along this circuit will be zero"* [3, p. 213]. Therefore, in the designs of modern electrical machines, the closed circuit of the magnetic circuit and the closed circuit of the electric current **are necessarily mutual**

penetrate each other.

If we adhere to the second position, then the lion's share of the MMF in a closed magnetic circuit is created by internal sources of the magnetic field (uniformly oriented magnetic fields of domains), which are exposed to an external magnetic field. Therefore, in order for a current to excite a magnetic flux in a closed circuit, **it is not at all necessary** that the current penetrate the closed circuit of the magnetic circuit, as required by the law of total current. *"The current situation with the practical use of the energy of circular molecular currents in*

ferromagnets, which Andre Marie Ampere spoke about back in 1820, is in many ways similar to the situation that developed at the turn of the 30s and 40s of the last century around the physics of the atomic nucleus.

From the discovery by Antoine Henri Becquerel of the radiation of uranium salts in 1896 until researchers discovered the enormous internal energy of the atomic nucleus in the late 1930s, only a small group of enthusiasts in the most developed countries were interested in the physics of the atomic nucleus. But since the moment when, at the turn of the 30s and 40s, a way to release this enormous energy was found, the situation has changed dramatically" [4].

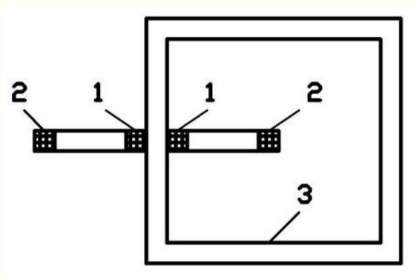
It is already known about ferromagnets that *"The contribution of the energy of the current source to the resulting energy of the magnet can be vanishingly small..."* [5], therefore we can assume that the stage of searching for ways to release the enormous energy of circular molecular currents has already arrived, or rather, has been going on for many years the stage of searching for ways to release the energy of magnetic fields of domains.

The work [5] describes the experimentally obtained excess of energy at the output of the transformer by 13.8 times compared to the energy supplied to the input of the transformer. That is, in this work Nikolai Emelyanovich Zaev (1925 – 2007), [6] proved that **a device designed like a conventional transformer can be a source of energy if there is an isolation between the output and the input.** In the experiments described in [5], this decoupling of the output and input was carried out by separating in time the process of supplying current to the primary winding of the transformer to magnetize the magnetic core and the process of taking energy from the secondary winding when connecting a load during demagnetization of the magnetic core.

After Gennady Vasilyevich Nikolaev (1935 – 2008) redesigned standard transformers at one of the enterprises in Yekaterinburg, the enterprise began to pay an order of magnitude less for electricity. When the electricity supply company

learned that the enterprise had not curtailed production, but continued to operate on the same scale, they went to court and after a court ruling, the transformers were cut up and removed from the territory of the enterprise, and standard transformers were installed in their place. G.V. Nikolaev was fired from the enterprise. That is, the method used by G.V. Nikolaev to release the energy of the magnetic fields of domains remained unknown.

One of the ways to release the energy of magnetic fields of domains was proposed by Arkady Anatolyevich Stepanov. In A. A. Stepanov's patent for invention No.: 2418333 (RU), weakening the influence of the load current on the magnetic circuit is achieved by increasing the radius of the turns of the secondary winding of the transformer (Fig. 1).



Rice. 1. 1 – primary winding; 2 – secondary winding; 3 – magnetic circuit

An increase in the radius of the turns of the secondary winding does not change the value of the induced emf (with a corresponding increase in the length of the magnetic core), since the induced emf depends only on the rate of change in the magnitude of the magnetic flux penetrating the secondary winding. At the same time, it is known [7 p. 432], that the intensity H at the center of the circular current i is inversely proportional to the radius R of this circular current:

$$H \sim \frac{i}{2R}$$

It can be assumed, with some approximation, that in Stepanov's transformer the ampere turns of the primary winding create a voltage H in the magnetic circuit as many times greater than the (same) ampere turns of the secondary winding, how many times the radius of the primary winding is smaller than the radius of the secondary winding.

Weakening the influence of the load current on the magnetic circuit (the load shunts the primary winding to a lesser extent) made it possible to use the phenomenon of current resonance in the Stepanov transformer when supplying energy to the primary winding, which increases the magnetization efficiency of the magnetic circuit by Q times (Q – quality factor of the resonant circuit formed by the primary winding and a capacitor connected in parallel to it).

Thus, to increase the ratio of output power to input power in the Stepanov transformer, two well-known phenomena are used: (1) weakening of the magnetic field in the center of the circular current with an increase in its radius and (2) current resonance.

During a demonstration of the operation of the Stepanov transformer [8], when a power of 42 watts was supplied to its input, a power of 500 watts was obtained at the output of the transformer.

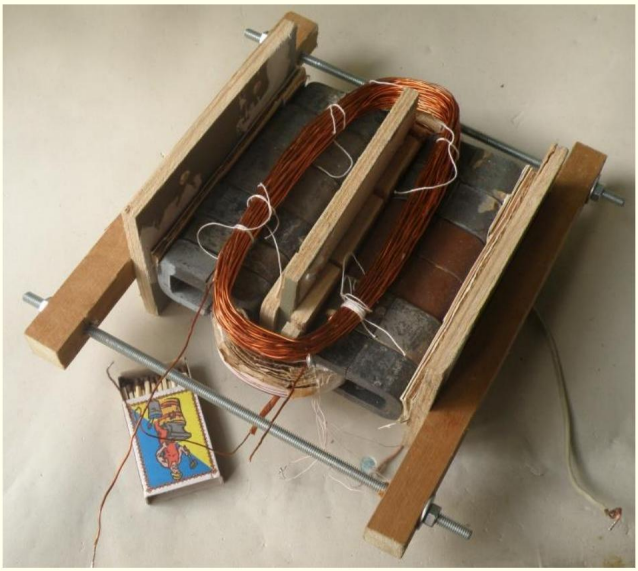
Roughly speaking, 42 watts of power in the Stepanov transformer are spent on creating the energy of the uncompensated part of the external magnetic field in the magnetic circuit, and 500 watts are obtained from the energy generated by the uniform orientation of the magnetic fields of the domains.

The given figures (42 and 500) allow us to assert that on the basis of the Stepanov transformer it is already possible to create a fuel-free energy source: it is enough to supplement the power amplifier, which is the Stepanov transformer, with positive feedback to generate continuous sinusoidal oscillations.

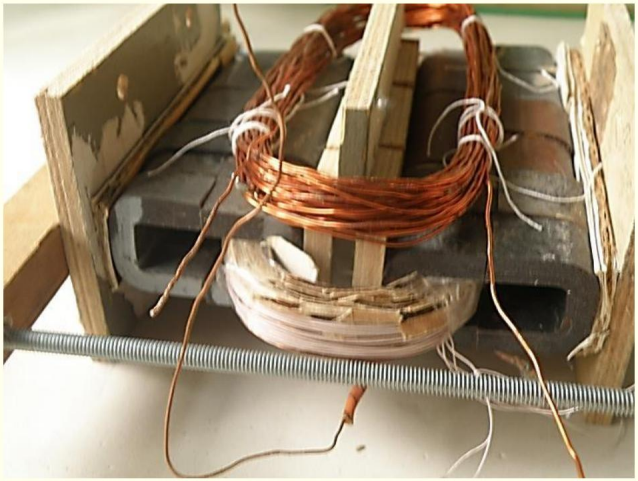
Another method of obtaining isolation between the output and input of a transformer is demonstrated by an experimental model of a non-reciprocal transformer proposed by the author (Fig. 2), which **should not work at all if** we continue to consider the magnetic wire as a passive element of the magnetic circuit. For a more complete understanding of the design of the experimental layout in Fig. Figure 3 also shows its side view in a larger plan.

A non-reciprocal transformer consists of three parts: - the primary winding (it lies on the magnetic core on top);

- magnetic circuit;
- secondary winding (its turns are located inside the magnetic wire).



Rice. 2. Experimental layout of non-reciprocal transformation - stands



Rice. 3. Experimental layout of a non-reciprocal transformer. Side view

When alternating current passes through the primary winding, which does not penetrate the closed circuit of the magnetic circuit, a magnetic flux is excited in the magnetic circuit.

The excitation of magnetic flux in the magnetic core under such unusual conditions can be explained by the fact that the magnetic field strength created by the current passing through the primary winding magnetizes the wall of the magnetic core adjacent to the primary winding. That is, in the wall of the magnetic circuit adjacent to the primary winding, under the influence of an external magnetic field, internal sources of MMF appear. At the same time, the wall of the magnetic circuit adjacent to the primary winding is a screen that weakens the strength of the external magnetic field acting on the opposite wall of the magnetic circuit.

A change in the magnetic flux surrounding the secondary winding excites an EMF in the secondary winding.

When alternating current passes through the secondary winding no EMF is excited in the primary winding.

Experimental prototype of a non-reciprocal transformer can can be characterized by the following main indicators.

The primary winding is 42 turns of wire with a diameter of 1 *mm.* Inductance without a magnetic core is 330 N, inductance with a magnetic core (Fig. 1) is 340 N. The secondary winding is 117 turns of wire with a diameter of 0.5 *mm.* Inductance without a magnetic core is 3200 N, inductance with a magnetic core (Fig. 1) is 18300 N. With a current in the primary winding of 0.65 *A* with a frequency of 1000 *Hz,* an emf of 2.4 V was created in the secondary winding . When a load of 1000 *Ohms* is connected to the secondary winding , its output voltage was 1.3 V. With a current in the primary winding of 0.8 *A* with a frequency of 1000 *Hz,* in

an EMF of 3.4 V was created in the secondary winding. When a load of 1000 *Ohms was connected to the secondary winding,* its output voltage was 1.6 V.

Such modest experimental results can be explained by the following reasons:

- only the lower half of the magnetic field is used, generated by current in the primary winding;
- only the

a small section of the magnetic circuit;

- the tape magnetic circuit prevents the penetration of an external magnetic field into the lower layers of the magnetic circuit wall, which is adjacent to the primary winding;

- high magnetic resistance of the magnetic circuit, as evidenced by the small increase in the inductance of the secondary winding when it is placed in the magnetic circuit.

However, despite such modest results, **it was possible to prove the operability** of the experimental prototype of a non-reciprocal transformer. Tests have shown that with the same ampere-turns in the primary and secondary windings, the transfer of energy (by voltage) from the primary winding to the secondary winding in a non-reciprocal transformer model is more than 50 times more efficient than in the opposite direction.

Unlike the Stepanov transformer, in which the influence of the load current on the operating mode of the magnetic circuit is weakened, in the experimental model (and all its possible subsequent improvements) the influence of ampere-turns of the load current on the operating mode of the magnetic circuit is much stronger than the influence of ampere-turns of the primary winding current. Therefore, the use of a resonant mode of operation of the primary winding is desirable to obtain practically significant results, since the MMF created by the ampere turns of the primary winding should slightly exceed the MMF created by the ampere turns of the secondary winding through which the load current passes. It can be expected that as a result of improving the design of the non-reciprocal transformer shown in Fig. 2, it is possible to create a power amplifier [9, p. 16], and on its basis a fuel-free energy

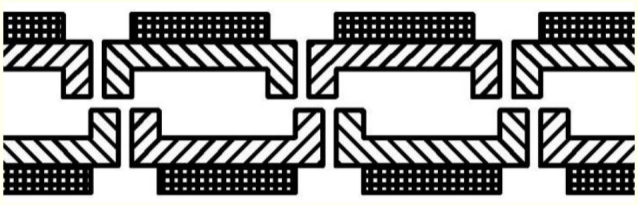
source can be built, which is presented to the author in the form of a non-reciprocal transformer covered by positive feedback, transferring the power amplifier to the mode of generating continuous oscillations.

The principle of removing the energy of the own magnetic flux of a ferromagnetic sample into a load, when closing the own magnetic flux of the ferromagnetic sample in addition to the source of an external field, can also be applied in the design of electrical thromotors.

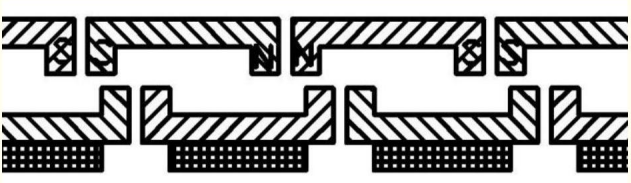
In Fig. 4 and fig. Figure 5 schematically shows the principle of operation of electric motors, which implement the removal of their own energy

magnetic flux of a ferromagnetic sample into the load, when the own magnetic flux of the ferromagnetic sample is closed
in addition to the external field source.

The electric motor elements located in the upper part of Fig. 4 and fig. 5, can move to the right or left relative to the electric motor elements located in the lower part. By changing the direction of the current in the windings (sources of the external magnetic field), it is possible to create attractive and repulsive forces between the poles of the rotor and stator. It should be noted that in the windings of electric motors of this design, when the rotor rotates, a back-EMF is not created, to overcome which a significant part of the power supplied to modern electric motors is consumed.



Rice. 4. The principle of operation of an electric motor with the removal of energy from the own magnetic flux of the magnetic core into the load when the own magnetic flux of the magnetic core is closed.
MO source of external magnetic field



Rice. 5. The principle of operation of an electric motor with the removal of the energy of the own magnetic flux of a part of the magnetic circuit (with a winding) to the load when the own magnetic flux of this part of the magnetic circuit is closed in addition to the source of the external magnetic field in the form of a winding with a current passing through it

According to the author, **the principle of removing the energy of the own magnetic flux of a ferromagnetic sample into the load, when closing the own magnetic flux of the ferromagnetic sample in addition to the source of the external field** (as is implemented in the experimental layout Fig. 2), **is the key to mastering the energy of circular molecular currents**

In conclusion, it should be noted that much that has been said about the internal sources of MMF (and the energy contained in them) in ferromagnets can be repeated about the internal sources of EMF in ferroelectrics. And from this it follows that the law of total current and the law of electromagnetic induction must be adjusted taking into account the existence of internal sources of MMF in magnetic circuits and internal sources of EMF in ferroelectric conductors. New generation electric machines should be designed on the basis of both adjusted laws [10, 11, 12].

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Valentin Aleksandrovich Ruchkin with his wife at the dacha

Valentin Aleksandrovich Ruchkin, corresponding member of the International Academy of Computer Science and Systems, candidate of technical sciences, graduated from the Kiev Higher Engineering Radio Engineering School of the Air Defense Forces in 1956, and was a teacher at higher military schools in 1958–1979. 1980–1995 researcher at the Faculty of Cybernetics of the Kyiv State

university. Area of scientific interests: statistical analysis of experimental data. 1996–2004 researcher at the Scientific Center for Radiation Medicine of the Academy of Medical Sciences of Ukraine. The subject of the work is statistical analysis of laboratory test data.

Author of four inventions and over 50 scientific papers. Experimentally proved the incorrectness of the Neumann-Pearson lemma for signal-to-noise ratios greater than 0.5 in voltage. He proposed a more general criterion than the likelihood ratio criterion. The author of a new class ***of non-reciprocal electromagnetic systems*** and new unique electromagnetic devices based on them, showed that on the basis of standard single-phase and three-phase electric generators it is possible to create autonomous power units that do not require fuel to generate electricity, proposed the designs of ***new generation electrical machines*** using internal source of MMF (energy of circular molecular currents) in ferromagnets, as well as the use of internal sources of EMF in ferroelectrics; showed that the law of total current and the law of electromagnetic induction must be adjusted taking into account the existence of internal sources of MMF in magnetic circuits and internal sources of EMF in ferroelectric circuits. Leading scientific expert of the Russian Physical Society.