Moving To New Electricity

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Epigraphs:

A habit is given from above to us,
It is a substitute for happiness...
A.S. Pushkin

Scientist, the same age as Galileo,
was no more stupid than Galileo.
He knew the Earth was turning
But he had a family for caring.
E. Evtushenko

American physicist Benjamin Franklin in 1747, on the basis of his observations, suggested (put forward a hypothesis) that there is a certain "electrical matter" consisting of small, invisible particles**. Franklin suggested that if a body is filled with electrical matter, then it is charged positively, and if it loses electricity, it charges negatively. -** https://obrazovaka.ru/fizika/napravlenie-elektricheskogo-toka.html

Everything new one is a well forgotten old one
From the memoirs (1824) of Rosa Bertin,a personal dressmaker of the French queen Marie Antoinette

He said "Let's fly!"
Astronaut Yury Gagarin.

I. ONE-WIRE METHOD

I have a grandson - Erez. He is a smart young man, but he, like many others, believes in well-established ideas and assumptions, even if some of them have long been disproved. This reasoning pushed me to explain to him [1], and perhaps not only to him, one important misconception in the field of electricity.

Fig 1. Erez

Today there are generally accepted descriptions of the processes occurring in electrical circuits. These descriptions are based on a model in which electrons (or other charges) move inside a conductor. In some articles and textbooks it is written that electrons do not move, but they push each other, as in the well-known "domino effect".
Such explanations are dubious. Electrons are mechanical particles with a mass. They cannot move or push each other at the speed of light. However, an electrical signal travels at the speed of light.
There are a number of sources that describe the passage of an electric current with the help of an electromagnet field which propagates over the surface of a wire. These data are also given in [2].
Very briefly, we can say that today in systems for the transmission of electrical energy, a sinusoidal current is used, which is propagated by transmission lines consisting of several wires. In most cases, there are two, three or more wires.
Alternating (sinusoidal) currents are easier to generate with high-power units. However, the efficiency of the sinusoidal signal was not high. After all, the generator of a sinusoidal signal, based on a rotor rotating in a magnetic field, generates a maximum energy twice per period and twice generates energy close to zero [5].
The efficiency of alternating current was significantly increased with the introduction of a three-phase system proposed by Petersburg professor Dolivo-Dobrovolsky. In this case, not one but three windings are installed on the rotor. The generated energy has three peaks per period. However, a three-phase system requires a minimum of three wires. And wires are the most expensive things in electrical power transmission systems.
Typically, power transmission systems provide for 100% redundancy [3] for power interruption protection. It can be done in different ways. One commonly used method is to install two sets of wires left and right on each support as shown in Figure 2.

Fig 2 An example of arrangement of wires on supports during transmission by the three-phase method with 100 percent redundancy

Nevertheless, it is still stated in the literature that the three-phase method is the most effective method. One of the objectives of this article is to show that this is not the case.

First, it makes sense to remind about possible misconceptions in the theory of electrical engineering. It can often be read that in a two-wire system, the current leaves the source through one wire, passes through the load, and returns through the other wire to the source (Figure 3A). At the same time, criticizing these misconceptions, in the same textbooks it is written that active energy does not return to the source [2].

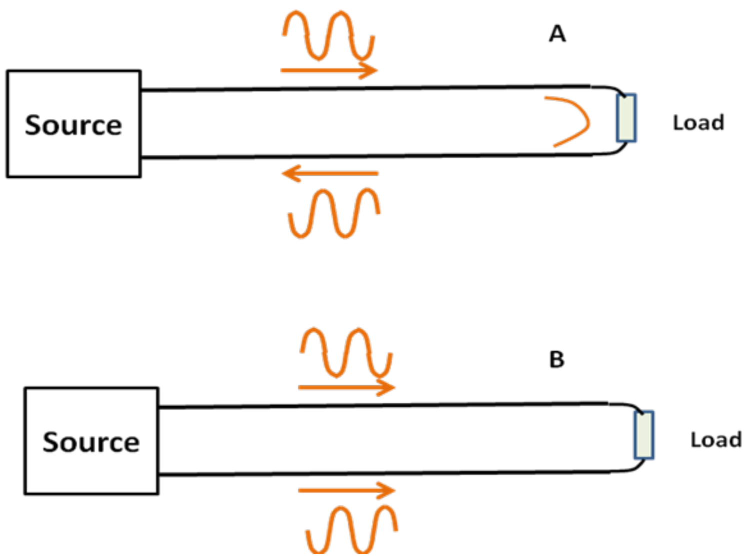

Fig 3. Possible paths of current flow from a source along a two-wire line.

Other authors have argued that it is possible to build a system using a wire and a ground. However, this is far from the truth. The resistance to an earth current is a thousand times greater than the resistance to a current of the wire. The purpose of grounding is zeroing of the potential, not replacing the electrical wire.

Below we will show that for more than 130 years we have not been building electrical systems optimally. This was understood by some before. For example, the great Tesla proposed to transmit current through one wire at a high frequency. Today such systems are called resonant systems. However, these systems have greater losses, including due to the radiation of the wires.

In 2012, a single-wire method of electricity transmission was proposed in [1] and explained in detail in [2] and in several articles. The method does not use grounding for this purpose. It has no additional losses and has great economic advantages. The sources noted in [2 3] show schematics and simulation results for single-wire systems. The diagrams show the values of the currents in the wires, which indicate the absence of losses.

The proposed single-wire system is based on a different model of a current flow from a source to a load. This model is shown in Fig. 3 B. This creates the required potential difference across the load. It will be shown below that this model allows to build all possible single-wire electrical devices and systems.

What only needed is to add a single wire transformer. The transformer allows you to take advantage of the main advantage of AC - voltage boost and voltage drop to reduce wire losses. Figure 4 shows a connection diagram of a single-wire (step-down) transformer in a simulation mode.

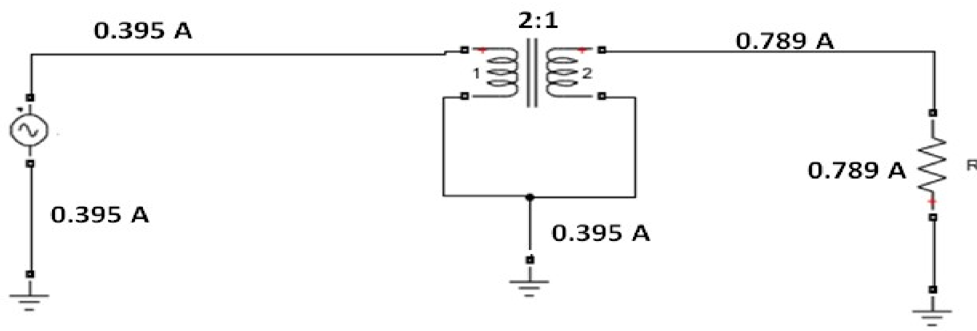

Fig 4

It should be noted that the grounding resistance is close to zero, so the current that enters the ground does not cause losses. From this simulation, it follows that the transformer does not affect the phase and power of the signal. In other words the products of the voltage value by the current value at the output and output of the transformer are equal to each other.

II. CONVERTERS

Converters 2 - 1, 3 - 1 are used to convert a two-wire or three-phase signal into a single-wire signal and vice versa. 1 - 2, 1 - 3.

Their descriptions are provided in US Patents [1] Converters allow changing the number of wires for a signal transmission without changing its power and parameters on which the transmitted information depends.

In the case of a two-wire signal (converter 2 - 1), an inverter is switched on in one of the wires [2], which changes the polarity of the signal. In this case, the signals in both wires will be identical. This means that they can be combined in one wire. That is, there will be a signal doubled in amplitude in this wire. Before the two-wire load, the wire is divided into two, and in one of them the inverter is introduced [2]. This is a converter 1 -2

In the case of a three-phase signal, the converter 3 - 1 vectorially adds the two signals and the inverted third signal is vectorially added to this sum. The resulting total signal has amplitude equal to the doubled value of the amplitude of each of their phases [6].

The reverse converter (1 - 3) performs the reverse process that is it splits the signal into three signals. One signal is inverted and the other two pass through phase-shifting circuits. Located in series resonant circuits can be used as these circuits.

Thus, the electrical system can be completely a single-wire one, as shown in Figure 5

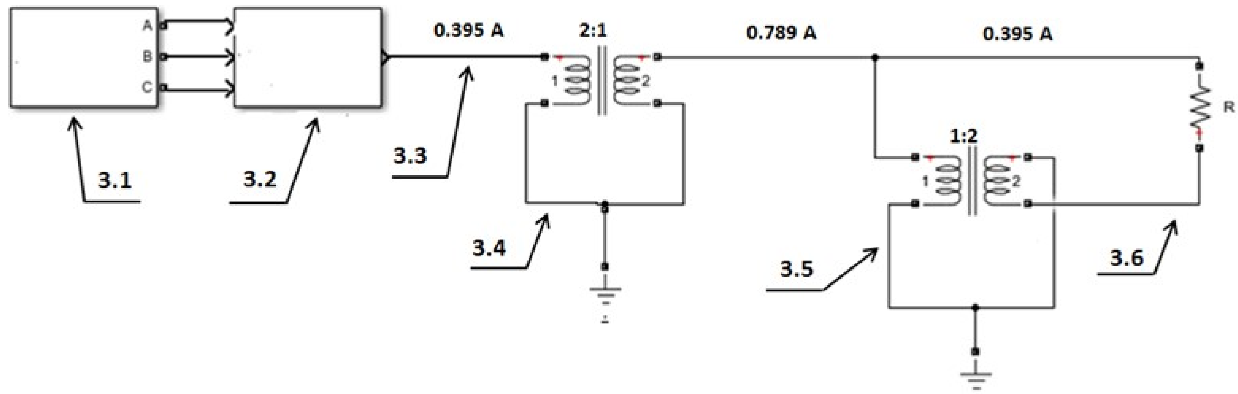

Fig 5

Рис5System 3 – 1 – 2 simulation diagram

3.1 – three-phase generator

3.2 – converter 3 – 1

3.3 – single-wire line

3.4 – transformer 2:1

3.5 – inverter

3.6 – two-wireload

In the proposed single-wire system, two docks of opposite polarity form one current, in which the direction of energy propagation is constant. However, such a process is well known.

For example it is walking. When we walk, one leg moves forward to catch on to the point where we need to get. The second leg at this time is in relation to the body moves back to push off. Then their directions change. These oppositely directed leg movements create one equal motion in the desired direction.

Another example is James Watt's steam engine. Another example is James Watt's steam engine, Figure 6

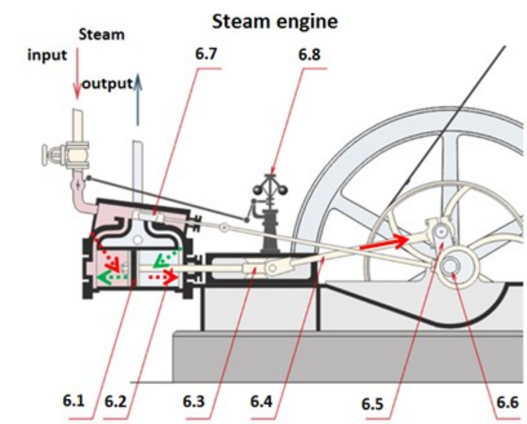

Fig 6

6.1 - piston, 6.2 - piston rod, 6.3 - slider, 6.4 - connecting rod,
6.5 - crank, 6.6 - shaft, 6.7 - sliding valve, 6.8 - centrifugal regulator
- the movement of the connecting rod
- steam counter flow with a slide valve
- return or forward movement of the piston

In this system, two streams of steam, which are directed in opposite directions, create a unidirectional movement of the wheel.

In fact, we have reached the core of dialectics, the law of the unity and struggle of opposites. Probably after describing these examples, the operation of a single-wire electrical system will not seem unexpected or strange.

But the main conclusion is not descriptions, but new possibilities for constructing a system for the transmission of electrical energy. It is shown that any system can be built as a single-wire system. When connected to a load, the converter can be turned on to obtain a signal corresponding to the load.

This method will save thousands of kilometers of expensive wires. In the case of laying a single wire not deep underground, large natural spaces will be freed up {7, 8}. The harmful influence of the electromagnetic field emitted by the wires will be excluded [9].

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