http://zaeto.ru/nuda/razmnojenie-magnitnogo-potoka--kak-nahalyavu-razmnojate-pereme/main.html

Magnetic flux multiplication

(how to multiply free then variable magnetic fields)

= FM =

Consider ring core transformers - ..... they are easier to draw.

All windings will be considered identical in the number of turns and the type of wire, unless it is specifically stated,

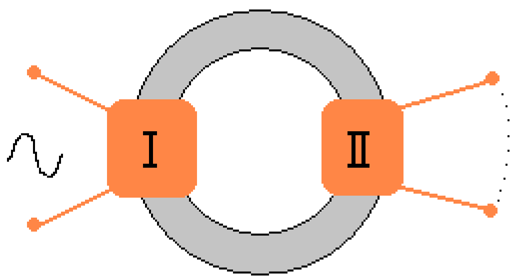
The input AC source will be considered sufficiently powerful and low-impedance, so as not to pay attention to it.

I try to describe the idea itself and where its legs grow from, I will try as simple as possible.

The first few options are trivial, but they are needed to show on which elements the final design is assembled, as often the formation of thought is more interesting than a discussion of the final result and subsequent explanations ..

Option 1

Conventional transformer on 1 ring core

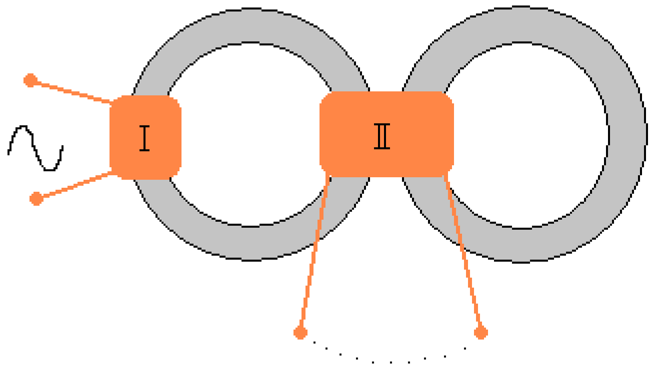


We supply the input alternating current to the winding I, we remove the same current from the winding II, but if the winding II is shortened, the input current in the winding I will sharply increase, since the inductance I decreases and the inductance of the input alternating current decreases. This is a well-known fact, who does not believe, can short the secondary winding of a mains transformer when it is energized and hear a humming sound and smell the effects of an increase in input current.

Option 2

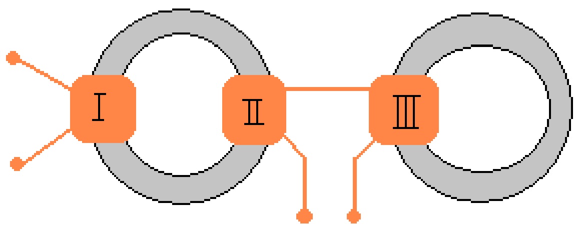
It differs from the usual

that an additional core of the same cross section as the main one is introduced into the secondary winding



We supply input alternating current to winding I, remove voltage from winding II as in the first case, but shorting winding II no **longer leads!** to an increase in current in the winding I, since the inductance of the primary winding not only does not decrease, but also slightly increases, by connecting an additional core to the common bundle. In this embodiment, the current can be removed from the secondary winding, but it does not exceed the idle current (considering the resistance at a given frequency) in the primary winding, that is, the primary winding completely determines the power that is transmitted through such a transformer.

A possible equivalent of the previous design - the central winding is divided into two independent inductances, so it is more convenient for calculating the turns



What does this give us?

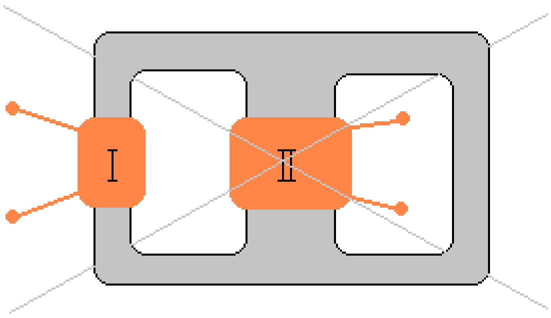
1 The output winding has almost no effect on the primary one, therefore entering into the resonance the primary winding and creating even a high current specified in it, the load on the secondary one will not spoil the resonance in the primary one.

2 If shorting the winding II, then this short circuit forms a mirror for the magnetic field. That is, striving to keep itself from changing the magnetic flux through its cross section by its ring current — it creates a reverse magnetic flux in the second core than in the first core — thereby trying to keep (in total) its magnetic flux unchanged.

3 We managed to create **an additional** magnetic flux, with almost no energy. We remove energy from the secondary coil, and the more we remove, the more precisely the magnetic flux is duplicated in the secondary core.

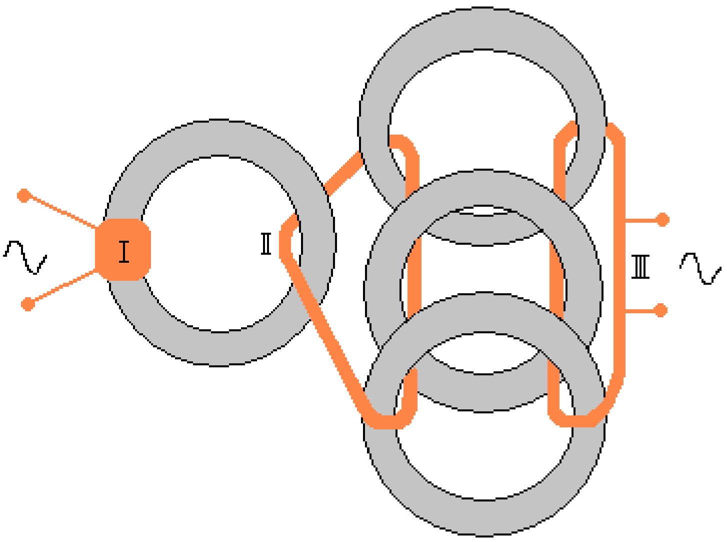
4 Separately, it is worth noting that the use of a “W” -type core is not equivalent to this design, since in the proposed construction it is important that the magnetic field is created **only** by means **of** coil II **currents** and the cores must not have magnetic engagement between them.

An example of a variant that **does not fit** ! for the proposed idea.



Option 3

Unlike the previous one, not one core was inserted into the secondary winding, but several



Here, winding II is shorted (no taps are shown in the figure), which leads to the fact that inside the secondary winding the sum of variable magnetic fields tends to zero, that is, the magnetic field of the primary coil is mirrored onto three cores in the opposite direction - that is, in the three right cores (in total, the ac variable field must correspond to the magnetic in the first (left) core. Or on the other - the magnetic field (alternating) from the winding I is divided into 3 cores equally.

If an alternating current is applied to the III winding, then in the II winding everything happens the opposite - the sum of the magnetic fields from the right three cores is mirrored through the current of the winding II to the magnetic core left in the figure, and on the left core there will be an alternating magnetic field (of the opposite sign), but the magnitude will correspond to the sum of the magnetic fields from the three right. There is only one trouble, the phases differ a bit on all three cores.

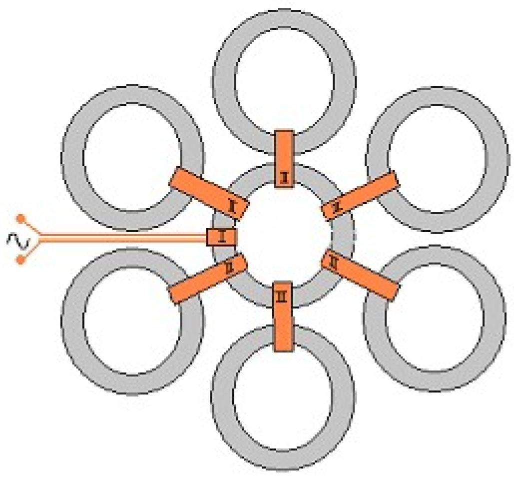
We note that in this embodiment, the alternating magnetic field in one direction (left-to-right) is divided into separate streams (in winding II) or collected from separate cores into one (in winding II) when it is turned back on (right-to-left).

Option 4

Returning to option 2, we draw its modification,

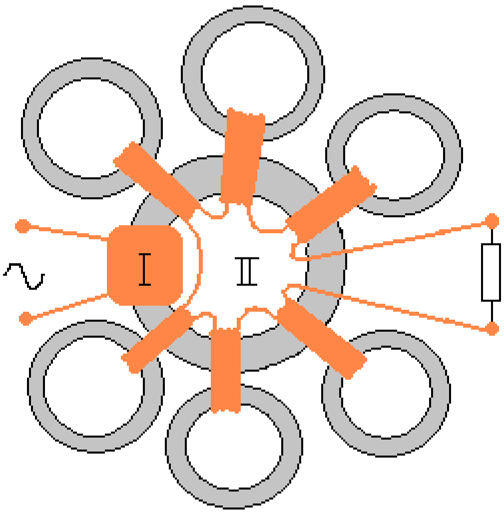
Moreover, windings II are independent and all are short-circuited.

(Doesn't Hubbard-Cutter remind a bit already?)



When an alternating current is applied to winding I, each winding II mirrors an alternating magnetic field into each core located circumferentially, and each core will have almost the same magnetic flux (alternating) as in the central one, which is easy to check by loading any peripheral core coil, but since they are all connected, loading one - we extinguish in all through a common bundle (but with a phase delay !!).

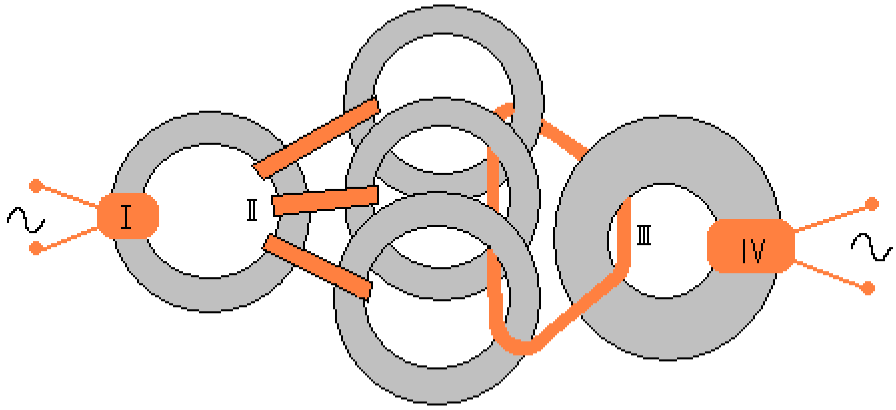
Another note is that it is possible to get energy from each winding II in the amount of idling of the input winding I on the central core, because the winding II cannot affect the winding I, that is, the input signal even in the shorted state. But combining the load as shown in the figure is not entirely correct, since each secondary housing will have some phase shift relative to each other, but it will work in principle.



Option 5

Deserving more attentive research

Based on the previous options - the logic of functioning of separate sections should already be clear



Consider successively the steps of his work:

An alternating current is fed to input I - it creates an alternating magnetic flux in the first core, say, a force of one unit, then through three identical shorted coils labeled II, the magnetic flux is mirrored (duplicated !!!) onto three central cores (they can be more). Then, these three variable magnetic fluxes are combined and mirrored with a short-circuited coil III on the third core (thick) - as a result, already **tripled is** circulating through the coil IV **!** variable magnetic flux. Moreover, the last ring of the core is not necessary, but it creates a visual representation of where and how excess energy is collected.

For control, we will check the development of the process in the opposite direction - from winding IV to winding I.

We supply an alternating current to IV winding, as a result a magnetic flux of one unit circulates in the right-hand (thick) magnetic core. Through a closed-loop winding III, the magnetic flux is mirrored to three magnetic cores simultaneously, that is, it will be divided into three approximately equal flows - that is, there will be a one-third magnetic flux in each central core !! from the input. Through windings II, each individually the magnetic flux from the central core will be balanced by one of the same flux in the left core. That is, the central rings of the cores should have the same magnetic flux with the left core of the pattern, so that each of the short-circuited coils II would be approximately zero alternating magnetic flux, that is, the same in different directions.). In other words, after the coil II in the left core there will be the same mag. Flow as in each individually central core.

In this design, the alternating magnetic flux force increases from left to right, therefore probably the energy also increases (I wonder where it comes from?), And right and left - the alternating magnetic flux decreases, hence the energy should probably decrease. (I wonder where it goes?) but the influence of the output VI winding on I also increases, although an extra delay phase runs through. As a result, in this embodiment, the load still affects the primary, but it was possible to check the passage of energy in both directions (in fact, this design works as a simple transformer, only with a greater phase delay)

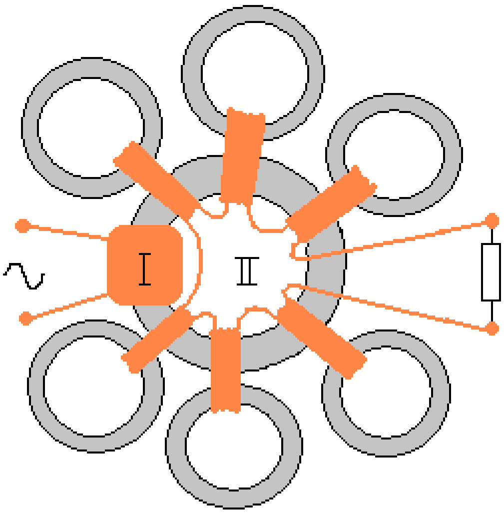
But if the short-circuited windings are short-circuited in different mements of time, then one can achieve that the energy is transferred only in one right direction. Input winding -> multiplication of the magnetic field on several cores -> assembly from several cores in one with a large current -> current supply in the desired phase back to the input winding.

Conclusion: when the magnetic fluxes multiply, the energy of the system increases, and when the magnetic flux merges into one magnetic flux, the energy only transforms, but does not decrease (without taking into account minor losses)

Conclusion: in order to get an energy gain, as an option, after multiplying the magnetic flux into separate daughter magnetic circuits, it is necessary to isolate these cores from the parent core, and have time to do this before the magnetic flux in the entire system has decreased, and only then remove energy from the subsidiaries magnetic cores (like flyback).

An example with a doubling of the magnetic field and without affecting the input (the central ring balances the output)

This scheme is the same as the previous one, but the load is connected to the break of the third winding.

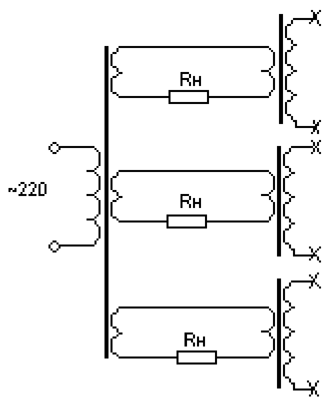


In transformers, motors or generators, output windings may have, in addition to a common magnetic circuit, but also their own separate magnetic circuits for each winding.

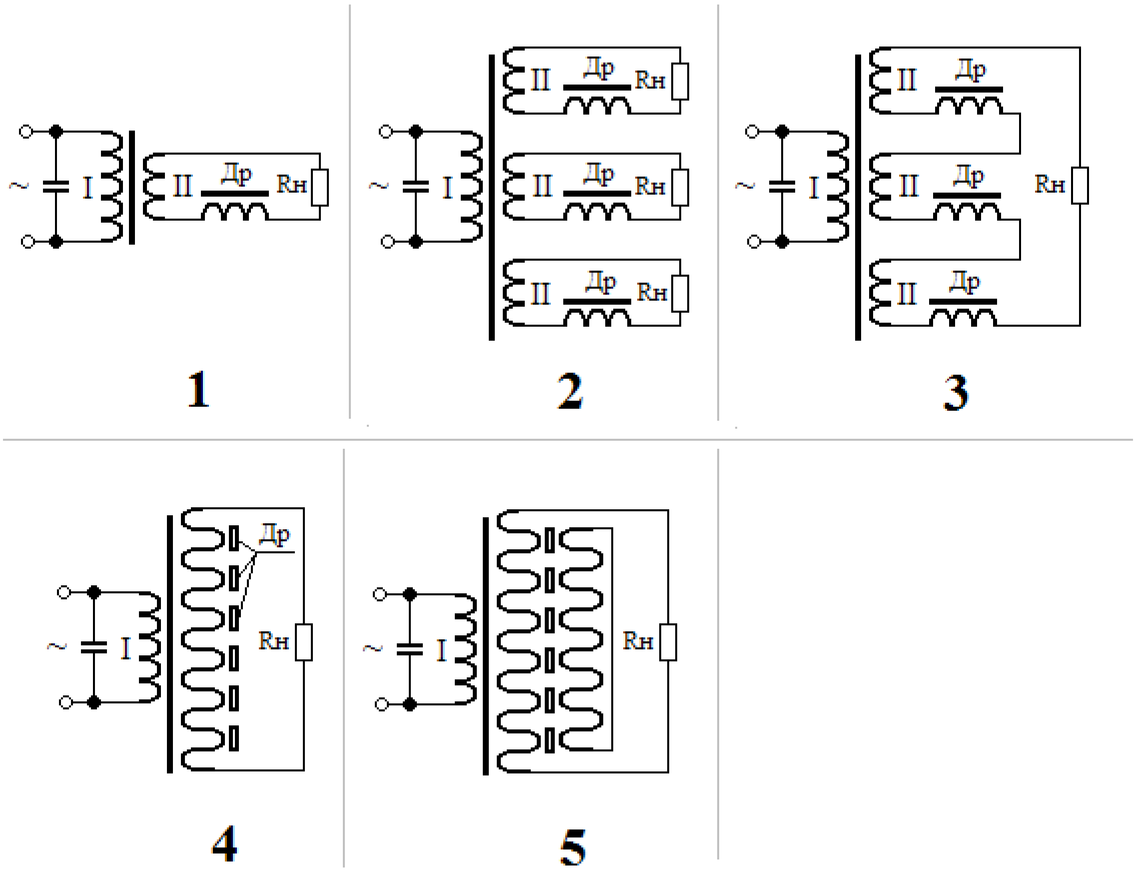
In other words, but the same thing: after each loaded winding of any devices in series with the load, it is desirable to put on the choke with the same inductance as the loaded winding.

Two identical ferrite rings, connected by short-circuited winding, are essentially two identical inductances connected in series.

Unusual inclusion of identical transformers:



=Fema=



The figure suggests a chain of transformer circuit changes, with a non-loading load.

All chokes have the same inductance as the secondary winding of the transformer to which it is connected.

Let all windings on transformers be with one number of turns.

1 circuit - will create the same current on the load resistor as in the primary winding, and the short circuit will have almost no effect on the input current in the transformer, due to the fact that the choke ensures the correct phasing of the current in the load.

2 scheme - will create on each load resistor the same current as in the input winding and short circuit of any load resistor will practically not affect the current of the input winding of the transformer.

3 scheme - unification of voltages from independent windings, but since the current in each of them practically does not affect the input winding, then as a result the output voltage will be tripled, but with a current almost as in the primary winding.

4 scheme - since the more there will be separate secondary windings, the more power gain is expected, therefore the limiting case will be when you need to plant your choke on each turn when winding the secondary winding. For example, when winding the secondary winding of a transformer, it is necessary, if possible, to fit each of the coils of the magnetic circuit on each turn (just take into account that the inductances of the coil and the choke are equal, otherwise there will

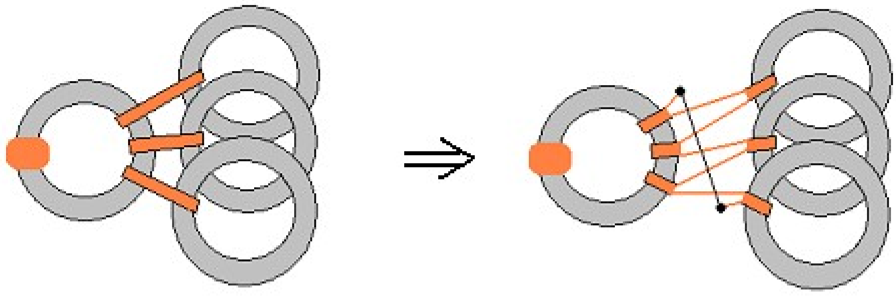
be a loss of energy). But practically you need to organize the maximum number of sections in the secondary winding and connect them through the same chokes.

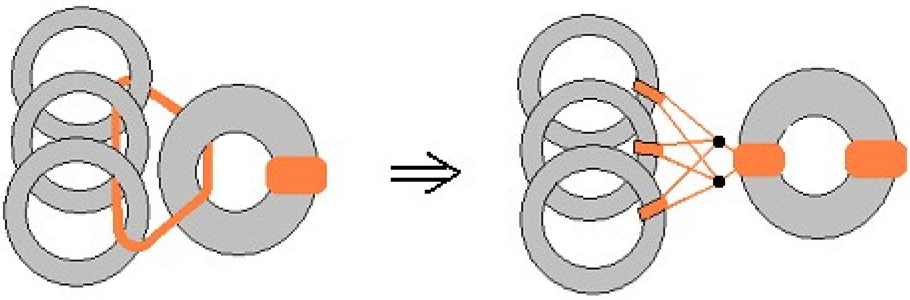
5 scheme - additional through-winding is introduced through all chokes (now transformers), the current of which allows to equalize all the effects of the inductance parameters of chokes when they are manufactured, since it is really impossible to accurately select inductances and there will be some variations in their characteristics.

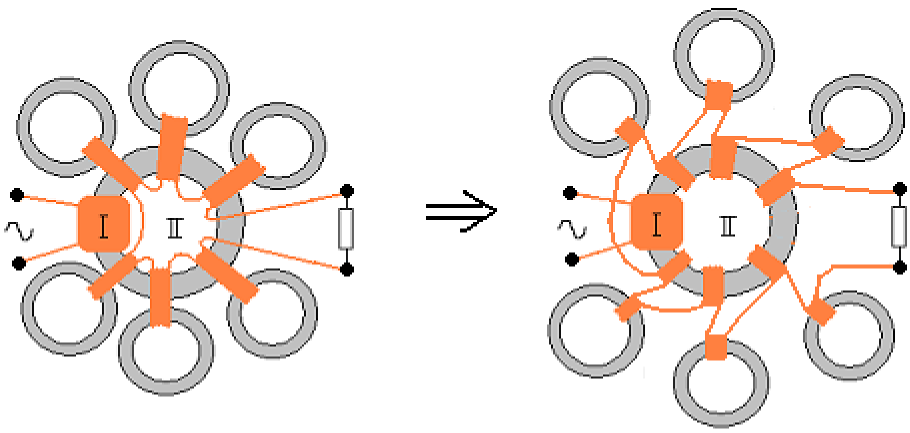
The secondary winding of this design will be very late with its response to a change in the magnetic flux in the core, and when selecting a frequency, it may coincide in phase with the next period.

Variants of Adequate Electrical Conversion

(can be used for the convenience of arranging elements)







The secret of the transformer Hubbard-Cater

Alternatively, an additional (subsidiary) magnetic core can be made in the form of a ferromagnetic layer near the conductor of the winding layer, as is done in Habbard and Cater transformers. But in this case, the magnetic permeability of the ferromagnetic layer is less than the permeability of the main core, therefore it will be worse to work than individual magnetic cores, but it is more technological in manufacturing "on the knee". The magnetic flux must be brought outside *(the main thing is that it would not be located along the secondary winding),* or if you try to create a magnetic flux of the internal coil - then all the magnetic lines of simple closed through the first yoke of the first layers of the secondary, and the output will be almost powerfully ty. The absence of a layer of magnetic conductor in the outer layer of the secondary winding can be explained by the fact that it prevents the introduction of a magnetic field from external coils *(otherwise many magnetic lines from external coils simply short out through this layer).* Moreover, the magneto insulator layer with a magnetic core layer in front of the first secondary winding layer is not necessary (*although desirable*), since the central core itself consists of a set of insulated iron rods, the closest of which to the first winding layer can perform the role of the first daughter magnetic core.