→ The author's website that includes video clips, complete instructions, and other related lifter information.

Jean-Louis Naudin's "Lifter Experiments Website"
→http://jnaudin.free.fr
→ A very in-depth website containing video clips, complete instructions,

World-Wide Lifter Replications
→ http://jnaudin.free.fr/html/lftwrld.htm
→ An overview with photos and video from many of the independent inventors who have replicated the lifter experiments.

Transdimensional Technologies, Inc
→http://www.tdimension.com
→ The home page for Transdimensional Technologies, the developers of the lifter design.

Blaze Labs (Saviour's Research Website)
→http://bel.150m.com
→An excellent site on research into lifter enhancements, radiation testing, sealed devices, power supplies, and other topics relating to lifter technology.

Lifter Builders Group
→ http://groups.yahoo.com/group/Lifters
→ An email group for the exchange of research findings for those interested in building lifters or staying current on the state of the technology.

NASA Patent #6,317,310
→ The NASA patent regarding obtaining thrust from an asymmetrical two-dimensional capacitor, grant Nov 13, 2001.

Research on the Capacitance Converter of Environmental Heat to Electric Power

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Nickolay E. Zaev works on creation of the prototypes of converter energy, which do not require any fuel. The direct conversion of environmental heat to electric power is possible in the processes of "charge-discharge" in non-linear condensers or by means of "magnetization-demagnetization" of ferrites. Such converters of energy create cold and electric power without any fuel.

Theory of the converter, results of early experiments on the generation of microwatt power, methods and features of research are given in this article. The methods of generation of a few watts power are described in details. The possibilities and difficulties of creation of powerful capacitance converters are discussed in this article.

I. Grounds of research.

1.1. From positions of orthodox physics there is no subject of research. It is evident that the energy of charging (C) A_c condenser C_x is always equal or more than the energy of discharging (D) A_d, i. e. always $A_c \geq A_d$. Only the advanced analysis shows that it is not always true. Exactly, in C_x, where $\frac{\partial C}{\partial V} < 0$ an inequality $A_d > A_c$ is possible, and in C_x, where $\frac{\partial C}{\partial V} < 1$, then the work $A_c > A_d$. Therefore we should discuss the nonlinear capacitors (NC). In the end of 1969 I noticed a systematic inequality $A_d > A_c$ during the measurement of A_c and A_d of many capacitors with different dielectrics. Theoretical grounds and results of measurements of this phenomenon are given in the publications in 1984 [1], [2, page 73]. On the industrial standards NC (varicond), ceramic condensers VK2-ZSH, $4 \cdot 6{,}8 \cdot 10^{-9}$μF with an optimal voltage about 95 V it was stated that $\frac{A_d}{A_c} \sim 1{,}21$ with the power to about $98 \cdot 10^{-6}$ Wt and "generated" extra power is equal to $21 \cdot 10^{-6}$ Wt.

1.2. In [1] and [2] the strict theoretical proofs of realization of $A_d > A_c$ (there are four of them) are given. On 1m³ of dielectric $|A_d| - |A_c| = -\frac{1}{2} a \cdot \varepsilon_0 \cdot E_c{}^3$ (E_c is an intensity of the field, V/m; ε_0 is a dielectric constant of vacuum, a is a coefficient of nonlinearity of the capacitor). Below we state one more proof more connected with the parameters of circuit.

It is well known that with the charge of a linear capacity from the source of constant voltage V_0=const through the resistor R=const it gets an energy $A_c = \frac{C \cdot V_0{}^2}{2}$ exactly equal to the output energy in the time of charging t_c. The output energy irradiated from the load R is a Joule heat $\Theta = R \cdot \int_0^{t_c} i^2 \cdot dt$ [3, page 546]. If NC (nonlinear condenser) is charged, then there are no proofs of such equation. The NC are the variconds or other capacitors, which have $\frac{\partial C}{\partial V} > 0$ in the interval $V = 0 \div V_k$. For the variconds V_k is some voltage, which corresponds to the maximum C_v. If $V > V_k$, then $\frac{\partial C}{\partial V} < 0$. For some other capacitors V_k is a voltage breakdown.

For further consideration let's believe that in the operating area of the given sample of varicond a function

$C_e=C_0(V_c)$ is linear, i.e. if C_0 is a nominal capacity (with $V_0 \cong 0$), then effective

$$C_v=C_0+a\cdot V_c \quad (1)$$

and $V_c=V_0-i\cdot R$ and $dV_c=-R\cdot di$ [4, page 30,33]. In any moment $dQ=R\cdot i^2\cdot dt$, and in varicond

$$\begin{aligned} dA &= \frac{1}{2} d\left[(C_0+aV_C)V_C^2\right] = \frac{1}{2} d\left[C_0V_C^2 + aV_{Cc}^3\right] = \\ &= C_0 \cdot V_C dV_C + \frac{3}{2} aV_C^2 dV_C = \left(C_0 + \frac{3}{2} aV_C\right) \cdot V_C \cdot dV_C \end{aligned} \quad (2)$$

With the charging of NC because of $dV_c=-R\cdot di$, i.e. $i\cdot dV_c=-R\cdot i\cdot di$ it is clear that power of R and C_v are equal in any moment with V_0=const. That's why the integrals due to the process "C" will be equal. With "D" it is indisputable, all energy of NC will radiate from load R. Thus, in NC like in LC (linear condenser) the energy of charging is equal to joule energy on R.

More significant is the feature of energy of NC. With the charging the voltage on it:

$$V_C = \left[V_0 - (Ri + dV_C + dV_C)\right] = \left[V_0 - R(i-di)\right]$$

It is constantly lower than in the case with LC, when it is equal to $V_0-i\cdot R$ due to the formation of additional (virtual) capacity $dC=a\cdot dV_c$, which call the additional current ***di*** in the moment ***dt***. The reason of ***dC*** is the features of molecular structure of dielectric. Namely it is ferroelectric. After the charging is finished $V_c=V_0$ and capacity of NC, $C_{v_0} = C_0 + aV_0$. A corresponding energy

$$A_c = \frac{1}{2} C_{v_0} \cdot V_0^2 \quad (3)$$

It is justified to consider it consists of two parts:

nominal $\quad {}_N A_c = \frac{1}{2} C_0 V_0^2$

and virtual

$${}_V A_c = \frac{1}{2} a \cdot V_0^3 \quad (4)$$

With discharging of this NC, if $C_{v_0} = const$, the energy of discharging A_d could be equal to the energy of charging A_c. But with the charging the virtual capacity decreases. ${}_N A_c = {}_N A_d$, but the virtual capacity gives the energy in a different way:

$$dA_V = \frac{1}{2} d\left(aV_0 \cdot V_0^2\right) = \left[aV_0\right] \cdot V \cdot dV + \frac{1}{2} V^2 d\left[aV\right] \quad (5)$$

While integrating we get:

$${}_d A_V = \frac{1}{2} aV_0^3 + \frac{1}{6} aV_0^3 = \frac{2}{3} aV_0^3 \quad (6)$$

i.e. on $\frac{1}{3}$ more than the energy, which was in the virtual capacity at the moment the charging began. Energy is taken from free (heat) energy of ferroelectric. B.B. Golizin showed the possibility of such mutual conversion in dielectrics in 1893 [5]. It is a pity, that there are no mentioning of this basic article by B.B. Golizin in any works on thermodynamics of dielectrics. Modern monographs [6] are overload by formal ratios, which are difficult to check by experiment. They do not give any foundations for the formula (5) or (6). Some of initial formulas are do not proved by the measurements [7]. ***According to Golizin formulas (5) and (6) are natural.***

Let's determine efficiency factor of the cycle "C-D" in NC with the given $a\cdot V_0$:

$$\eta = \frac{A_D}{A_C} = \frac{\frac{1}{2} C_0 V_0^2 + \frac{2}{3} aV_0^3}{\frac{1}{2}(C_0 + aV_0)V_0^2} = \frac{C_0 + 1{,}3333a \cdot V_0}{(C_0 + aV_0)} \quad (7)$$

Table 1

$a\cdot V_0$	1	2	3	5	7	9	20
η	1,1665	1,2222	1,24975	1,2775	1,2914	1,1997	1,31714

Thus, η is weakly depends on $a\cdot V_0$ and according to (7) hardly will exceed 1,4. The first experiments by the author show the same [1]. The further experimental research on cycles "C-D" on variconds can specify the level of efficiency factor (7). The case is, that instead of $a\cdot V_0$, $a\cdot V_0^n$ can appear with n>1.

If we purposely use the feature of discharge of virtual capacity of variconds (or another capacity in the interval of presence of $\frac{\partial C}{\partial V} > 0$ in it), we can create a generator of electric energy (converter of the environmental heat) with the power of

$$W = \frac{1}{3} a \cdot V_0^3 \cdot f \quad (8)$$

if ***f*** is the frequency of cycles "C-D".

For this purpose we should provide a return of energy A_d to the repetitive charging, to select only new energy $\frac{1}{3} a \cdot V_0^3$ on the stage "D" by the scheme solutions. At the same time we should eliminate the loss of energy to the Joule heat on R according to (8) by introduction of inductance L to give a form $V_0\cdot\sin\omega t$ to the charge voltage $V_c(t)$ in the interval $0-\frac{\pi}{2}$ during t about $10RC_v$.

This generator is a converter, transformer, and concentrator of the heat environmental energy. It is because during its work dielectric refrigerates, absorbs energy from medium. For example, if C_0 is about 220mF, aV_0 is about $10C_0$, R is about 2 Ohm, V_0 is about 100V. Then $a=2\cdot10^{-5}B^{-1}\cdot F$, RC_{v0} is about $4\cdot10^{-3}$sec., t is about $4\cdot10^{-2}$ sec., f is about 25 Hz (do not taking into account the losses):

$$W=\frac{1}{3}\cdot2\cdot10^{-5}\cdot10^{6}\cdot25\cong166\ \text{Wt}$$

It is obvious that dielectric due heat-insulated can become a "source" of cold. Realization of this converter (generator of energy from nothing) or refrigerator is not more that an engineering task, which can be solved by usual routine methods.

A notice by authors [9] on the page 501 is very interesting. Discussing the oscillation circuit with NC by $U_c(q)=aq+bq^3$ (q ia a charge) and following its solution according Puancare they came to a conclusion about the unlimited increase of amplitude in this circuit (in full accordance to our views). This conclusion was considered to be a mistaken one. They didn't see any physical ground of the required flow of energy to the circuit.

A bad joke played the law of conservation: they didn't take into account the flow of the heat energy from outside to NC, possibility of its conversion studied by us. Jokes of history do not end on this fact. In 1920-1930-s I.V. Kurchatov studied the Rochelle salt, which is a classic dielectric [13]. It was stated (p. 290) that maximum of dielectric permetivity $\varepsilon=\frac{Q}{E}$ (Q is the charge, E is intensity of the field, V/cm) with the thickness of 4 mm is achieved with 2V/cm, ε=4000; with $E_{max}>2$ V/cm a quick decrease occurs and with E<2 V/cm ε grows from 1300.

Exactly this area $E<E_{max}$ is interesting for us, because it is less studied in the aspect of energy. Only Andersen pointed that in this area $Q=C\cdot V^2$ (page 287), determining Q by ballistic galvanometer (only this but not energy). It is an area of spontaneous polarization. It was stated (page 301), that ΔQ (deviation from linearity) is almost liner dependent from E^3 (as in [1] and [2]). With $E_{max}=30$ V/cm, $e^2=\frac{dQ}{dE}\sim190\cdot10^3$. With the growth $E>E_{max}$ it is quickly decreases (thickness of 7,2 cm, i.e. V~216 V).

It is mentioned that with the thickness of 6 cm and charging V=70V (E=11,6 V/cm), discharging goes faster then the charging; with V=270V this process goes in opposite direction. It is understandable, because E=45 V/cm, i.e. more than E_{max}=30V/cm.

This circumstance was the evidence of the fact that $A_d>A_c$. This all tells us about a loss of chance yet in 1930-s to state a phenomenon $A_d>A_c$ in NC in the area $\frac{\partial\varepsilon}{\partial E}>0$ and it was made exactly due to the conviction in impossibility, inadmissibility of $A_d>A_c$.

II. Objects and methods of research

Variconds were the objects of research. Variconds and other condensers, in which the non-linearity could be found were described in [4] in details,. Some of them are given in [1], which have a significant non-linearity. But now variconds are beyond competition. As numerous experiments showed the main difficulty of sure realization of NC converters on especially powerful ones, i.e. having the practical meaning, is commutation. Namely it is connection of C_x with C_δ ("C") and connection of C_x with the load "D". On the Fig.1 there is a scheme of demonstrational unit, which illustrates the fact that $A_d>A_c$.

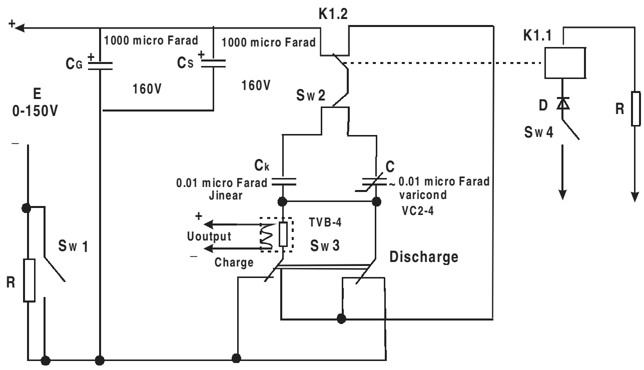

Fig1

Demo scheme of the separate measurement. The energy of charge and discharge in the common (linear) condenser and nonlinear (varicond) are measured.

Due to its very low power there is no problem of commutation. Relay RS-22 with the supply frequency of 50Hz provides 50 cycles "C-D" in 1 second. Increase of power by increase of capacity of C_x immediately changed the results. They became dependent from that on what pair of contacts provided the processes of "C" and "D". We tried few types of relay, their parallel switching on, change of frequency and all was in vain. It was clear that the problem is the processes in the contacts during connection and disconnection determined by the density of current and speed of "C" and "D". Then we tried to work with commutation by means of unipolar transistors. On the Fig. 2 the scheme of power analogous switcher on the unipolar transistors is shown (developed and made by Yu. S. Spiridonov).

Work with it showed that the switcher is asymmetrical. Some times it does not close "C" or do not conduct "D" to the end. A long operational development required, which was interrupted by external circumstances.

That's why we appealed to the classic collector, which serves to electrical engineering for more than 150 years. On the Fig. 3 the scheme of a measuring instrument for "C" and "D" with the commutation on the collector is shown.

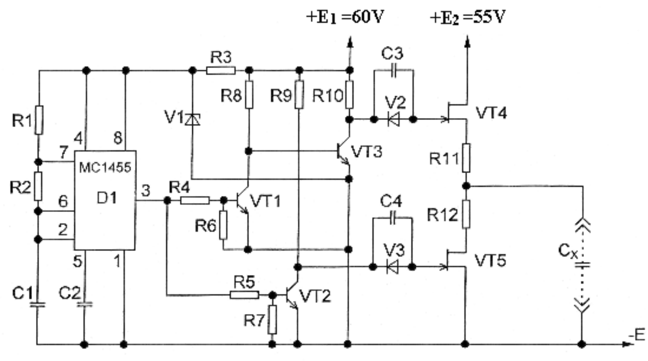

Fig2

Scheme of the power analogues switcher for the varicond converter. R_1=10 kOhm, R_2=100 kOhm, C_1=0,15 micro F, C_2=0,01 micro F, V_1: D824A, R_3=1,1 kOhm, 2 Wt, R_4=1 kOhm, R_5=1 Ohm, R_6=300 Ohm, R_7=300 Ohm C_x=0,5 micro F Varicond VC2-4

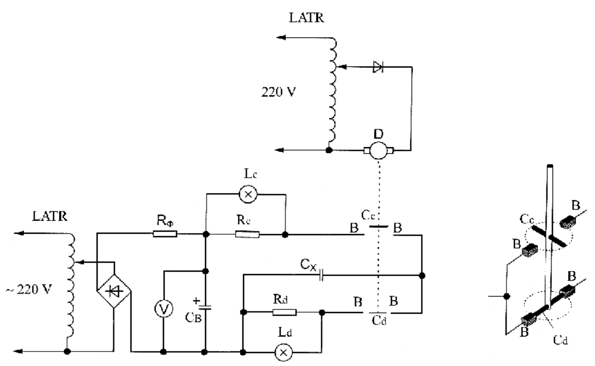

Fig 3

Scheme of measurement of the power W of charge and discharge of the condenser C_x:C_x are the variconds (nonlinear condensers) 0,5-3,5 micro F C_x are the common (linear) condensers for the control of W_c=W_d C_c, C_d, are the collectors of charge and discharge on the same axis; D is the motor; B are the brushes; L_c; L_d are the filament lamps R_c, L_d are the resistors in the circuit of charge and discharge; C_B is a buffer condenser~500 C_x

These are two collectors from the tank generator put on the common axle. There are 27 lamellas on each of them. The conductor connects 4 and 5 lamellas diagonally, in the neighboring lamellas these wires are perpendicular to each other. On 1 lamella there are $\frac{2\pi}{27}$ radians. The width of brush is 1 lamella. If the angular speed $\omega = 2\pi \cdot n$ rps, then the contact lasts for $t = \left(\frac{2\pi(3+1)}{27}\right) / 2\pi \cdot n = \frac{0{,}148}{n}$ sec. On this faultless commutator we also found that the results of change of energy A_d and A_c depend on the situation that "C" and "D" are situated on the left or in the right side of the commutator. In other words, the change in places of "C" and "D" on the commutator leads to some changes in results. Theory and practice of use of collectors given in [10], [11], [12] proved the results of work with our commutator. Taking into account the information from these sources it was decided to increase the speed of rotation to sharply decrease duration of the arc during the disconnection. And it improved the situation: change of collectors do not influence the results of measurements of A_d and A_c, but condition of surfaces of the contact began to influence the results. However, due to the perspective of producing of more powerful varicond converter, mechanical commutators should be changed on electronic ones, on the unipolar transistors or controlled transistors. They are noiseless, have big resource, small size and weight. Mechanical commutator is noisy and requires a lot of energy on the drive. It is heavy and requires maintenance (change of brushes, librication of bearings, turning of collectors, etc.).

On the Fig. 4 a general view of dependencies E(V) and η(V) are shown.

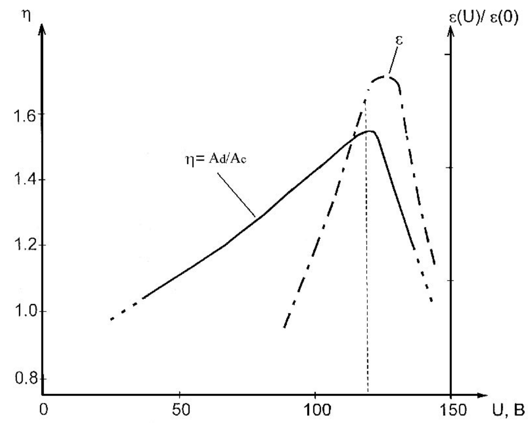

Fig 4

III. Research Results

Since the expected $\eta = \frac{A_d}{A_c} \sim 1{,}3$, we immediately have a problem to get a reliable measurement of A_d and A_c. The scheme on the Fig. 3 is one of the applied ones. This scheme was tested as a demonstrational on with the power of ~0,5~1 Watt. Is was supposed that the lamps (having the size like the lams for a pocket torch) L_d and L_c will have a different light. L_d will have more bright light with R_c=R_d. An experiment proved it only with a weak light and low power

(~ $W_c = \frac{3{,}5 \cdot 10^{-6} \cdot 70^2}{2} \cdot 50 \sim 0{,}4$ J/sec~0,4 Watt).

Then we switched on the thermoelectric converters TVB-9 instead of lamps. It appeared that A_d were different (like A_c) if to turn K_d from one brush to another one (the same was with K_c). Further we changed the scheme. We deleted R_d and R_c and connected a varicond C_x in series with R_x on the "common" wire. Thus we excluded an assumption about the possible inequality of R_c and R_d as the causes of inequality of A_c and A_d. Nevertheless, the inequality of resistance in "C" and "D" circuits remained due to the unavoidable inequality of resistance "lamella-brush" on that collector and another one. That's why we applied an averaging method.

Method of analysis of efficiency factor: η:

a) if "C" and "D" were made though the common resistor, then the voltage drop on it $V_R = R \cdot \tilde{I}$, $\tilde{I}$ is an average current for the time "C" or "D". Then the power "C" or "D" is equal to $W_c = \tilde{I}_c^2 \cdot R$, $W_d = \tilde{I}_d^2 \cdot R{=}_R V_c \cdot I_c = \frac{V_c^2}{R}$, and that's why

$$\eta = \frac{V_d^2}{V_c^2} \qquad (9)$$

b) if "C" and "D" are made though TVB (thermoelectric converter), then their power is proportional to electromotive force of thermopair TVB. $V_T=\beta(T_{hot}-T_{cold})\cdot I^2\cdot T_{hot}$ is evidently proportional (coefficient β) to the square of current strength on the fixed R of the heater. But $\eta = \frac{V_d^2}{V_c^2}$ and $\tilde{I} = k \cdot \sqrt{V_T}$, i.e. $W=V_T \cdot K^2 \cdot R_{heater}$. That's why

$$\eta = \frac{{}_dV_T}{{}_cV_T} \qquad (10)$$

c) perfectly strict measurements of energy of the act "C" or "D": multiplication $I_i \cdot V_i$ in the interval Δt. Then the energy of "C" or "D"

$$A = \sum_{i=n}^{i=1} I_i \cdot V_i \cdot \Delta t \qquad (11)$$

This method using the oscillograph with the memory is very laborious even with $t_c=20\Delta t$.

III.1. Experiment of April, 9, 1997. C_x=5,29 μF, VC2-B, nominal; R_x=2,5 Ohm. LATR (Laboratory Transformer output voltage) is equal to 100 V. $V_{C_\delta} = 97$ V, C_δ=4700 μF, electrolytic, n~6 rpm, 12 Hz.

"C" to the left	TVB-9 #127	20mV
"D" to the right	TVB-9 #127	27mV
"C" to the right	TVB-9 #127	20 mV
"D" to the left	TVB-9 #127	24 mV

D_{av}=25mV, C_{av}=20 mV, η=1,25.

III.2. The same as III.1, but LATR output voltage is equal to 120 V, $V_{C_\delta} = 85V$.

D_{av}=25mV, C_{av}=21mV, η=1,19.

III.3. The same as III.1, but LATR output voltage is equal to 102 V, $V_{C_\delta} = 103$ V.

"D" to the left	TVB-9 #127	25mV
"C" to the right	TVB-9 #127	20mV
"D" to the right	TVB-9 #127	28 mV
"C" to the left	TVB-9 #127	23 mV

D_{av}=26,5 mV, C_{av}=21,5 mV, η=1,23.

III.4. The same as III.1, but LATR output voltage is equal to 100V, R_x=5,1 Ohm, $V_{C_\delta} = 98$ V.

"D" to the left	TVB-9 #127	22mV
"C" to the right	TVB-9 #127	19mV
"D" to the right	TVB-9 #127	26,4mV
"C" to the left	TVB-9 #127	17 mV

D_{av}=4,2 mV, C_{av}=18 mV, η=1,344.

III.5. The same as III.4, but R_x=10 Ohm.
D_{av}=25 mV, C_{av}=19 mV, η=1,31.

It follows from 1-5 that for optimum $V_{C\delta}$ and R_x=5,1 Ohm, we can provide η~1,35 , that corresponds to our theory (7).

III.6. Experiment of May, 24, 1997.

Variconds VC2, nominal is 6μF. Changes in "D" and "C" of the "stack" TVB in series C by thermoelectromotive, parallel by hermoheaters so, that R_{heat} total ~0,2 Ohm, LATR output voltage is equal to 170 V, n~50 rpm, 100 Hz.

V_{c_δ}	60	75	80
$_{II}D_{left}$, mV	11,4	18	25
$_IC_{right}$, mV	8	12	25
D_{right}, mV	9	13,6	21,6
C_{left}, mV	10	13,6	21
D_{av}, mV	10,2	15,8	23,3
C_{av}, mV	9	12,8	19
η	1,13	1,16	1,23

III.7. Experiment of May, 23, 1997.Variconds VC2-B, nominal 27μF, C_δ=5440 μF, without R_x in the circuit, only in "D" and "C", TVB-9x3 (see III.6), LATR output voltage is equal to 130 V, 20 rpm, 40 Hz.

D to the left, C to the right; then D to the right, C to the left.

V_{C_δ}	40	50	60	70	80	86
D_{av}, mV	4,4	9,6	19,8	33,2	46,4	60
C_{av}, mV	3,2	7	15,6	28	44	60
η	1,375	1,37	1,27	1,19	1,05	1,0

With the increase of battery capacity of variconds a tendency to the shift of maximum h to the side of more low voltage is noted. The reason is that every elementary capacitance $_iC_x$ of the varicond has its own of maximum $_i$h. To the right of absorption of $_iV_{C_\delta}$ energy begins.

That's why $_iC_{C_\delta}$ with higher $_iV_{max}$ absorbs energy from those, which have maximum to the left. And "positive properties" of all of them coincide on the ascending part of the curve C_x=f(V). That's why the battery C_x should be consisted of separate capacities with the same C_x=f(V). Otherwise the specific power of energy generation from the unit of volume and weight of variconds decreases. The optimal voltage of charging V_c also decreases. But we should remember that $A = f(V_c^2)$.

III.8. Experiment of October, 18, 1996.

The battery of variconds VC2-4, which consists of 250 disks of 0,01 μF connected in parallel, mechanical commutator (2 collectors); "C" and "D" were made through the load R=11 Ohm. The voltage was measured by the device B7-40/5. The control was made on the linear capacitor MBGM 0,05μFx4, 1000 B, C_k.

						Control		
LATR V	**T_c f**	V_{C_δ}	**V_cV**	**V_dV**	**η**	**V_c**	**V_d**	**η**
100	9 mc 112 Hz	100				0,52	0,54	1,08
100	-	119,3				0,53	0,58	1,2
100	-	99,8	5,1	5,3	1,08			
100	-	120	6,2	6,2	1,0			
100	-	92,1	4,1	4,3	1,10			
100	-	94,4	3,4	3,9	1,32			
100	-	72,6	2,7	3,1	1,32			
120		71,4	3,2	3,7	1,34			
130		71,9	3,4	4,0	1,40			

III.9. Experiment of May, 23, 1997. Varicond VC2-B, C_x=6μF, $V_{C_\delta} = 70$ V, collecting commutator "C↔D". Measurements are made on TVB-9x3 in the circuit "D" and "C". We give D_{av} and C_{av} depending on the speed of rotation (frequency of cycles).

LATR, V	**Hz**	**η**	**D_{av}, mV**	**C_{av}, mV**
130	40	1,2	2,1	1,75
140	50	1,15	3,45	3
150	66	1,03	7,1	6,9
160	83	1,07	9,6	9
170	100	1,16	12,5	11,2
180	125	1,08	15,6	14,4

We can see that even with so small content frequencies of >40 Hz provide the lack of time for the exhaustive passing of "C" and "D".

III.10. Experiment of May, 24, 1997. Variconds VC2-B, nominal 33 μF; TVB-9x3, mechanical commutator, 125 Hz, V=45 V (LATR output voltage is equal to 180 V). D_{av}=54 mV, C_{av}=40 mV by TVB-9x3. The efficiency is: η=1,35

III.11. Experiment of June, 04, 1997. Linear condensers are in parallel, MBGO-1, 20μF±10%, 500V, 04.91 and the same 10μF±10%, LATR output voltage is equal to 170V, 100 Hz. Let's give the average value "D↔C" on the collectors, TVB-9x3.

V_{C_δ}, V	20	40	60	80
C_{av}, mV	3,5	12	30	48
D_{av},mV	3,0	7,5	23,5	42
η	0,86	0,62	0,78	0,87

This example shows a sharp difference between LC energetics and NC energetics; LC has η<1.

III.12. Experiment of June, 13, 1997. Variconds VC2-B, nominal 6 μF. Mechanical commutator. There are the lamps of 12 V, 21 Watt, with inductance of $12{,}6 \cdot 10^{-3}$ H in the circuit of "C" and "D" . LATR output voltage is equal to 110 V (≈20 rpm). The voltage given in the table was measured on the lamps.

V, V	50	70	80	90	96	103	120
C, mV	13	26	37	53	66	84	140
D, mV	13	27	41	60	83	102	130
η	1	1,08	1,23	1,27	1,58	1,44	0,86

These results are given in diagrams on the Fig. 5. From this Fig. 5 we can see that the experiment quantitatively proves the common dependencies on the Fig. 4.

VI. Discussion of results

In the experiment III.10 we evidently proved once more the theoretical statement that with $\frac{\partial C}{\partial V} = 0$ only the losses of energy can be in the content, i.e. the cycle "C-D" has η≤1. From the other side, the experiment III.8 shows that with the increase of V_{charge} the nonlinearity can appear in the linear capacitor. This fact was pointed out in the beginning of the article.

In all experiments with variconds we achieved the levels η, defined by the formula (7). We found that in some η>1,3 due to the fact that the expression aV_0^n has η>1.

The maximum value was achieved in the experiment III.11: n~1,6 with C_x=6 μF, VC2-B. In the experiment III.9 η~1,35 with $C_v = 33 \cdot 10^{-6}$ F.

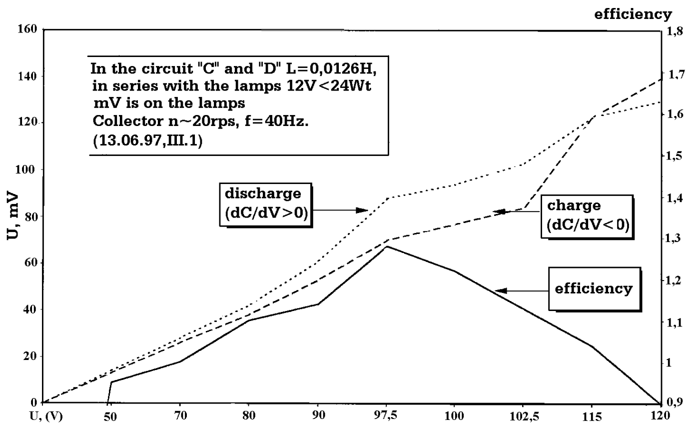

Fig. 5.
Dependence of efficiency and power in the load of the circuit of charge and discharge from the voltage "C" in NE about 6 micro F (nominal)

Thus, in the first case

$$A_c = \frac{90^2 \cdot 6 \cdot 10^{-6}}{2} = \frac{81 \cdot 6 \cdot 10^{-4}}{2} = 243 \cdot 10^{-4} = 0{,}0243 \text{ J},$$

i.e. absolute surplus energy with "D" A_d-A_c=1,6A_c-A_c=0,6A_c=0,0146 J. With the frequency of 40 Hz (20 rpm) the generated surplus power Δ=0,0146·40=0,584 J/sec≈0,6 Watt. In the second case

$$A_c = \frac{33 \cdot 10^{-6} \cdot 45^2}{2} \cdot 0{,}35 = 0{,}017 \text{ J and}$$

W=0,017×125=2,125 Watt.

It is a power of surplus energy generation. We could observe it visually with the lighting of lamps (12 V, 21 Watt). Lamp in "D" circuit is brighter than the lamp in "C" circuit.

Calculation of specific characteristics

Condenser VC2-B, nominal 0,15 μF, D=26 mm, h=10 mm. Volume is 3,714 cm³, weight ~3,714·4,7≅18 g. With V=55 V, 100 Hz, $C_x = 33 \cdot 10^{-6}$ F, W=5 Watt, volume of battery is 220 units, V_δ=836 cm³=3,8×220, weight=3960 g.

With η=1,35, surplus power is 1,75 Watt. That's why the specific surplus power is 2,1 kWt/m³, 0,442 kWt/ton.

Let's note that the converters based on the nonlinear ferromagnetic materials has the specific indexes 3-5 times higher (for the same volume and mass of nonlinear material the efficiency will be higher).

We can simplify the difficulties of commutation placing the inductancies with the disappearing small ohmic resistance to the circuit "C" and "D". Also we can divide the battery on a great number of parts with smaller capacity with their own, may be relay, commutators.

Totality of the obtained results evidences on the necessity of thenew level of work. We should separate the surplus energy from the energy, which is required to the second charging. We should develop a unit with A_d partly spending on A_c, and part of Δ=η-1 spending to the active load. In principle this scheme is given on the Fig. 6.

It is undoubtedly, that the practical realization of this scheme is a big separate problem of routine engineering and design character. And solution of it requires time and funds.

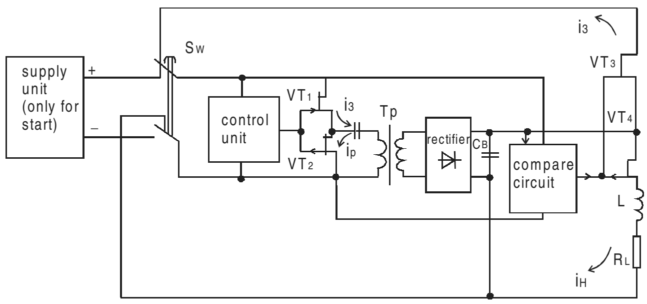

Fig.6.
S_w is a switch C_x is a working condenser (varicond) about 200 μF R_L is a load T_P is a pulse transformer, K=2 C_B is a ballast condenser about 300 C_x

V. Conclusions

1. The long-term work on realization of capacity converter with $\eta>1$ with the power of few watts was finished on variconds VC2-B with the specific power of 2,1 kWt/m^3, 0,44 kWt/ton.
2. The main difficulty of realization of cycle "C-D" with the higher power was established: commutation of battery of variconds between the source and the load, introduction of inductancies in the circuit "C" and "D" improves the situation.
3. A scheme of generator of energy (capacity converter) was suggested. This converter works on the part of the energy output and spending the part of its power to the active load.

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References

1. Zaev N.E. Energetics of the cycle "Charge-Discharge" of the condenser. Russkaya Mysl', M.: 1992, p. 12.
2. Zaev N.E. Conditions of generation of energy by nonlinear dielectrics and ferrites. Magazine of Russian Physics Community, GRFM, 1991, #1, p. 49-52, M.: 1996, p. 73-77.
3. Ionkin L.A. and others. Theoretical principles of electrical engineering, part I, Vysshaya shkola, M.: 1965.
4. Variconds in the electron impulse schemes. Sovietskoye radio, M.: 1971.
5. Golizyn B.B. Selected works, I, M.: 1960 (Scientific notes of Moscow University, #10, 1, M.: 1983).
6. Lions M., Glass A. Ferroelectrics and relative materials, Mir, M.: 1981; Poplavko Yu. M. Physics of dielectrics, Vischa shkola, Kiev: 1980; Sychiov V.V. Complex thermodynamic systems, 3-d edition, Nauka, M.: 1980.
7. Zaev N.E., Zhukov S.M. Calorimetric research on the heat of the processes of charge and discharge of condensers. Elektronnaya technika, series "Radio components", part 4(96), 1987, p. 19.
8. Meerovich L.A., Zelitchenko L.G. Impulse techniques, Sovietskoye radio, M: 1954 (283-285).
9. Principles of engineering electrophysics , part II, Vysshaya shkola, M.: 1972 edited by Ionkin P.A.
10. Tolkuniv V.P. Theory and practice of commutation of machines of direct current. Energiya, M.: 1979.
11. Shenfer K.I. Dynamo machines and engines of direct current. M., L.: 1937.
12. Kireeva G.A. Factors difficulting the process of commutation in machines of direct current. Kharkov: 1977 (abstract of thesis).
13. Kurtchatov I.V. Selected works, volume 1, Ferroelectricity, Nauka, M.: 1982.

Inductive Conversion of Heat Environmental Energy to Electrical Energy

N.E. Zaev

Abstract

The author gives a ground for realization of the cycle "magnetization – demagnetization" of inductance with a magnetic core in the mode, which provides generation of excess energy during "demagnetization". Experiments, which prove these conclusions, are described in details. Realization of the ratio ***φ = energy of demagnetization / energy of magnetization >1*** *in the device based on inductance with magnetic core. The author believes that presence of spontaneous magnetization in the area $H=(1,2\div1,4)H_c$ is a basis for $\varphi>1$, when demagnetization is made by the due to the factor of kT (i.e. heat environmental energy).* ***The author experimentally confirmed φ>2 at 1 kHz.*** *The author called this heat converter "ferrocassor" (concentrator of environmental energy).*

A task of detailed consideration of energetic aspects of the cycle "M-D" (magnetization – demagnetization) is to find a way to realize the ratio

$$\frac{A_M}{A_D} = \frac{energy"M"}{energy"D"} = \varphi > 1 \qquad (1)$$

A foundation for realization of (1) is the evident difference of A_M and A_D in Nature, which is not usually mentioned. The work A_M is sum of the part of energy ("injection"), which came from the outer source ${}_1A_M$ and energy of spontaneous magnetizing ${}_0A_M$ (it is free energy of magnetic core), which is "mobilized" by the work ${}_1A_M$. The work A_D (demagnetization) takes place only due to the disordering effect of the factor kT, i.e. due to heat energy of magnetic, which is renewable energy from environmental. This is a principle difference of our research of energy of "M-D" cycle (we are considering rectangular impulses with V_0=const and duration of t_u) from other engineering solutions of applied problems [1-6], when apriory the work is considered as $A_M > A_D and \frac{A_D}{A_M} < 0$. In similar tasks the time t_u is about 10μc and calculations are made with canonic ratios [7, page 140]:

$$i = \frac{V_0 \cdot t_u}{\omega L} e^{-\alpha t}[\omega \cos\omega - \alpha \sin\omega t] \qquad (2)$$

where $\alpha = \frac{R}{2L}, \omega = \sqrt{\frac{1}{LC} - \alpha^2}$.