FREE ENERGY
OF THE OSCILLATING
PENDULUM-LEVER SYSTEM

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ABSTRACT

This study explains the effect of creating the free energy in the device made of: a) oscillating pendulum-lever system, b) system for initiating and maintaining the oscillation of the pendulum, and c) system which uses the energy of the device by damping the oscillation of the lever. Serbian inventor Veljko Milković (www.veljkomilkovic.com) has invented, patented and developed series of such machines based on two-stage oscillator for producing energy. The operation of the machine is based on forced oscillation of the pendulum, since the axis of the pendulum affects one of the arms of the two-armed lever by a force which varies periodically. Part of the total oscillation energy of the pendulum-lever system is changed into work for operating a pump, a press, rotor of an electric generator or some other user system. The creation of free energy was proved by a great number of physical models.

The effect of creating the free energy is defined in this study as the difference between the energy which is the machine transfers to the user system by the lever and the energy which is input from the environment in order to maintain the oscillation of the pendulum. Appearance of the free energy is not in accordance with the energy conservation law. The effect of creating the free energy results from the difference between the work of the orbital damping forces of the lever and the work of the radial damping force of the pendulum motion. This effect enables increase of the input energy. The coefficient of efficiency of the machine can be more than one.

Key words: two-stage oscillator, free energy, orbital damping, radial damping

OBJECTIVE AND RESULTS

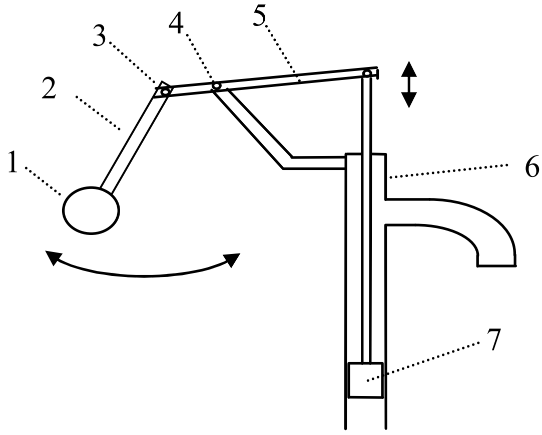
The objective of this study is to explain experimentally found phenomenon of increasing the input energy by operation of the pendulum-lever system as an example. In fact, when the oscillating pendulum-lever system is built-in the machine for energy generation, the efficiency coefficient can be greater than one, which is not in accordance with energy conservation law.

Professional community is well acquainted with the hand water pump with pendulum (Fig. 1.), which was invented, patented and constructed by Serbian inventor Veljko Milković (www.veljkomilkovic.com) in 1999. This pump is only one of inventions based on the operation of the two-stage oscillator system.

Figure 1.

Hand water pump with pendulum:

1- load of the pendulum
2- handle of the pendulum
3- axis of the pendulum
4- axis of the two-leg lever
5- two-leg lever
6- water pump
7- piston of the pump



The pump is made of pendulum, two-leg lever and cylinder with the piston which pumps the water. Oscillation of the pendulum is maintained by periodical action of the human arm. Oscillation period of the pendulum is twice bigger than the period of the lever oscillation. Piston of the pump has reverse effect on the lever and damps its oscillation. Damping of the lever motion causes damping of the pendulum, but the work of the force damping the pendulum is less than the work of the forces which damp the lever. Equilibrium position of the lever is horizontal, and the equilibrium position of the pendulum is vertical. Oscillation of the lever and the pendulum takes place in the same plane, vertical in reference to the ground. Physical model of this type of water pump was shown at a number of exhibitions, in some publications [1, 2] and on the Internet (http://www.veljkomilkovic.com/rucnaPumpaEng.html www.freeenergynews.com, www.peswiki.com, http://www.youtube.com/watch?v=hNpgl7o_1QI, http://www.youtube.com/watch?v=dvst47E5CvM)

1. Orbital damping of the lever movement causes radial damping of the pendulum

Two types of damped oscillations appear during operation of the two-stage oscillator system. One occurs due to orbital and the second due to radial damping of the oscillator movement. Orbital damping is a consequence of friction on the axis, resistance of the fluid, resistance of the piston of some device as water pump, interaction between electric currents in the solenoids etc. Radial type of damping results from the movement of the oscillator axis bearing, i.e. movement of the oscillator referent point in respect to the ground. Radial damping frequently causes the decreasing of the engine power and other harmful effects which are produced by unwanted vibrations.

If the oscillator system consisting of pendulum and a lever is isolated, the lever and the pendulum oscillate in resonance and there is no damping. Mathematical model which describes this independent two-stage oscillator system is known [3].

This study analyses voluntary damping of the oscillating pendulum-lever system, by reverse action of the user system on the lever. User system overtakes a part of the total internal mechanical oscillation energy of the lever-pendulum system. The lever bears orbital damping. Orbital damping of the lever causes radial damping of the pendulum. The work of the outer force periodically compensates the loss of the part of the total internal mechanical oscillating energy of the lever-pendulum system due to the work of the outer force, which affects the pendulum directly. Radial damping of the lever is excluded, since the bearing of the lever axis is fixed.

2. Pendulum overtakes the energy from the environment E_O under stable operation conditions of the machine. User system overtakes the resulting energy of the machine E_R by means of the lever which oscillates forcedly

Work of the outer force on activating the machine, to achieve stable operating regime, can be neglected after a certain period of time since this initial energy is input only once. Only the outer supplied energy E_O, which is needed in order to maintain already achieved operating regime of the machine, is relevant for the further analysis. The machine thus continuously gives over the resulting energy E_R to the user system.

All the energy values in the further analysis are related to the time of one oscillation of the pendulum. Further analysis operates with absolute values of the work of the forces and momentum of the forces.

3. Free energy of the machine is the difference between the resulting energy E_R and input energy E_O

Input of the energy E_O from the environment results in transfer of the energy E_R to the user system which is a part of the machine having the role of energy consumer.

In this study, the free energy is defined as the difference between the resulting, used energy of the machine and the energy input from the outside:

$$\varepsilon = E_R - E_O \tag{1}$$

The effect of free energy is not in accordance with the energy conservation law but it has been proved experimentally. The objective of this study is to support this effect theoretically and to explain it.

4. Total internal mechanical oscillation energy of the pendulum-lever oscillator system is reduced to the oscillation energy of the pendulum

User system overtakes a part of the total internal mechanical oscillation energy of the two-stage oscillator by damping the oscillation of the lever. The lever oscillates forcedly, not freely but in a condition of damping its movement. One can assume that the total mass of the lever is in the point where the user system reacts. This equivalent material point of the lever has a variable kinetic energy in reference to the ground. But the lever is periodically changing the direction of the rotation around its axis. This periodical change of the direction is fully depending on the oscillations of the pendulum, so the lever does not have its own oscillation energy:

$$U_L = 0 \tag{2}$$

If the equilibrium position of the lever were vertical, a relevant variable component of the gravitational force would affect the equivalent material point as in the case of the pendulum, which is not the case, since the equilibrium position of the lever is horizontal.

If the oscillations of the pendulum would stop abruptly, the lever would stop oscillation immediately, which proves that the lever does not have its own oscillation energy. On the contrary, if the oscillations of the lever would stop abruptly, the pendulum would continue to oscillate since the pendulum has its own oscillation energy. This means that the total of internal mechanical oscillation energy of the pendulum-lever oscillation system: $U = U_P + U_L$, belongs solely to the oscillation energy of the pendulum U_P:

$$U = U_P \tag{3}$$

The same is valid for each variation of this variable:

$$\Delta U = \Delta U_P \tag{4}$$

Outer energy E_O is used solely to compensate the loss of the part of oscillation energy of the pendulum ΔU_P:

$$E_O = \Delta U_P \tag{5}$$

Loss of the part of oscillation energy of the pendulum ΔU_P, which is equal to the outer energy E_O, occurs during each oscillation of the pendulum. This loss is the consequence of the work of the forces damping the oscillations of the pendulum. Total loss of the oscillation energy of the pendulum depends on the work of radial damping force of the pendulum A_P, and the work of orbital damping forces of the pendulum A_{FP}, which results from friction on the pendulum axis and the resistance of air:

$$E_O = A_P + A_{FP} \tag{6}$$

5. Effect of free energy of the pendulum-lever oscillating system, where only the lever is loaded by reverse action of the user system, is based on two key properties of this oscillation system. First is related to the fact that the lever does not have its own oscillation energy, and the second to the fact that the work of the orbital damping force of the lever is greater than the work of the radial damping force of the pendulum

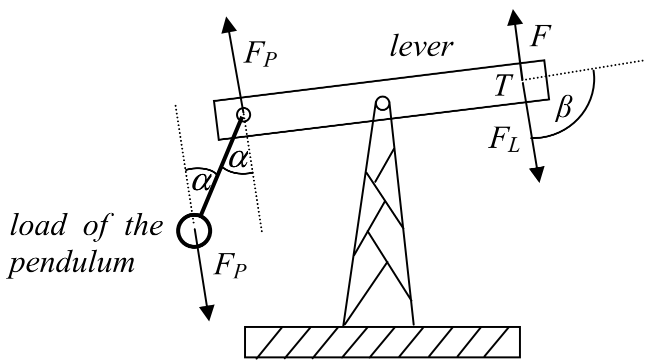


Figure 2.

Fig. 2 refers to the moment when the right arm of the lever moves upward, and the load of the pendulum to the left.

Force F affects directly the users system, for example the piston of the pump. Work of this force A is equal to the resulting energy of the machine E_R:

$$A = E_R \tag{7}$$

Total work of the orbital damping forces of the lever A_L depends on the energy that is overtaken by the user system E_R and the work of the friction and resistance forces A_{FL}, which are directly related to the lever:

$$A_L = E_R + A_{FL} \tag{8}$$

Forces F and F_L have the same point of application T. Force F has smaller intensity than the equivalent orbital damping force F_L. But if the intensity of the momentum of the force F is much bigger than the intensity of the momentum of the friction and resistance forces F_{FL} the difference between the intensities of the moments of the F_L and F forces is negligible.

Action of the total variable orbital damping force of the lever F_L is transferred to the pendulum axis by the radial damping of the pendulum F_P. We could assume that the points of application of the time dependent variable forces F_L and F_P are placed at equal distances from the lever axis. In that case intensities of these are equal at any time: $F_L = F_P$. Since the right arm of the lever moves upwards the force F_P which is damping the lever is directed downwards. Radial force damping the pendulum F_P is directed upwards. This action on the pendulum axis is transferred on the pendulum load by the handle of the pendulum in the opposite direction. For this reason, the intensity of the pendulum damping is the same as if the force of intensity $F_P \sin \alpha$ would affect the load of the pendulum perpendicular in respect to the pendulum handle. This force is smaller than the force F_P and apparently smaller than the force F_L.

In order to simplify the analysis, it was assumed that the handle of the pendulum and both arms of the lever have the same lengths. Under the given conditions, the intensity of relevant momentum of the equivalent orbital force damping the lever M_L is greater than the radial momentum of the force damping the pendulum M_P at any time:

$$M_L > M_P \tag{9}$$

More precisely:

$$M_L : M_P = \sin \beta : \sin \alpha \tag{10}$$

If we take into account that $\beta = 90^0$, which is technically achievable, prompt ratio $M_L : M_P$ depends only on angle α. Decrease of the angle α is followed by increase of the intensity ratio $M_P : M_K$ and this ratio could be much greater than unity. Maximum value of the angle α is determined according to the technical demands related to the power of the machine and efficiency coefficient.

Relations (9) and (10) cannot be questionable under any conditions. For that reason the work of the orbital damping force of the lever during one oscillation of the pendulum is greater than the work of the radial damping force of the pendulum:

$$A_L > A_P \tag{11}$$

From relations (1), (6) and (8) it follows:

$$\varepsilon = A_L - A_{FL} - A_P - A_{FP} \tag{12}$$

Free energy of the machine ε is included in the work of orbital damping forces of the lever, decreased for the total work of the friction and resistance forces and the work of radial damping force of the pendulum, which is unavoidable smaller than the work of the orbital damping force of the lever.

6. Energy conservation law is violated independent of the free energy value.

Three cases are possible:

a) **Free energy is less than zero if: $A_L - A_P < A_{FL} + A_{FP}$:**

$$\varepsilon < 0 \tag{13}$$

This means that the total work of the friction force exceeds the difference between the work of the orbital damping force of the lever and the work of the radial working force of the pendulum. But the total work of the friction and resistance forces ($A_{FL} + A_{FP}$) is the part of the total output work of the machine. So the energy conservation law is violated in this case, since $A_L > A_P$, according to relation (10).

b) **Free energy is equal to zero if: $A_L - A_P = A_{FL} + A_{FP}$:**

$$\varepsilon = 0 \tag{14}$$

This case does not yield any novelty. From the energy point of view it is not particularly interesting.

c) **Free energy is greater than zero if: $A_L - A_P > A_{FL} + A_{FP}$:**

$$\varepsilon > 0 \tag{15}$$

This means that the total work of the friction and resistance forces is relatively small or almost negligible compared to the difference between the work of the orbital damping force of the lever and the work of the radial damping force of the pendulum. Technically this is achieved by using a massive pendulum load and a massive lever, with respective reverse action of the user system. Experiments have shown that the application of ball bearings was sufficient for minimizing the work of friction forces. Resistance of the air is negligible since the rates of pendulum and lever oscillation are relatively small.

In this case the efficiency coefficient of the machine η_m is bigger than one. But the total efficiency coefficient of the device η depends also on the efficiency coefficient of the user system η_u. According to the second law of thermodynamics, the user system is not capable of transforming the total resulting energy E_R into useful work. Total efficiency coefficient of the device is equal to the product of two mentioned coefficients: $\eta = \eta_m \cdot \eta_u$. If this total efficiency coefficient is greater than one, the system as a whole produces more available energy than the input quantity, neglecting the useless dissipation of energy. There are no theoretical or technical constraints to achieve this efficiency coefficient.

CONCLUSION

The free energy of the machine based on oscillation pendulum-lever system, is defined in this study, as a difference between the resulting energy of the machine and the energy input from the environment in the same time interval. Existence of the free energy defined in this way is not in accordance with the energy conservation law, but it has been verified experimentally and it can be explained.

Appearance of the free energy is necessarily a consequence of the reverse action of the user system on the lever since the lever has no oscillation energy of its own and the momentum of the orbital damping force of the lever is greater than the momentum of the radial damping force of the pendulum at any phase of oscillation. The same effect appears in case of all two-stage oscillators which fulfill these conditions, for example, in case of eccentric flywheel which rotates on the edge of a wheel [1]. The wheel has no oscillation energy of its own, and the momentum of the orbital damping force of the wheel is greater than the momentum of the radial damping force of the eccentric flywheel at any time, except in two phases: π and 2π, when the mentioned moments of the orbital and radial damping forces are equal.

Machines based on the operation of the two-stage oscillators can have efficiency coefficients significantly higher than one. This conclusion is verified by a series of experiments done so far with two-stage oscillator systems of different dimensions and different user systems.

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