ANALYSIS OF THE INFLUENCE OF THE CENTRIFUGAL FORCE DURING OPERATION OF THE TWO-STAGE MECHANICAL OSCILLATOR BY VELJKO MILKOVIĆ

Introduction

The goal of this analysis is to mathematically explain the obvious energy surplus in the operation of two-stage mechanical oscillator by Veljko Milković (www.veljkomilkovic.com), while using physics formulas deducted from the energy conservation law. Deeper analysis and creation of the mathematical system model after the moment of starting the lever arm would not provide mathematical proof of the energy surplus because we would talk about the energy conservation law which is questioned by Milković's two-stage mechanical oscillator both by layman and experts in the field of mechanics and physics.

This analysis consists of two experiments already known in physics and they represent an introduction into the experiment named "MEASURING THE RATIO OF OUTPUT AND INPUT ENERGY OF THE TWO-STAGE MECHANICAL OSCILLATOR BY VELJKO MILKOVIĆ".

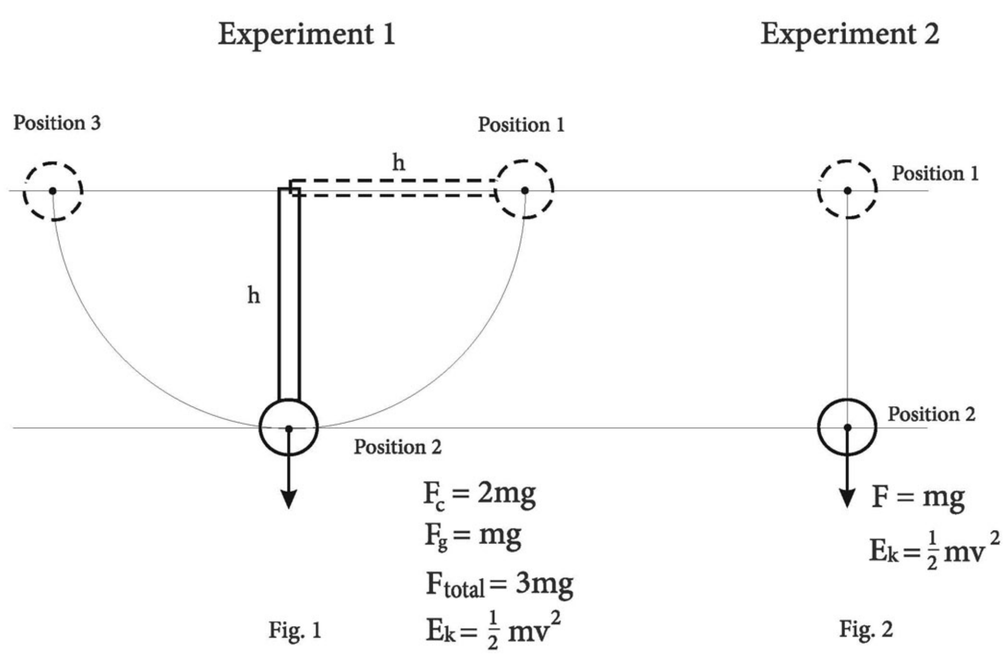

Fig. 1

Fig. 2

EXPERIMENT 1:

Axis around which the pendulum oscillates is attached to one end of a lever arm.
Let's leave that lever arm blocked for now.

Fig. 1 describes the experiment where the weight of that pendulum with mass *m* free falls from position 1.

If we disregard the friction force and air resistance, the pendulum will interminably move in the semicircle trajectory from position 1 to position 3, as shown in Fig. 1.

If the pendulum arm has length *h*, potential energy of the pendulum body in position 1 is:

$$Ep = mgh \tag{1}$$

Pendulum weight in position 3 has the same potential energy.

In position 2, total potential energy of the weight from position 1 turns to kinetic energy:

$$Ek = \frac{mv^2}{2} \tag{2}$$

i.e. weight with mass *m* will have the following speed in position 2:

$$v = \sqrt{2gh} \tag{3}$$

Now, let us look at the situation where this two-stage mechanical oscillator is set so that the pendulum moves only when total centrifugal force approximately equals *3mg*.

In this experiment, radius of the semicircle trajectory of the pendulum weight *r* has length *h,* so that the pendulum weight in position 2 is influenced by centrifugal force with the approximate value:

$$Fc = \frac{mv^2}{r} = \frac{m \cdot 2 \cdot g \cdot h}{h} = 2mg \tag{4}$$

In addition to centrifugal force, the weight in position 2 in influenced also by gravity:

$$Fg = mg \tag{5}$$

so that the total force exerted on the weight in position 2 equals to:

$$F_{total} = Fc + Fg = 2mg + mg = 3mg \tag{6}$$

I am mentioning that this approximate amount of the force will take effect because the mechanism is set in such a way that the lever starts to move only when the centrifugal forces reaches approximate value of *3mg*.

EXPERIMENT 2:

Let us look at the second experiment, described in Fig. 2:

We have let the same weight into the free fall from height *h*.

Freefalling weight after distance h will have the kinetic energy:

$$Ek = \frac{mv^2}{2} \tag{7}$$

and will be influenced by gravity at that position:

$$F = mg \tag{8}$$

When we compare these two situations, we can see that the weight has the same kinetic energy in both situations:

$$Ek = \frac{mv^2}{2} \tag{9}$$

in position 2 both in experiment 1 and 2, and that energies needed to lift the weight to height h are the same in both cases:

$$Ep = mgh \tag{10}$$

but the force exerted on the weight vertically downwards in position 2 of the experiment 1 equals to:

$$F_{total} = Fc + Fg = 3mg \tag{11}$$

and in the experiment 2, force exerted on the weight vertically downwards is:

$$F = mg \tag{12}$$

in all positions of the trajectory, including position 2.

Is it not true that the weight in position 2 of the first experiment is in energetically more favorable situation than in the same position in the second experiment?

It seems clear that the influence of the centrifugal force is the key to the explanation of the energy surplus of the two-stage oscillator by Veljko Milković, the inventor.

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