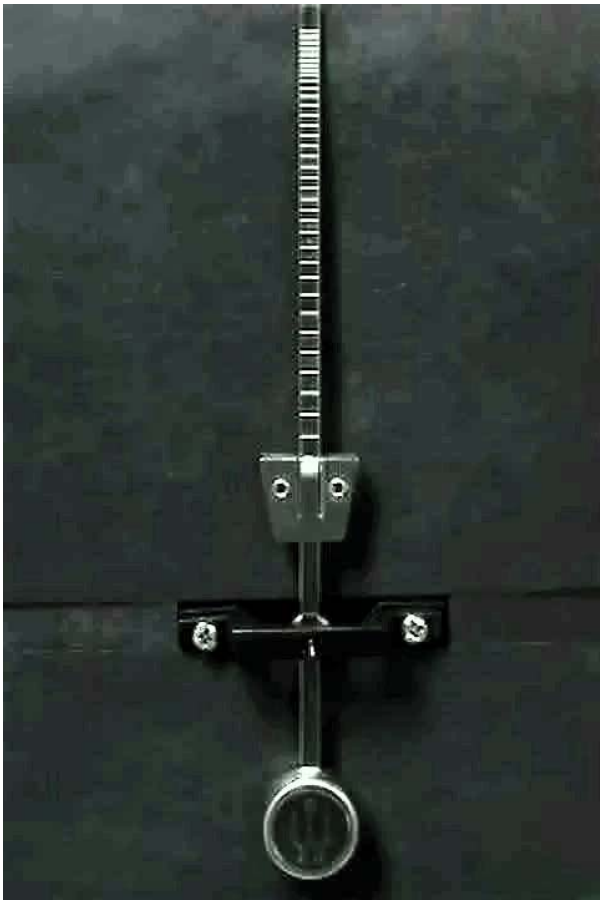
Question #358

This week's question features a device that can't stop ticking and would make even the Energizer bunny jealous. Its true identity has been carefully masked and will be revealed in next week's answer, if one does not guess it by then.

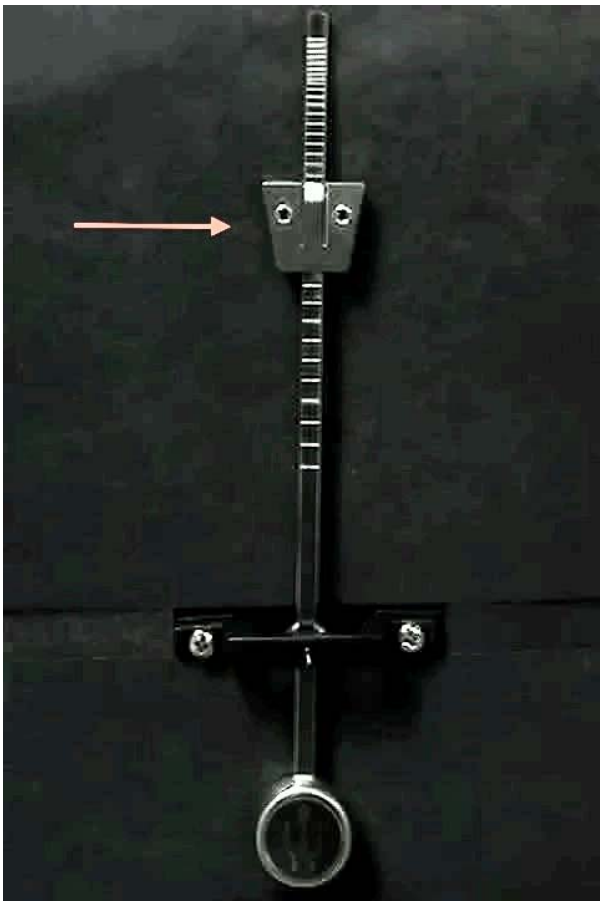
The apparatus consists of a rod at the bottom of which there is a fixed mass (circle). The rod pivots above this mass at a fixed point and is free to oscillate from side to side. Above the pivot point there is another *moveable* mass (trapezoid) which can be adjusted either higher or lower. Catch a video of it in action by clicking your mouse on the photograph below.



Alternate high-res version.

Notice how the adjustable mass is very close to the pivot point.

And now the question: Suppose the mass were adjusted further upwards, away from the pivot point (pictured below). How would the of frequency of oscillation change?



- (a) The frequency will not change; the ticking machine will oscillate the same.
- (b) The frequency will increase (i.e. the machine will tick faster). Since the torque exerted by the moveable mass increases, the effect is much like moving a person further down a teeter-totter; the further the person is away, the more quickly rod will accelerate.
- (c) The frequency will decrease (i.e. tick slower). The torque exerted by the moveable mass is less, and therefore the effect is like moving a person closer in on a teeter-totter. Less torque, less acceleration.
- (d) Other (you must explain).

Click here for Answer #358 after November 23, 2009.

Question of the Week

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For questions and comments regarding the *Question of the Week* contact
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given on the Lecture-Demonstration Home Page.