Application No. 135: D.I.Y. shake torch

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This torch keeps its promise - without battery

Time and again you can see advertisements for torches that supposedly get their energy from shaking.

Thereby, electronic induction is utilised. If there is a conductor in an alternating magnetic field, the charge carriers within are displaced - voltage is induced.

The easiest way to accomplish this is would be to move a permanent magnet. If the conductor is not just a wire but a spool, each of its turns is penetrated by the magnetic field, and a high voltage is induced at the spool's connections. With the "shaking" you basically quickly displace a magnet within a spool and produce electric energy.

Actually, it's a great idea for torches, since batteries always seem to be drained when you need them during a power outage, etc. Also, the low amount of energy produced by the shake induction is sufficient to run modern luminaires like LEDs.

Some time ago, I got hold of such a lamp. Unfortunately, I found out that this thing was only good for pulling money out of careless buyers' pockets. Besides the spool, the magnet and the accumulator for the storage of the "shake energy", it contained, well concealed, two big coin cells.

We are talking about ordinary lithium cells, which you must not recharge. The two coin cells were connected in series with the accumulator that was charged by shaking. Therefore, the "shake energy" is used, but as soon as the hidden coin cells are drained, you can shake your arm off, but the lamp won't glow anymore.

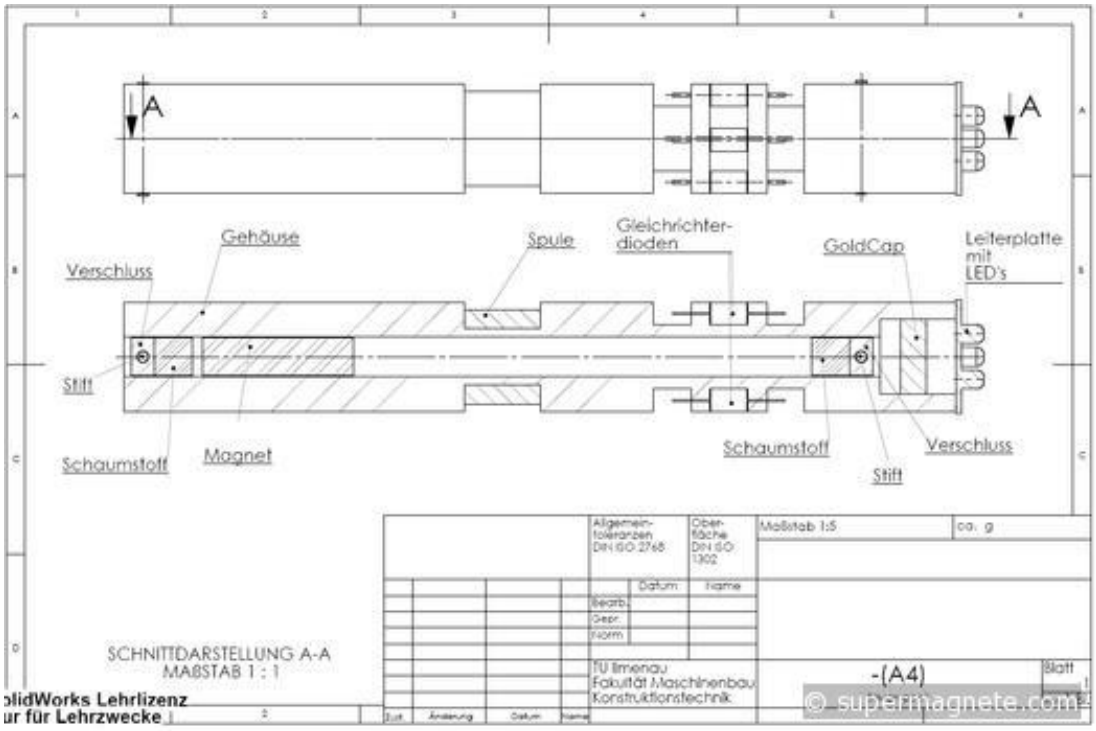
The only thing I could do was to return the article with the remark "don't like article". By no means do I want to critisise the manufacturers of real shake torches. Certainly, there are real examples, but probably for a lot of money and in selected stores only. Anyway, this experience caused me to order a rod magnet (www.supermagnete.de/eng/S-10-40-N) in my last order from supermagnete.de for my own shake torch experiments.

After receiving the SuperMagnets, I immediately started with my experiments, first on a piece of standard PVC water pipe.

I wrapped the spool by rule of thumb. The emerging electricity had to be rectified and stored. I found some SB540 Schottky diodes in my toolbox for the rectification. These are strongly oversized for this purpose, but they have the desired low flux jump compared to normal silicium diodes. With a high flux jump, the diodes would use up too much voltage themselves.

In order to make best use of the induced voltage, I decided on a bridge rectification with 4 diodes. The energy storage could take place in small accumulators or in electrolyte condensers. After a few tries, I decided on so-called GoldCap electrolyte condensers, because they feature high capacity and a small design.

Since my first attempts were promising, I was ready to devise a professional configuration.



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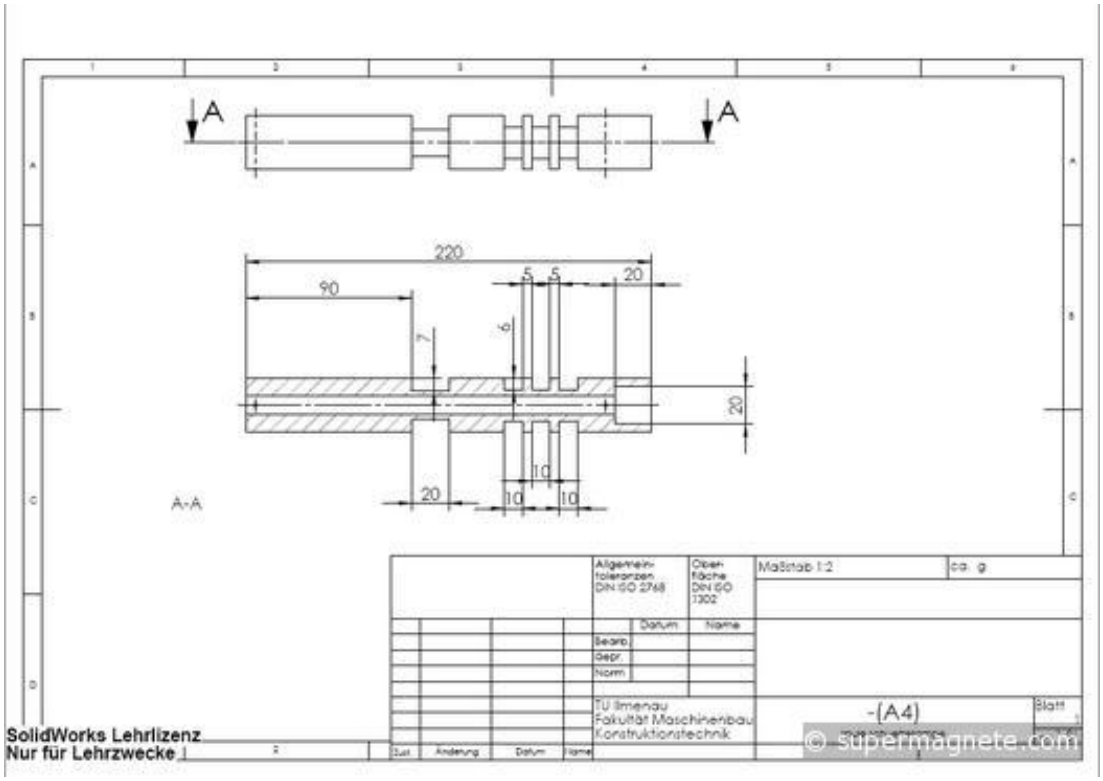
First a drawing of my idea.



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On a friend's turning lathe, I had slots cut into a thick-walled plastic pipe and up front I had a piece milled out.

A 20 mm wide slot is used for wire wound coil of 0,1 mm copper finish wire. For voltage alignment, I wanted to fit the 4 Schottky diodes into the three 10 mm wide slots.

Into the milled out part at the front of the pipe I wanted to fit the GoldCap condenser (1F; 5,5V).

A slow-running gear motor served as a wrapping fixture for the spool.

The rod magnet (www.supermagnete.de/eng/S-10-40-N) should be freely movable inside the pipe.

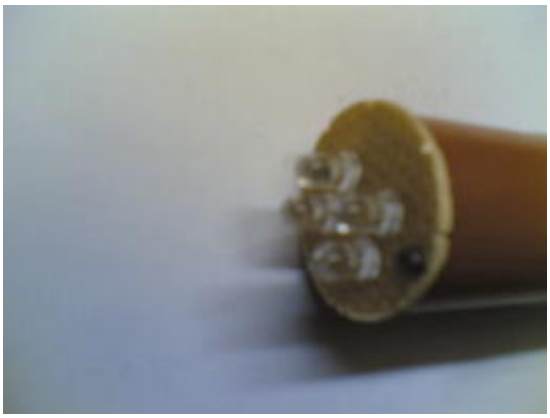
I made 2 end-pieces out of round brass and I drilled and pinned them to the housing. For the pinning of the brass pieces you can use 2 aluminum rivets, since steel pins attract the magnets too much and you can't shake it anymore.

I added 2 small rolls of foam, so the magnet won't hit the brass pieces too hard.

All the individual parts before the assembly. The spool received already a protective finish and is masked.

Here are the rectifying diodes that are fitted into the slots and the switch that should later connect the LEDs.

The conductor board with the 4 LEDs, which will be incorporated over the embedded condenser. The LEDs should be replaced later by Osram PowerTopLEDs for better lighting.



Here, everything is completely assembled and fully functional.

A concluding test, and although it is morning, the camera is blinded...

After completing the torch, it wasn't hard to utilise the built-in magnet as a holder as well. Unfortunately, it is a little bit too weak to hold the lamp all by itself through the 10 mm plastic. But with a little support from the outside, it is no problem to hang up the lamp on a door frame in the workshop. Here is the Q-40-20-10-N (www.supermagnete.de/eng/Q-40-20-10-N) that I used, on the left without and on the right with the lamp.

Articles used
1 x S-10-40-N (www.supermagnete.de/eng/S-10-40-N)
1 x Q-40-20-10-N (www.supermagnete.de/eng/Q-40-20-10-N)

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