



Green University of Bangladesh
Department of Computer Science and Engineering (CSE)

Faculty of Sciences and Engineering

Semester: (Summer, Year:2022), B.Sc. in CSE (Day)

Physics Project Report

Course Title: (Phy 103)

Course Code: Phy 103 Section PC-221 DE

Student Details

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Submission Date: 29-08-2022

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Project Report Status

Marks:

Signature:

Comments:

Date:

Project Name:

Fidget spinner pushed by an electromagnetic coil.

ID: 221902001

Hasnat Zamil did this

Objective of the project:

This fidget spinner accelerator works by using an electromagnet with a reed switch and a fidget spinner with magnets mounted on the 3 sides. First of all, the magnet of the fidget spinner are mounted so that all the magnets have their north pole facing outwards. The electromagnet is wired so that the side is closest to the spinner will have a north polarity when it is powered. When the spinner starts spinning the electromagnet will be off. As the magnet on one side of the spinner passes the electromagnet, it will trigger the reed switch, activating the electromagnet. Because both magnet and electromagnet will now have the same poles, that arm of the spinner will be pushed away from the electromagnet. When it moves far enough away, the reed switch will disengage and shut off the

electromagnet. Because the spinner will be spinning from this first cycle, it will have enough momentum for the next arm to move past the electromagnet and need switch and repeat the cycle. As each arm moves by the electromagnet and get repulsed, the spinner will speed up and gain momentum. That is how this system of acceleration works.

Importance of the topic:

From this topic we learn about

Farad's law which is important for this project and this law is known as 'Faraday's law of induction'.

This magnetic field is produced because the current flows through the coil which is inside the electromagnet and as know according to Faraday's law of induction, all current carrying conductors produce a magnetic field around them. This law is a basic law of electromagnetism predicting how a magnetic field

will interact with an electric circuit to produce an electromotive force (EMF), Faraday's law states that a current will be induced in a conductor which is exposed to a changing magnetic field.

If the circuit consists of N loops, all of the same area and if Φ_B is the flux through one loop, an emf is induced in every loop and Faraday's law becomes

$$\mathcal{E} = -N \frac{d\Phi_B}{dt}.$$

How we got interested in this topic:

First we read this topic which corresponds to our physics course Electricity and Magnetism topic. Then we think of making a project with the spinner and we share it with our group. Then we search google and youtube about what projects can be made with spinner. Then we found this project which was a little bit complicated.

Circuit Diagram:

ID: 221902353

✓✓ Khondokar Saim did this

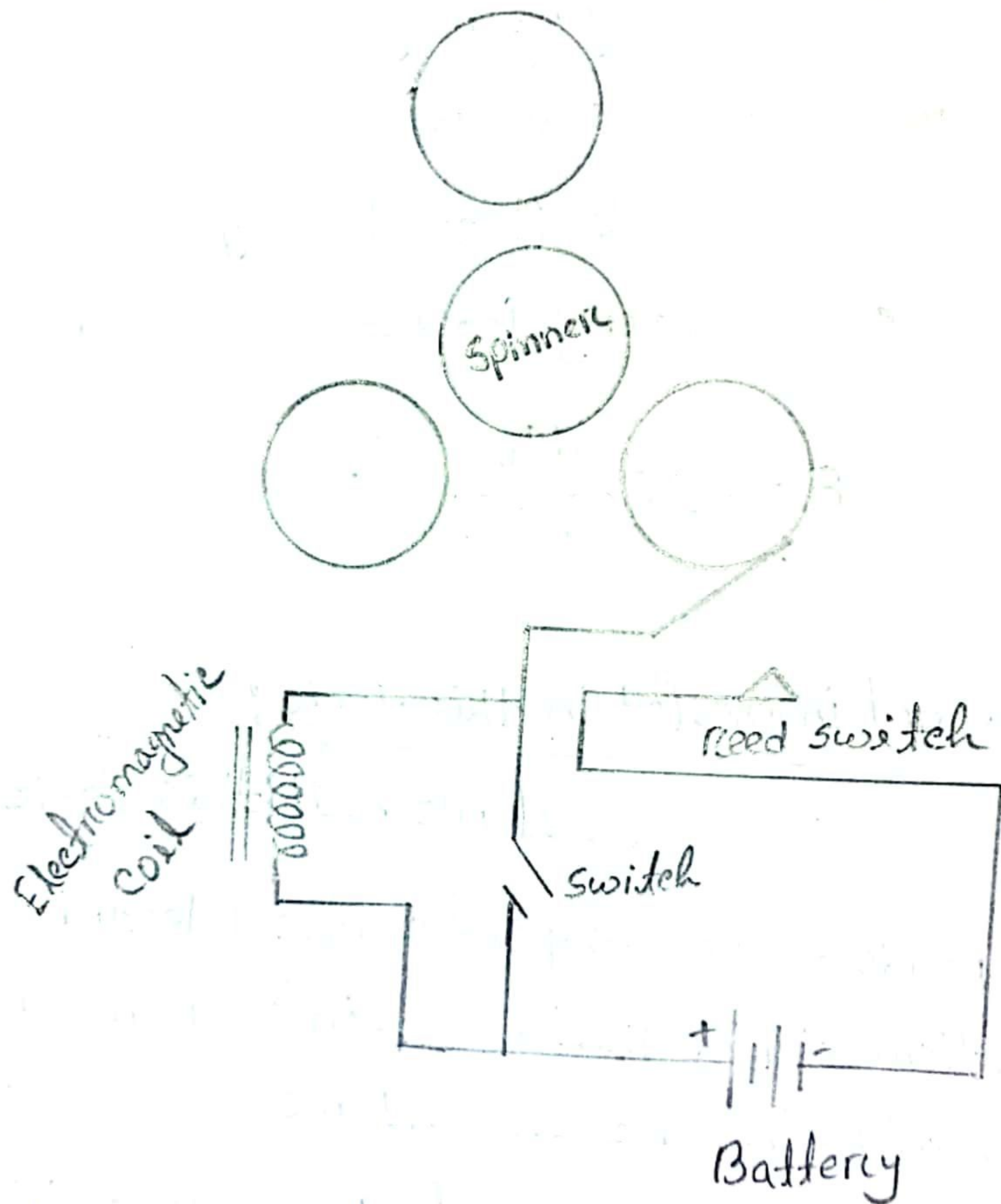


Fig: Fidget spinner pushed by an electromagnetic coil circuit diagram.

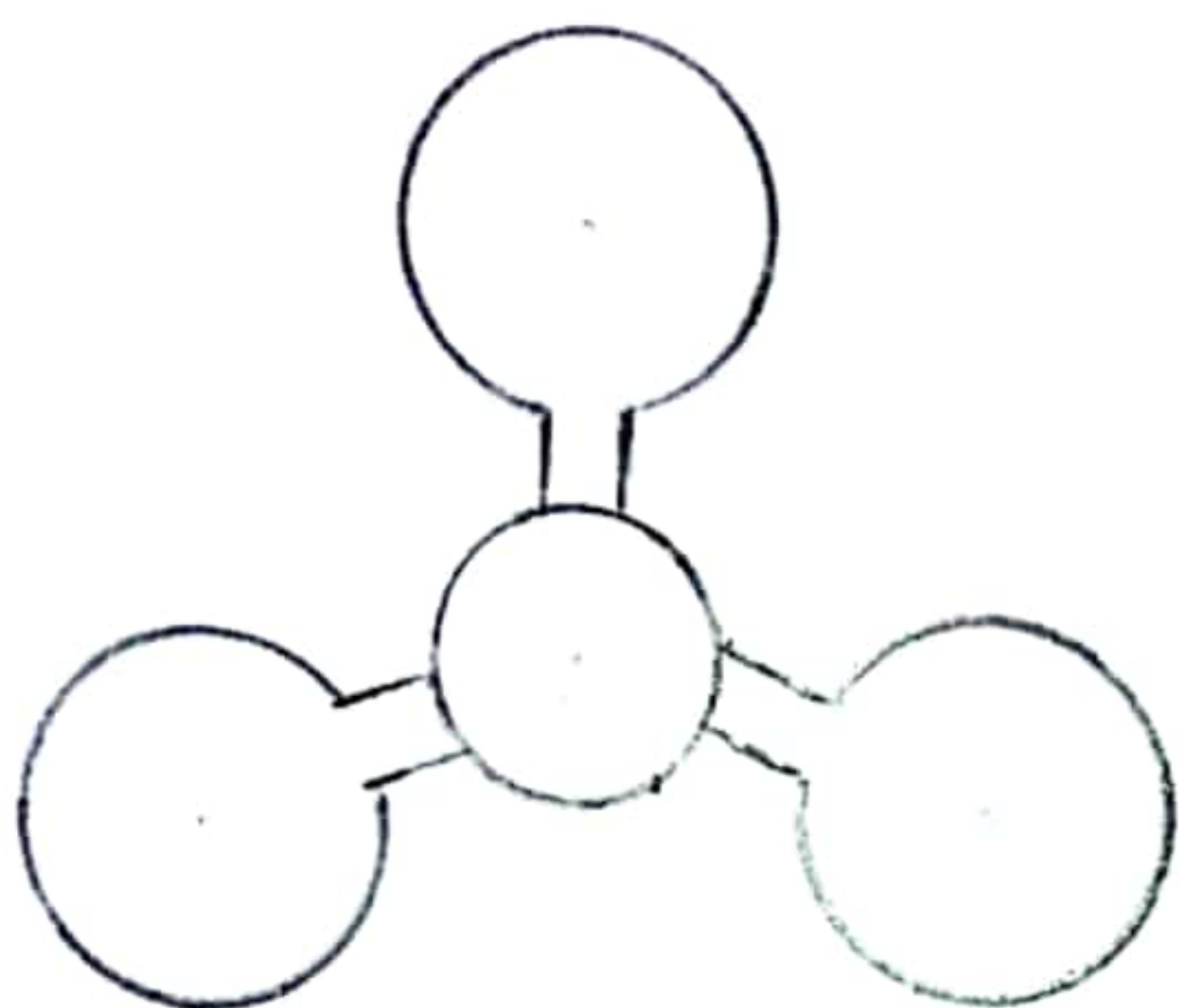


fig: fidget spinner

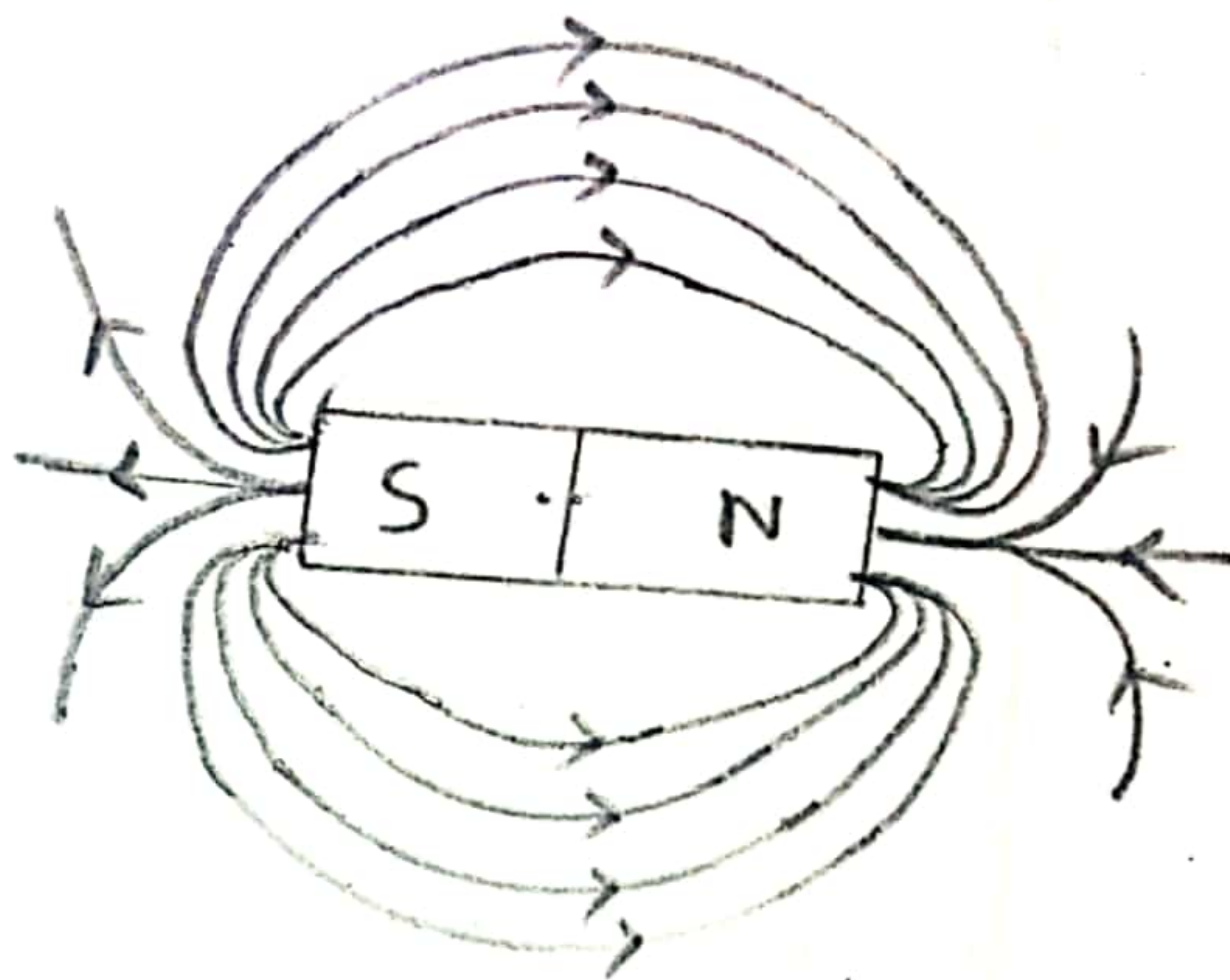


fig: magnetic field

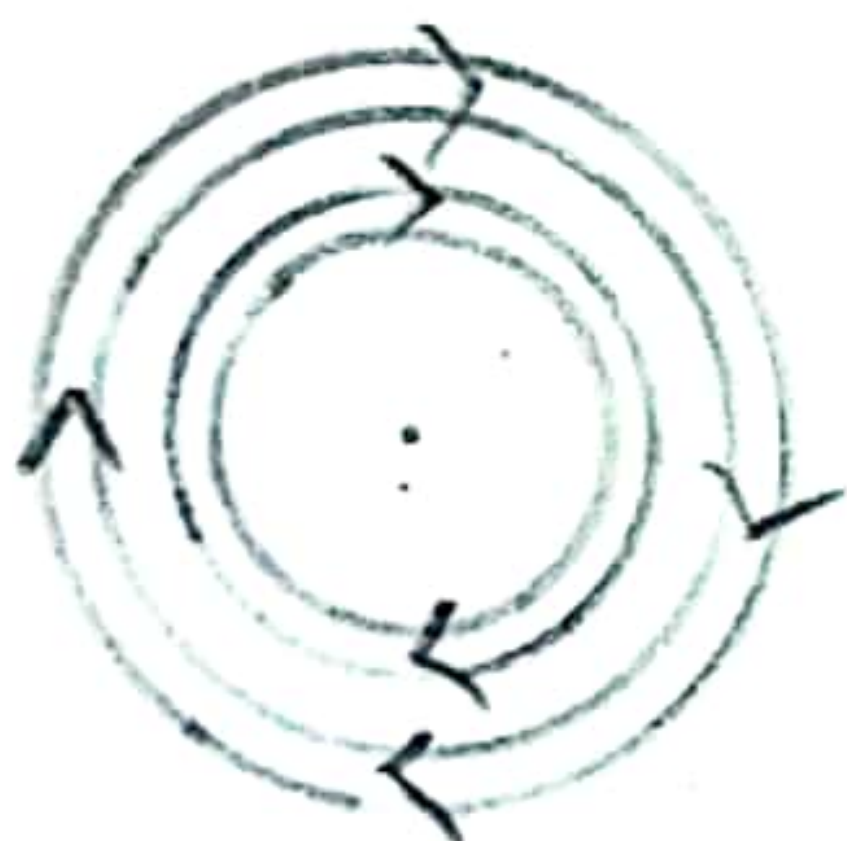


fig: magnetic coil wire

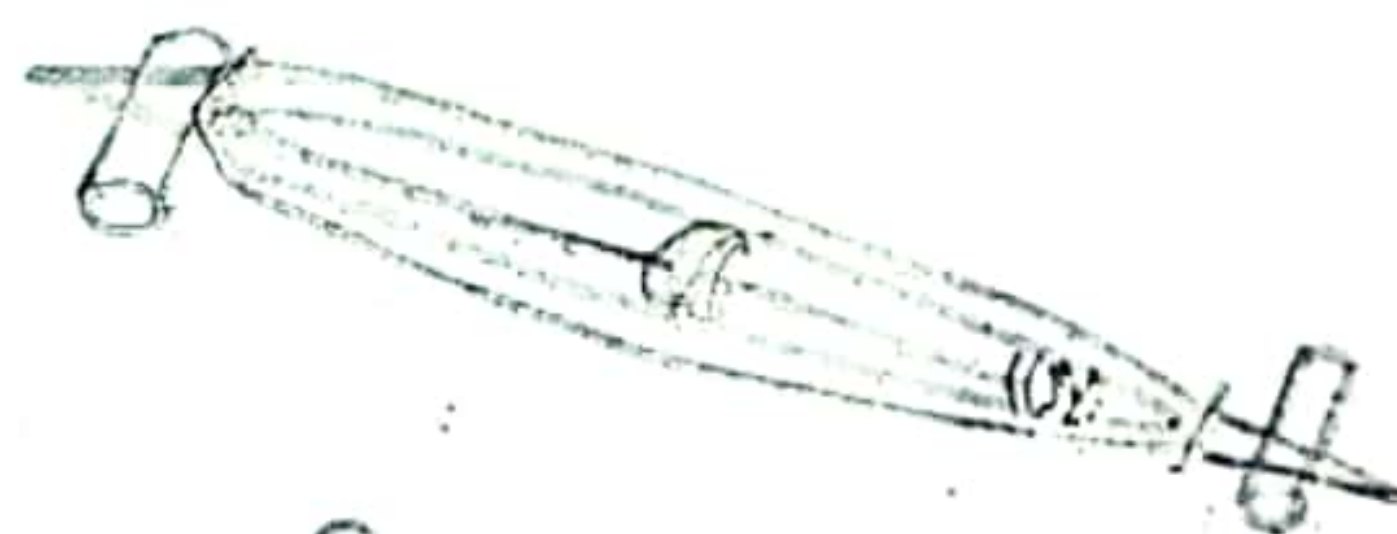


Fig: Reed switch

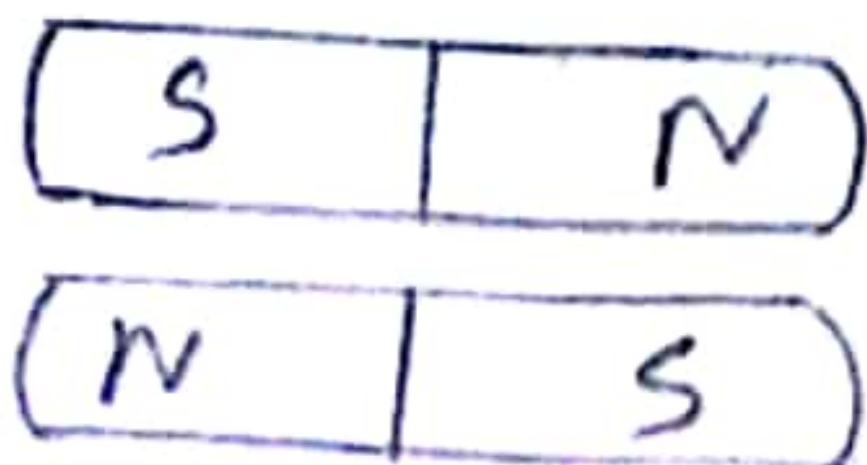


fig: magnet



fig: Battery

Tools:

1. Fidget spinner
2. Electromagnetic coil wire
3. Hot glue gun
4. Reed switch
5. Magnet
6. Switch
7. Battery

Description of the components:

1. Electromagnetic coil:

Electromagnetic coils are used in electrical engineering, in applications where electric currents interact with magnetic fields.

2. Fidget spinner:

A fidget spinner is a toy that consists of a ball bearing in the center, of a multi-lobed flat structure made from metal or plastic designed to spin along its axis with pressure.

3. Neodymium Magnets:

A neodymium magnet is the most widely used type of rare-earth magnet. It is a permanent magnet made from an alloy of neodymium, iron and boron to form the $Nd_2Fe_{14}B$ tetragonal crystalline structure.

4. Hot glue gun:

A hot glue gun is a hand-held device that uses a heating element to heat and melt solid glue. Once the adhesive has melted, it can be directed out of the gun's nozzle and then on to a given object.

5. Electrometer:

An electrometer is an electrical instrument for measuring electric-charge or electrical potential difference. There are many different types, ranging from historical handmade mechanical instruments to high-precision electronic devices.

6. Reed switch:

ID: 221902329
Shihab did this

The reed switch is an electromechanical switch operated by an applied magnetic field. It is used to control the flow of electricity in a circuit. They are made from two or more ferrous reeds encased within a small glass tube-like envelope, which become magnetised and move together or ~~se~~ separate when a magnetic field is moved towards the switch.

7. Battery:

An alkaline battery is a type of primary battery that derives its energy from the reaction between zinc metal and manganese dioxide. Alkaline batteries have a higher energy density and longer shelf life, yet provide the same voltage.

Discussion:

Electromagnets are made of coils of wire with electricity passing through them. Moving charges create magnetic fields, so when the coils of wire in an electromagnet have an electric current passing through them

the coils behave like a magnet; One face of the coil becomes a north pole; the other a south pole. The permanent magnet attracts its opposite pole on the coil and repels its like pole, causing the coil to spin. The strongest electromagnet is possible in the case of a 5 cm coil with 200 turns. A wire coil is an electrical conductor with one or more turns designed to produce a magnetic field. This is commonly used to increase the strength of a magnetic field. And a reed switch is used to control the flow of electricity in a circuit.

Problem we faced:

1. we needed three magnets but we couldn't find them anywhere so we broke 2 hard disks and took them (magnet) out.

2. First we used non-rechargeable batteries which was relatively low voltage. So, the circuit wasn't work properly. Then we solve the problem by using rechargeable battery.

3. Due to high numbers of patches of copper coil the spinner was not spinning properly. Later on, we were able to spin the spinner properly by changing the coil patch numbers to 180.

Conclusion:

- The current will flow through reed switch and the coil when the switch is on.
- This will produce an electromagnetic field while the reed switch repels the magnet on the fidget spinner or get it spin continuously.

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