

# Franklin's Bell

## Background

This was the first device that converted electrical energy into mechanical energy in the form of continuous mechanical motion. The bell clapper moves back and forth between two oppositely charged bells.

The invention was attributed to Benjamin Franklin but it was actually invented by Andrew Gordon in Germany in the 18th century.

## You will need...

- ✓ Two aluminium cans,
- ✓ aluminium foil,
- ✓ cotton thread,
- ✓ glass rod,
- ✓ string,
- ✓ two wires,
- ✓ two crocodile clips,
- ✓ high voltage supply (can use a Wimshurst machine, electric bug swatter either),
- ✓ insulated metal (scissors with plastic handles).

## Follow these steps

1. Place the two cans close to each other.
2. Tie a piece of thread around the middle of the glass rod and attach a ball of aluminium foil to the bottom of the string.
3. Place the glass rod across the top of the two cans as in the picture.

4. Connect the two cans to the high voltage power supply. (If using a bug swatter connect one can to the outer metal layer and the other to the inner metal layer.)
5. Switch on the power supply.
6. Observe what happens.
7. To discharge place an insulated scissors across the two cans.

## So what happened?

One of the cans becomes positively charged and the other negatively charged. The aluminium foil ball receives an induced electrostatic charge from one of the cans and is then attracted to it. The ball swings toward the can until they touch and the ball takes on the same charge as the can. Because like charges repel each other, the ball immediately is electrostatically repelled away from the can and, because opposite charges are attracted to each other, the ball is electrostatically attracted to the opposite can. When the ball touches the second can, the ball takes on the charge of the

second can, is repelled by it, and then returns to first can. The process keeps repeating creating a ringing effect.

## What next?

Try different materials for the ball such as the can tab.

Try different voltages.

## Safety notes

1. Take care when using high voltages as you can get an electric shock if you touch the cans!! Take care when discharging!
2. Do not allow students to do this experiment or stand close to this experiment.

