

In the nineteenth century, electricity was in its infancy.

Experimenters were struggling to understand the relationships between electricity, magnetism and the properties of materials.

Around 1826, Joseph Henry, a newly frocked professor at the Albany Academy, was fascinated by the magnetic compass and terrestrial magnetism.

He quickly expanded his investigations into magnetism in general and became a pioneer in the study of electromagnets. Electromagnets are devices that are only magnetic when energized with an electrical current.

Henry discovered that tight, orderly wrapping of wire around a soft iron core produced a much stronger electromagnet than a loose, haphazard looping of wire. Using this technique, he built the strongest electromagnet the world had ever seen.

By 1831, Henry was applying his knowledge to inventions. He produced a number of devices that used electromagnets to move pieces of iron or other magnets. We still see these devices today in the form of electrical buzzers, bells, and even doorbells.

In 1832, Henry moved to what is now known as Princeton where he taught numerous classes and continued his research. Here he influenced an entire generation of inventors.

In 1835, Henry invented the electrical relay—an extremely important invention which is basic to uncountable other electrical devices.

In essence, an electrical relay is a five wire device. Two wires control an electro magnet. The third wire connects with either the fourth or the fifth wire depending upon whether the electromagnet is energized.

If the electromagnet is not energized, there is a connection between the third and fifth wire. If the electromagnet is energized, then the third and fourth wires are connected.

A relay allows a small amount of power—just enough to energize a small electromagnet—to turn on and off a very large amount of power.

There are hundreds of variations on relays, but they all share the same basic principles. We will revisit relays from time to time in other talks. Relays helped to make many other inventions practical including the telegraph, and the telephone. In fact, early computers were designed using relays for the decision making circuits.

Henry's studies gave us the basic understanding of the relationship between magnetism and electrical currents. This would eventually lead to the invention of the induction motor by Nikola Tesla, the telephone, and the long distance telegraph by Samuel Morse just to name a few.

Joseph Henry's contribution to electrical studies is so important and basic that the unit of inductance—that relates current to the strength of a magnetic field—is known as a Henry.

Henry joins with

- Andre-Marie Ampere, a French inventor, from which we get amps, the measure of current
- Michael Faraday, an English inventor, from which we get Farads, the measure of capacity
- Georg Simon Ohm, a German inventor, whose name is now used for the measure of resistance,
- Alessandro Volta from which we get volts, the unit of electrical potential
- James Watt, a Scottish inventor, whose name is now used for the measure of power

In 1846, The Smithsonian Institution was created and Joseph Henry was appointed the 1st Secretary – the person in charge – and stayed in that post until he died in 1878 at the ripe old age of 80.

While at the Smithsonian, Henry worked with other inventors of the day, contributing to the improvement of numerous inventions.

So, whenever you hear a buzzer or the sound of a bell, you should think of Joseph Henry, the man who first used electricity to change his world.