

**Technical Description:Lights bulb**

Qirat Shahid

Writing as a engineer

City College of New York

Elisabeth von Uhl

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## **Light bulb**

### **Introduction**

Have you ever wondered what a light bulb is? We see light as a source coming from the bulb. Every one of us has held a light bulb. Before the light bulb we used lamps and candles, which was dangerous because it would set things on fire. For example, someone passing by the lamps or the candle and your hair was near it will catch fire. Which is why a light bulb is a savior to the modern world. Light bulb is an amazing invention not because it provides us with light but how it works and the history behind it.

### **Light bulb history**

. While when we think of bulbs we think of electricity. When we think of who invented the light bulbs usually we think it is Thomas Edison. But it is not. Humphry Davy invented the first electric light, when he was experimenting with electricity. He invented an electric battery when he connected wires to his battery and a piece of carbon, the carbon glowed, producing light. His invention was known as the Electric Arc lamp. While it produced light, it didn't produce it for long and was much too bright for practical use (History of the light bulb: Lighting basics). This shows that Humphrey invented the light bulbs.

After 7 decades later in 1840 , A British Scientist Warren de la Rue enclosed a coiled platinum filament in a vacuum tub and passed an electric current through it. From 1850 to 1878, Swan have developed a longer lasting light bulb using a tread cotton that also removed the problem of early bulb blackening (History of the light bulb: Lighting basics, 2023). In 1874, Henry Woodward and his colleagues Mathew Evans built their lamps with different sizes and shapes of carbon rods held between electrodes in glass cylinders filled with nitrogen. But they sold the patent to Thomas Edison in 1879 (History of the light bulb: Lighting basics, 2023). At the same time Henry Woodward and his colleagues Mathew Evans built their lamps with different sizes and shapes and they patented them. Thomas Edison filed his first patent application for “ Improvement In Electrical Lights” on October 14 1878 (History of the light bulb: Lighting basics, 2023). He also filed another U.S patent for an electrical lamp using “ a carbon filament or strip coiled and connected ...to plating contact wires” (History of the light bulb: Lighting basics, 2023). After his second patent was granted, which was very important because it showed different ways to make carbon filament like using cotton and linen thread, wood splint paper coiled in various ways. They discovered that a carbonized bamboo filament could last over 1200 hours (History of the light bulb: Lighting basics, 2023). It was a great discovery because now for the first time a filament lasts over 1200 hours which was not possible before. After this discovery in 1880 Thomas Edison company, which was Edison Electric Light Company, began marketing its new product that was manufacturing light bulbs. There is more history that leads light bulbs to what it is today (History of the light bulb: Lighting basics, 2023). This clearly shows that Thomas was not the one to make The light bulbs but improved and sold it. Him selling the bulb causes us the people to think that he invented the light

bulbs. He is the one to market and advertise the bulb. Warren de la Rue is the one who truly started to invent the light bulb.

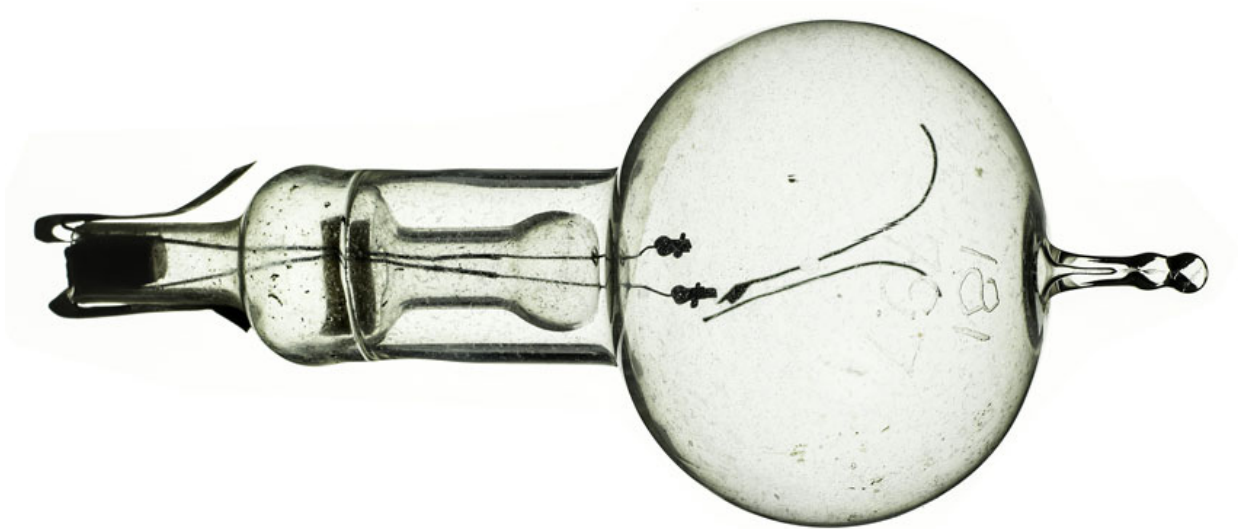


Figure 1: History of the light bulb: Lighting basics, 2023

### Light bulb system

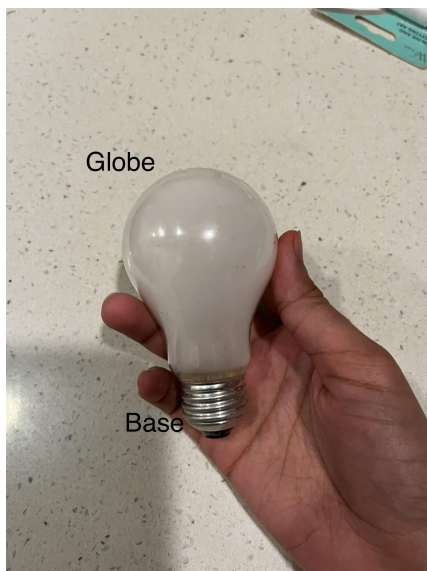


Figure 2: Image by Qirat Shahid, 2023



Figure 3: Image by Qirat Shahid, 2023



Figure 4 : Image by Qirat Shahid, 2023

#### Exterior part of the light bulb

- Globe
- filament
- Base

There are three parts: Thin glass forms the exterior of the bulb, called the globe. It contains the filament which gives off light, a stem that holds the filament, and a metal base that screws into a socket, such as in a lamp or ceiling fixture. The parts function together as one of the most successful inventions of all time. They fit together like a puzzle, just perfect.

## Interior of the bulb



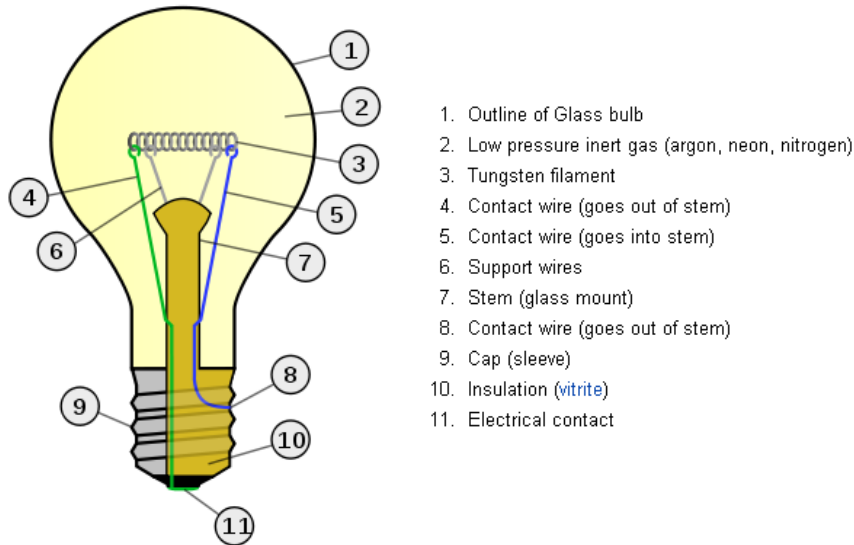
Figure 5: Image by Qirat Shahid, 2023

- The outer glass shell of the light bulb is called the globe. The glass ensures maximum light efficiency and provides strong support for the other parts of the bulb. The light bulb has a shape similar to a plant bulb; the rays of light from the filament are much more effective with this shape.
- The filament inside the light bulb is shaped as a coil to allow the required length of tungsten within its small environment to produce an abundant amount of light. Tungsten is a natural solid metal and a chemical element which is brittle in its raw state but in its pure form is very strong. It has to be, as the filament heats up to a blistering 2,550 degrees Celsius (4,600 degrees Fahrenheit). (Agravante, M, 2019).
- Then they are Wires and a Stem. Within the inner center of the light bulb there is a centralized stem made from glass, which supports the filament in its place. The connecting wires ensure the steady flow of electricity through the components of the light bulb. For example, the human heart works when blood travels to and from the heart. There are veins and arteries connected to the heart and rest of the body which allow the

blood to go in the heart and out of the heart to the rest of the body. There is a wire that takes the electricity from the base of the light bulb and another wire that completes the electrical circuit back to the base.

- There are also Invisible Gasses that you can not see from your naked eye. You can not see the light bulbs are inert glasses usually it have argon and/or nitrogen. These low-pressure gasses prevent the filament inside the bulb from burning out; it also relieves some of the stress on the glass globe from normal atmospheric pressure, lessening the chance of glass breakage.
- There is also a base. The base of the light bulb has three main functions. First, it securely supports the light bulb within an electrical source unit, like a lamp or a light fixture. The second job of the base is to transfer the electricity from the main electrical source to the inside of the light bulb itself (Agravante, M., 2019). The last function is to secure the globe and all of the components inside the bulb, creating a reliable and convenient light source. Filament and glass bulb are enclosure. The base connects the light bulb to the power source that provides electrical voltage. The base holds the contact wires through which electricity must continuously flow to energize the filament.
- The filament is the part that heats up until it starts glowing to give off light. An incandescent light bulb's filament is made of tungsten, a periodic table metal with a very high melting point (Agravante, M., 2019). This very high melting point allows tungsten to remain stable enough for the light bulb to continue working.
- A glass bulb encases the tungsten filament so that it does not catch anything on fire. The glass bulb either has a vacuum inside or an inert gas that prolongs the life of the filament so that the bulb can continue to light up (Agravante, M, 2019).





1. Outline of Glass bulb
2. Low pressure inert gas (argon, neon, nitrogen)
3. Tungsten filament
4. Contact wire (goes out of stem)
5. Contact wire (goes into stem)
6. Support wires
7. Stem (glass mount)
8. Contact wire (goes out of stem)
9. Cap (sleeve)
10. Insulation (vitre)
11. Electrical contact

Figure 6: An incandescent light bulb | download scientific diagram - researchgate, 2011

### **Volts, Watts, and Lumens**

Volt, watt and lumen are terms that are different but all are related to light bulbs. Volts measure the force of electricity flowing through a wire. For example, a 6-volt battery is different from a 9-volt battery in that the larger battery forces more electricity through a wire than the smaller one (Agravante, M.,2019).Watts measure the amount of energy the light bulb uses per hour. A watts measures energy use. A bulb with a higher wattage produces more light because of the increased power of electric current flowing through it. A 200 watt bulb uses up 200 watts of energy each hour. A lumen refers to the light bulb's measured brightness. A lumens measures brightness output.

### **Light bulb light up and type of light bulb**



Figure 7: Chakraborty, S., 2022

Light bulbs are everywhere. We think that all light bulbs are the same but no. There are four light bulbs that are Incandescent, Halogen, CFL and Led. LED bulbs are made of LEDs and made of semiconductor. They are the most energy-efficient in the modern world. Halogen bulbs are improved versions of Incandescent bulbs. It has a mixture of inert gas and little halogen. Halogen bulbs are reused and effectively elongate the life-span of the bulb. Fluorescent bulbs use the principle of fluorescence, where the mercury vapor is energized using the electric current flowing through the bulb (Chakraborty, S., 2022 ).This energized mercury vapor emits ultraviolet radiation to the phosphor coating on the inner walls of the bulb, causing it to emit light energy (Chakraborty, S., 2022). We are going to talk about light up as general (Incandescent, and Halogen). When electricity is pass it first enter the base that make of metal and pass it to wires. The electricity Circuit to the filament. It heat the filament. Which cause the Bible to light up. Essentially, the lightbulb is a very thin filament of hard-to-melt metal – tungsten, usually – encased in a glass bulb filled with inert gasses so that the filament does not oxidize and disintegrate. The electricity causes the wire to glow and a portion of that energy is turned into light (Person,2022). The electricity is converted to heat and use by the light bulb.

**In conclusion**

As you can see, Light bulb is an amazing invention not because it provides us with light but how it works and the history behind it. Its history leadlight bulges to what it is today and how it works today. Warren de la Rue is the one who truly started to invent the light bulb. Thomas is the one to market and advertise the bulb. There are many part of a bulb that work together that work together to make light bulb light. They are four type of bulb that are use in modern world that are Incandescent, Halogen, CFL and Led. The electricity causes the wire to glow and a portion of that energy is turned into light (Person,2022). Light bulb is a very successful and amazing invention and is perfect the way it is but we all have experience over that year as time changes things changes as well and are improving for better. I can only imagine what a light bulb will look like in the future and can not Wait to see it.

Reference

History of the light bulb: Lighting basics. Bulbs.com. (n.d.). Retrieved March 27, 2023, from <https://www.bulbs.com/learning/history.aspx>

An incandescent light bulb | download scientific diagram - researchgate. (n.d.). Retrieved April 3, 2023, from [https://www.researchgate.net/figure/Figure-1-An-Incandescent-light-bulb\\_fig1\\_267598738](https://www.researchgate.net/figure/Figure-1-An-Incandescent-light-bulb_fig1_267598738)

Agravante, M. (2019, March 2). Information about light bulbs for kids. Sciencing. Retrieved April 3, 2023, from <https://sciencing.com/information-light-bulbs-kids-5561995.html>

Chakraborty, S. (2022, February 16). How does a light bulb work? Science ABC. Retrieved April 6, 2023, from <https://www.scienceabc.com/pure-sciences/how-does-a-light-bulb-work-working-principle.html>

Person. (2022, February 24). How does a lightbulb actually work? BBC Future. Retrieved April 6, 2023, from <https://www.bbc.com/future/article/20131101-how-does-a-lightbulb-work#:~:text=Essentially%2C%20the%20lightbulb%20is%20a,energy%20is%20turned%20into%20light.>

