



# LIGHTING INNOVATIONS

**NECESSITY** is the mother of all **INVENTIONS**. What we reap is what we have sown in the past. However, maintaining and managing the seeds and crop is even crucial step. Experiencing illuminated moments with LEDs and advance lighting devices are the outcomes of some wonderful innovations. The series of inventions generated during various stages actually changed the way of our living style and thinking pattern. One of the examples of such changes is witnessed in energy sector too, where we have seen many breakthroughs from power plants and electric transmission lines to home appliances and electric motors. The invention of Light bulb made it a symbol of innovation. Light bulb is included in the list of greatest invention of the century.

## REALITY CHECKS

**1809:** Electric arc lamp was invented by Humphrey Davy in 1809. He used two carbon rods as a source of energy that flow through an arc of vaporizing carbon and create intense white light.

**1820:** Electric Incandescent Lamp was invented by Warren De la Rue who enclosed a platinum coil in an evacuated tube and passed an electric current through it. His lamp design was worked but the cost of the precious metal platinum made this an impossible invention for wide-spread use.

**1850:** Edward Shepard invented an Electrical Incandescent Arc Lamp using a charcoal filament.

**1852:** M. J. Robert invented an Incandescent Lamp that consist of a graphite rod operating in vacuum

**1854:** True Light Bulb was invented in 1854 by Henricg Globel, a German watchmaker.

**1875:** Herman Sprengel invented the Mercury Vacuum Pump making it possible to develop a practical electric light bulb.

**1875 -** Henry Woodward and Matthew Evans patented a Light Bulb.

**1878:** Sir Joseph Wilson Swan an English physicist was the first person to invent a practical and longer-lasting Electric Light Bulb (13.5 hours).

**1879:** Using lower current, a small carbonized filament, and an improved vacuum inside the globe, Edison successfully demonstrated the Light Bulb.

**1879:** Charles F. Brush of the United States invented the carbon arc Street Lamp.

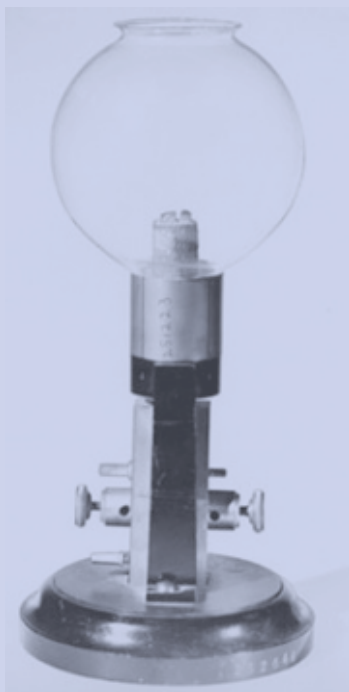
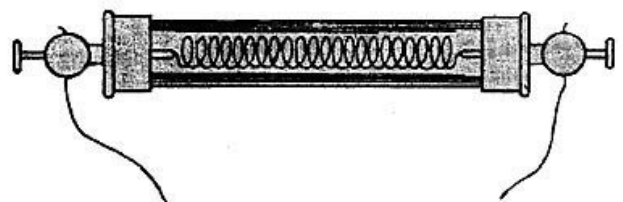
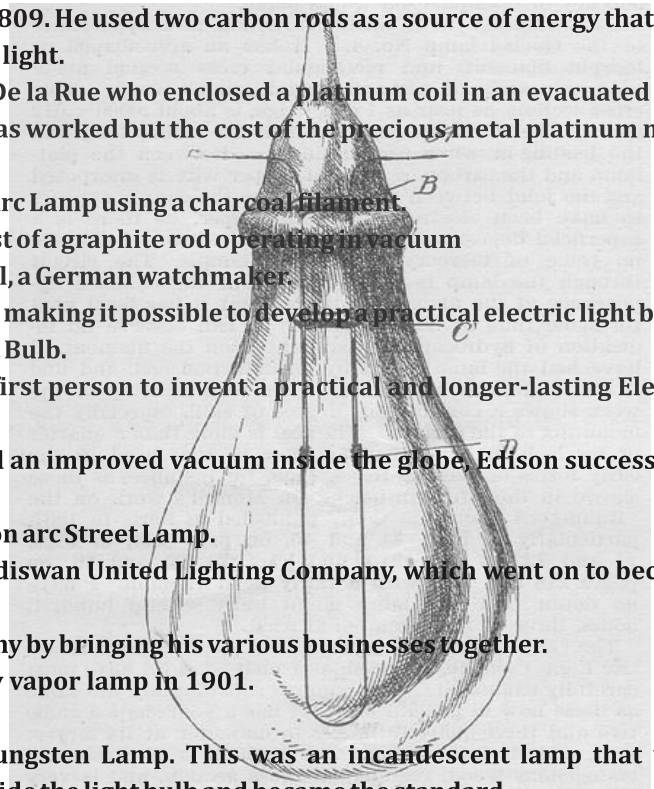
**1883:** The companies of Edison and Swan merged to form Ediswan United Lighting Company, which went on to become one of the largest manufacturers of light bulbs.

**1890:** Edison established the Edison General Electric Company by bringing his various businesses together.

**1901:** American, Peter Cooper Hewitt patented the mercury vapor lamp in 1901.

**1911:** Georges Claude of France invented the Neon Lamp.

**1915:** Irving Langmuir invented an Electric Gas-Filled Tungsten Lamp. This was an incandescent lamp that used tungsten rather than carbon or other metals as a filament inside the light bulb and became the standard.



## REAL STORY

As generally believed, Thomas Alva Edison did not "invent" the first light bulb. The true light bulb was first invented in 1854 by Henricg Globel, a German watchmaker. He used a carbonized bamboo filament placed inside a glass bulb. Two patents were granted to Henry Goebel in 1882 for an improvement of the Geissler-System of vacuum pumps and a solution to connect carbon-filaments and metal-wires in a light bulb. In 1875, Herman Sprengel invented the mercury vacuum pump making it possible to develop a practical electric light bulb. In 1875, Henry Woodward and Matthew Evans patented a light bulb.

Before 'inventing' famous Light Bulb, Thomas Edison with Sir Joseph Swann invented the first electric incandescent lamps during the 1870s. Edison's lamp became the first commercially successful incandescent lamp. Edison received U.S. Patent 223,898 for his incandescent lamp in 1880. Incandescent lamps are still in regular use in our homes.

Thomas Edison identified and acknowledged the true potential of a 50-year-old idea and worked on its improvement. In fact, he bought the patent rights from Henry Woodward and Matthew Evans's patent of a light bulb in 1875. Unfortunately, the two entrepreneurs could not raise the financing to commercialize their invention. Thomas Edison, who had been working on the same idea, invested \$50, 000 in the idea perceived as failed by the inventors themselves. Using lower current, a small carbonized filament, and an improved vacuum inside the globe, Edison successfully demonstrated the light bulb in 1879.

During the same time, in 1878, Sir Joseph Wilson Swan an English physicist, was the first person to invent a practical and longer-lasting electric light bulb (13.5 hours). Swan used a carbon fiber filament derived from cotton. Swan received his patent for a light bulb using a carbon filament in 1880. In 1881, the Savoy Theatre became the first public building to be lit by Swan incandescent light bulbs. It took 1,200 lamps.

In 1883, the companies of Edison and Swan merged to form Ediswan United Lighting Company, which went on to become one of the largest manufacturers of light bulbs.

In 1890, Edison established the Edison General Electric Company by bringing his various businesses together. General Electric was formed by the 1892 merger of Edison General Electric Company and Thomson-Houston Electric Company. In 1896, General Electric was one of the original 12 companies listed on the newly formed Dow Jones Industrial Average. After 119 years, it is the only one of the original companies still listed on the Dow index.

## RECENT DEVELOPMENTS

### 1927: Fluorescent Lamps

Friedrich Meyer, Hans Spanner, and Edmund Germer patented a fluorescent lamp in 1927. One difference between mercury vapor and fluorescent lamps is that fluorescent bulbs are coated on the inside to increase efficiency. At first beryllium was used as a coating however, beryllium was too toxic and was replaced with safer florescent chemicals.

### 1959: Halogen Lights

U.S. Patent 2,883,571 was granted to Elmer Fridrich and Emmett Wiley for a tungsten halogen lamp - an improved type of incandescent lamp - in 1959. A better halogen light lamp was invented in 1960 by General Electric engineer Fredrick Moby. Moby was granted U.S. Patent 3,243,634 for his tungsten halogen A-lamp that could fit into a standard light bulb socket. During the early 1970s, General Electric research engineers invented improved ways to manufacture tungsten halogen lamps. In 1962, General Electric patented an arc lamp called a "Multi Vapor Metal Halide" lamp.

### 1976: Compact Fluorescent Light (CFL)

In 1976, Edward Hammer at General Electric figured out how to bend the fluorescent tube into a spiral shape, creating the first compact fluorescent light (CFL). Many CFLs of 1990 were big and bulky, they didn't fit well into fixtures, and they had low light output and inconsistent performance. In 1991, Philips invented a light bulb that lasts 60,000 hours. The bulb used magnetic induction.



## 2008: Light-Emitting Diode (LED)

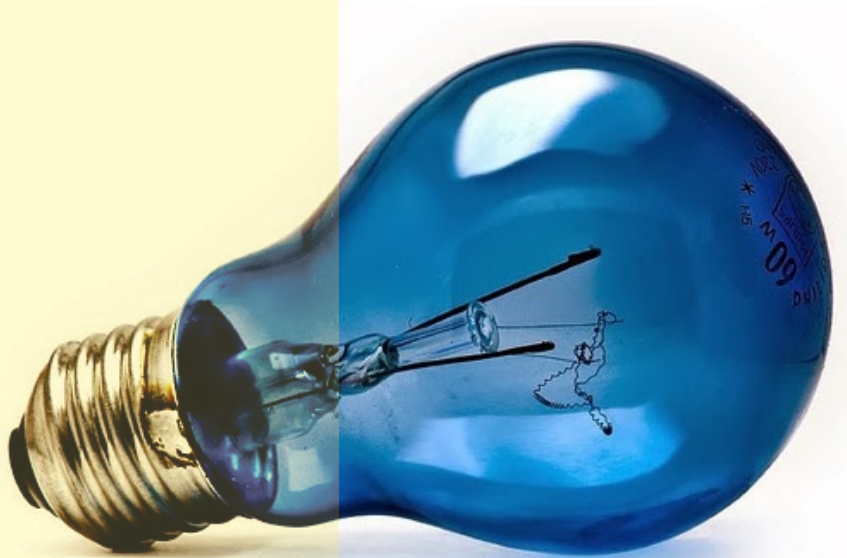
One of the fastest developing lighting technologies today is the **light-emitting diode** (or LED). A type of solid-state lighting, LEDs use a semiconductor to convert electricity into light, are often small in area (less than 1 square millimeter) and emit light in a specific direction, reducing the need for reflectors and diffusers that can trap light. To make LEDs an option for general lighting, researchers next had to focus on improving the efficiency of LEDs. Lighting companies continued to make improvements to both the quality of light and the energy efficiency of LEDs while cutting their costs. Since 2008, the cost of **LED bulbs has fallen more than 85 percent**, and most recently, a number of retailers announced that they will sell LEDs at Rs. 100 or less. Today's LED bulbs are also **six to seven times more energy efficient** than conventional incandescent lights, cut energy use by more than 80 percent and can last more than 25 times longer.



Replacing the old bulbs with LEDs is only the tip of the iceberg when it comes to saving energy on lighting.

## REAL LESSON

- **ADVANCEMENT AS WELL AS DIVERSIFICATION IS THE KEYS TO SUCCESS.**
- **MERELY INVENTING DOESN'T ALWAYS HELP, ONE NEEDS TO IDENTIFY POTENTIAL AS WELL.**
- **THOMAS ALVA EDISON DID NOT "INVENT" THE FIRST LIGHT BULB BUT HE IDENTIFIED AND DIVERSIFIED THE ESSENCE OF TRUE INVENTION INTO A SUCCESSFUL BUSINESS MODEL.**
- **LIFE EXPECTANCY OF A TECHNOLOGY MUST BE RECOGNIZED WELL IN TIME.**
- **FORESEEING THE DEMANDS AND WORKING TO FILL THE GAP PROVIDES FOR THE GREATEST LEAP.**
- **FROM FIRST LIGHT BULB TO LED, GENERAL ELECTRICAL (GE) IS STILL INVENTING; A LOT TO LEARN FROM GE.**



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