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Discovery

William Coolidge – Cathode Ray Tube

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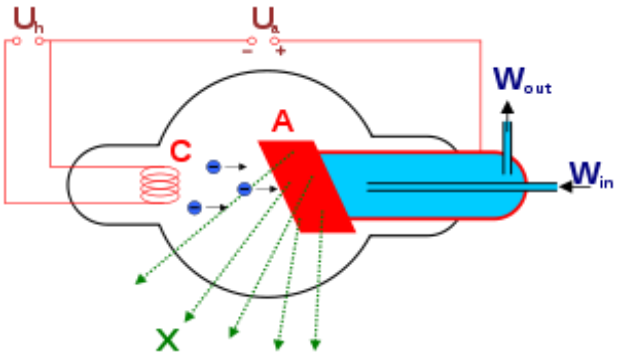
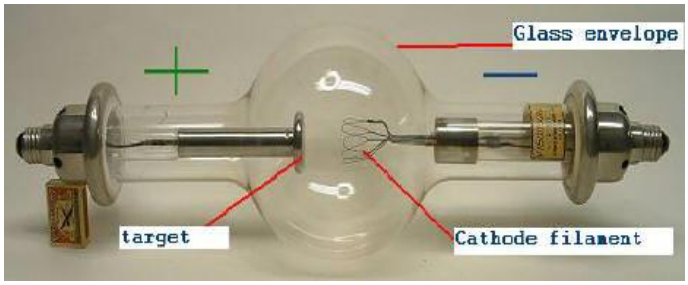
1. INTRODUCTION

American physicist Coolidge lived to be 102 and was awarded 83 patents during his lifetime. On August 6, 1935, he received a patent for the cathode ray tube, a key component of televisions and other electronics applications. All light and radio waves belong to the electromagnetic spectrum, and are all considered different types of electromagnetic waves, including microwaves and infrared bands whose waves are longer than those of visible light (between radio and the visible) and UV, EUV, X-rays and g-rays (gamma rays) with shorter wavelengths. The electromagnetic nature of x-rays became evident when it was found that crystals bent their path in the same way as gratings bent visible light: the orderly rows of atoms in the crystal acted like the grooves of a grating. The most important event in the progress of radiology was the invention by William Coolidge in 1913.





2. WILLIAM COOLIDGE & X-RAY TUBE

William Coolidge invented the X-ray tube popularly called the Coolidge tube. His invention revolutionized the generation of X-rays and is the model upon which all X-ray tubes for medical applications are based. This device patent number #1,203,495, granted in 1913, made the use of x-rays for medical diagnosis. X-rays are a form of energy that travels in waves much smaller than those of visible light. Coolidge's machine allowed these waves easily to be produced by the impact of high-energy electrons on a tungsten anode within a vacuum tube, and then to be directed through a substance onto a photographic plate. Denser materials within the substance being scanned absorb more x-rays, and thus produce a brighter photographic image on the plate.

2.1. Advantages of Coolidge tube

The key advantages of the Coolidge tube are its stability, and the fact that the intensity and energy of the x-rays can be controlled independently. Increasing the current to the cathode increases its temperature. This increases the number of electrons emitted by the cathode, and as a result, the intensity of the x-rays. Increasing the high voltage potential difference between the anode and the cathode increases the velocity of the electrons striking the anode, and this increases the energy of the emitted x-rays. Decreasing the current or the high voltage would have the opposite effects. The high degree of control over the tube output meant that the early radiologists could do with one Coolidge tube what before had required a stable of finicky cold cathode tubes. As a bonus, the Coolidge tube could function almost indefinitely unless broken or badly abused.

2.2. Other inventions of Coolidge: invention of ductile tungsten

A breakthrough in tungsten applications was made by W. D. Coolidge in 1903. Coolidge succeeded in preparing a ductile tungsten wire by doping tungsten oxide before reduction. The resulting metal powder was pressed, sintered and forged to thin rods. Very thin wire was then drawn from these rods. This was the beginning of tungsten powder metallurgy, which was instrumental in the rapid development of the lamp industry - International Tungsten Industry Association (ITIA).

3. WILLIAM D.COOLIDGE

Born on Oct 23rd 1873 and Died by Feb 4th 1975. Coolidge, born in Hudson, Massachusetts, graduated from the Massachusetts Institute of Technology in 1896, majoring in electrical engineering. He received his Ph.D. in 1899 from the University of Leipzig. He later returned to MIT, working first as an instructor and later as an assistant professor. Coolidge joined the staff of General Electric Company's Research Laboratory in 1905 and early in his career played a major role in the development of the modern incandescent lamp. He invented ductile tungsten, the filament material still used in such lamps. He worked on many other devices such as high-quality magnetic steel, improved ventilating fans, and the electric blanket. During World War II he contributed research to projects involving radar and radar counter measures. He was awarded 83 patents during his lifetime.

It is impossible to estimate the number of lives that have been saved thanks to Coolidge's greatest achievement---to say nothing of its applications in scientific research (for example, in analyzing the structure of crystals). The "Coolidge tube" stands as a classic example of an inventive mind harnessing a phenomenon of nature and putting it to use for the good of humanity.

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