

Tube of the Month

Coolidge Dental X-Ray Tube of 1919

A few years before the invention of the vacuum tube, work was being done with gas discharge cathode ray tubes (no filament). In 1895, W. K. Roentgen noticed that an unknown ray was being emitted from his CRT's screen. The ray wasn't affected by magnetism and it would pass through other objects. He set up an experiment to see what it would do to human tissue. He had his wife stick her hand into the beam along with a photographic plate. All the bones and her ring were visible. This unknown radiation he called "X-radiation". It is unknown what his wife called him.

X-rays were an exciting scientific subject and within a few months many people were experimenting. Thomas Edison was one of the first to warn of the danger caused by x-rays especially to the eyes. Eye protection was tried when taking dental x-rays. The early days of x-ray experimentation were marked by skin burns, blindness, death, deformed frogs and of course law suits.

In 1913, William Coolidge, who worked for General Electric (later Vice President), invented an x-ray tube that had a tungsten target and a hot cathode. This tube made modern x-rays possible, as the results were predictable. The rays could be channeled in a beam and the exposure time reduced. The electron beam was projected onto an angled tungsten target that was surrounded by copper for heat dissipation. Many different tubes were produced but in 1919 the first dedicated dental x-ray tube was made.

The tube was angled so the equipment could get close to the patient's face. With an anode potential of 50,000 volts, precautions needed to be made. The 13-inch tube was encased in lead glass and had a funnel like aiming tip. The anode was protected with Bakelite and some rods were formed to make a screen guard. The filament had a focusing reflector to direct the beam. Like most early x-ray tubes, the filament voltage was applied through a standard light bulb assembly. Some fins were attached to the anode end for heat dissipation.

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