Tech Develops 4 Million Volt X-Ray Machine

Produce Radiation

Stronger Than Radium

Supply of Whole World

Develops a direct current x-ray generator operating at a potential of more than 4,000,000 volts, was announced at the thirty-fourth annual meeting of the American Roentgen Ray Society in Chicago on Friday morning, September 18.

This generator produces the first radiation which is more penetrating than the gamma rays of radium and with an intensity greater than that of the entire available world supply of radium. The new generator was announced in a paper presented by Dr. John G. Trappe, its designer, and R. W. Cloud who described construction of the apparatus, while a paper by Dr. Richard Davies of Boston reported the preliminary clinical observations on the use of these high voltage x-rays.

Development of the new generator has gone forward under a grant of funds from the Collis P. Huntington Memorial Fund.

The new generator, the design of which is based on the Van de Graaff principle of high voltage machines, consists of a dome-shaped high-voltage terminal above which is the insulated metallic space. A single insulating belt twelve inches wide travels at high speed within the colloid and transfers an electrical charge continuously between the terminal and the colloid. This assembly is mounted within a sealed metal pressure tank in order that by compression of a mixture of air and Freon gas the electrical charge may be retransmitted. This tank is four and one half feet in diameter and thirteen feet high.

In operation, a negative electric charge is sprayed on the insulating belt at its lower end and carried up into the high-voltage terminal, which thus acquires a negative electrical pressure in direct proportion to the stored electrical charge. The voltage may be adjusted from a few thousand volts to the maximum of more than four million volts by controlling the current sprayed on the charge-carrying belt. The arc tube is fixed vertically within the generator column. A metal expansion joint connects the tube and the terminal, and also in a water-cooled gold target originating at the upper flanges in the high-voltage terminal and conducted to the storage column. The electrons for producing x-rays by bombardment of the gold target originate at the upper flanges in the high-voltage terminal and conduct to the storage column. The electrical charge continuously between the terminal and the arc tube is progressively accelerated and focused as they are projected down the tube at the gold target.

In describing the clinical use of the highly penetrating radiation of the new generator, Dr. Dresser reported that the rays have essential the same physical properties as the gamma rays of radium, but that their intensity permits more tissue destruction with the result that the depth dose is much greater than it has been possible to obtain in radium therapy.

Treatment with the high-voltage deeply penetrating x-rays produces a visible skin reaction. The primary generator of the type just described was developed in 1907 to operate at a potential of 1,000,000 volts. This machine was installed in the Collis P. Huntington Memorial Hospital in Boston. A second and more compact unit operating at 1,500,000 volts was built in 1940 for the Massachusetts General Hospital.

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