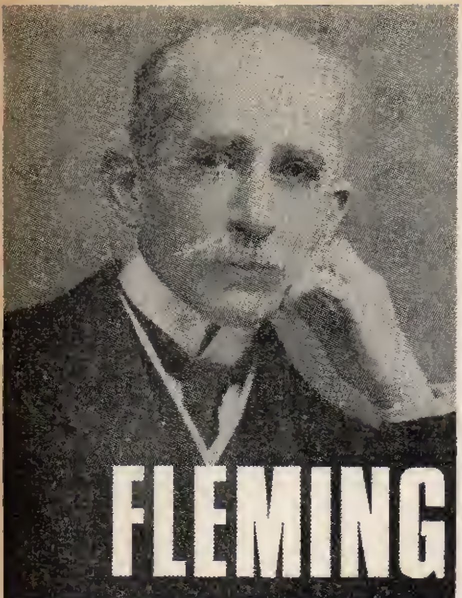

discovery. I have found a method of rectifying electrical oscillations. that is making the flow of electricity all in the same direction. so that I can detect them with an ordinary mirror galvanometer. I have been receiving signals on an aerial with nothing but a mirror galvanometer and my device. but at present only on a laboratory scale. This opens up a wide field for work. as I can now measure exactly the effect of the transmitter. I have not mentioned this to anyone yet as it may become very useful.

Yours very sincerely
J.A. Fleming

FLEMING ... AND THE DIODE

60th Anniversary of the Invention of the Thermionic Valve by Sir Ambrose Fleming, F.R.S.

THE "Fleming Oscillation Valve", the forerunner of today's vast range of specialised valves, was discovered by Sir Ambrose Fleming just 60 years ago, in November 1904. Perhaps one of the most important electronic discoveries of the century, this invention heralded the birth of the electronics industry.

At the time of his discovery, Sir Ambrose was Professor of Electrical Engineering at University College, London, and since 1899 had been Scientific Adviser to The Marconi Company. He was very closely associated with Marconi himself and had played a leading part in the design of the powerful transmitting equipment at Poldhu in Cornwall, with which Marconi made his first successful wireless transmission across the Atlantic in 1901.

In his search for better methods of detecting electromagnetic or wireless waves, Sir Ambrose, recalling the results of earlier research involving the passage of electric currents through rarefied gases, conducted a series of experiments utilising some of his original apparatus. This new work led him to the discovery of the "Fleming Oscillation Valve", the first thermionic valve produced in the world. This was quickly recognised by the Marconi Company and the "valve" was soon put into full production.

The immediate effect of Fleming's diode was to improve the sensitivity of the early wireless telegraphy receiving apparatus which previously had been dependent upon coherers or crystal detectors. But the subsequent developments were even more momentous.

One man's discovery frequently inspires other workers in a similar field. This was so in the case of the thermionic valve. Following on the success of Fleming's invention, three years later Lee de Forest of America patented a thermionic valve with a third electrode. The invention of the triode (Lee de Forest originally called it the "audion") made possible both the generation and the amplification of alternating currents; it brought to an end the era of the spark transmitter, and ushered in the wireless telephone. Soon many further potentialities of the valve were perceived . . .

Sir Ambrose died in his 96th year on 18 April, 1945, at Sidmouth, where he had spent the last few years of his intensely active life in retirement.

(Left) Three early Fleming diodes
(Right) Two early Marconi production models of the Fleming diode
At the top of the page appears a reproduction of the end of a letter from Fleming to Marconi informing him of this discovery which "may become very useful"
(Photographs kindly supplied by the Marconi Co. Ltd.)