

Nobel Prize in Physics 1928



Owen Willans Richardson

The Nobel Prize in Physics 1928 was awarded to Owen Willans Richardson *"for his work on the thermionic phenomenon and especially for the discovery of the law named after him"*.

RESEARCH INFORMATION:

Among the great problems that scientists conducting research in electrotechnique are today trying to solve, is that of enabling two men to converse in whatever part of the world each may be. In 1928 things had reached the stage when we could begin to establish telephonic communication between Sweden and North America. On that occasion there was a telephone line of more than 22,000 kilometres in length between Stockholm and New York. From Stockholm, speech was transmitted via Berlin to England by means of a cable and overhead lines; from England by means of wireless to New York; then, via a cable and lines by land, over to Los Angeles and back to New York, and from there by means of a new line to Chicago, returning finally to New York. In spite of the great distance, the words could be heard distinctly and this is explained by the fact that there were no fewer than 166 amplifiers along the line. The principle of construction of an amplifier is very simple. A glowing filament sends out a stream of electrons. When the speech waves reach the amplifier, they oscillate in tune with the sound waves but are weakened. The speech waves

are now made to put the stream of electrons in the same state of oscillation as they have themselves. So exactly does the stream of electrons adapt itself to the speech waves that the amplification could be repeated 166 times without the distinctness of speech being lost.

I should like to give another example of what has recently been attained in that department. On the 16th of February 1928, there was a conference between the American Institute of Electrical Engineers in New York and the Institution of Electrical Engineers in London. The various speeches could be heard in both places by means of loud-speakers.

Most people here present will certainly be able to call to mind those anxious days, when news of the missing Nobile expedition was awaited all over the world. Everyone will no doubt remember that the first word of the lost expedition was picked up by a wireless amateur. I think that on this occasion it was clear to many people that wireless is not only a means of diversion and as such, one of the more prominent - but also one of the most valuable expedients in the struggle against that sort of Nature which is still unconquered.

Every owner of a valve receiving-set knows the importance of the valve in the apparatus - the valve, the essential part of which is the glowing filament.

At the Jubilee, held in the twenty-fifth year of the reign of King Oscar II, our medical men were enabled to take up the struggle against the tuberculosis, thanks to the Jubilee Fund. At the Jubilee held on Your Majesty's 70th birthday, the fight against cancer was taken up in the same manner. We all know that Röntgen rays are one of the keenest weapons employed in this struggle. But we know, too, that this weapon is double-edged. The rays cannot only do good but also do harm. All depends on the accurate regulation of their strength and intensity. Quite recently, a change has taken place in this department. Röntgen rays are obtained when rapidly moving electrons collide with a solid body. By using a glowing filament in order to produce the electron stream, the means of regulating accurately the strength and intensity of Röntgen rays has been obtained.

Behind the progress which has here been briefly pointed out, lies the work of many men. But we have seen that they all have one thing in common. A "red thread" connects them - the glowing filament.

As early as 1737, a French scientist, Du Fay by name, found out that air in proximity to a glowing body is a conductor of electricity. Valuable researches concerning the character of this conductivity was made by Elster and Geitel, two German scientists. Their investigations were continued by Mr. J.J. Thomson, the Grand Old Man of English Physics of today. By these researches they have found it probable that the conductivity of air in proximity to a glowing metal depends on electrons in the air, which have been made free in some way or another. So far had the researches advanced when Mr. O. W. Richardson appeared and devoted himself to it. He began by laying down a theory for the phenomenon. According to this theory the phenomenon is bound up with the electrical conductivity of metals. The latter depends on the fact that there are free electrons in a metal. At higher temperatures these cannot, according to Mr. Richardson, be retained by the body but they are emitted according to a fixed law. But a theory alone does not give any knowledge of reality. That can be obtained only by means of experimental research. So Mr. Richardson proceeded to do this. The point was to find out if the theory was really right. The strenuous work of twelve years was necessary to settle this question. So hard was the struggle that even so late as in the twelfth year, there was a time when it was uncertain whether Mr. Richardson's theory was not completely wrong, and if the origin of the phenomenon was not quite different, being, for instance, chemical reactions between the metal and impurities in it. But in the end, Mr. Richardson's theory proved to be correct in all essential points. The most important fact was that Mr. Richardson's opinion about the thermion-phenomenon with fixed laws was totally confirmed. Through this fact a solid basis was obtained for the practical application of the phenomenon. Mr. Richardson's work has been the starting-point and the prop of the technical activity which has led to the progress of which I have just spoken. Professor Richardson. You are a happy man. You possess the very

thing that gives life its chief value. You can devote yourself with all your strength to the activity that you love. We constantly see the results of this activity come to light. Besides this, you are fortunate enough to see the harvest ripen to the benefit of mankind in the fields you tilled in your youth. For one who is so rich it is but a little thing to receive the



greatest prize which the Royal Academy of Sciences has at its disposal as a reward for a scientific discovery. I ask you, however, to receive from our King's hand the Nobel Prize for Physics for the year 1928.

For more details please visit:

http://www.nobelprize.org/nobel_prizes/physics/laureates/1928/press.html