Obituary Notices

The Marchese Marconi

THE death of the Marchese Marconi from heart failure on July 20 deprives us of one who had taken the leading part in the development of world-wide communication. It is difficult to exaggerate the importance of his discoveries and the great effects they will have on the future history of the world. For communication purposes, he took the lead in helping to abolish space; and it is to be hoped that this, in the course of time, may result in the abolition of differences in language and even limitations of race. When sound and television are perfected in broadcasting, the outcome of early experiments in radio, life will surely be made easier for the masses, and Marconi's name will be kept green for hastening the advent of this blessing to humanity.

The early history of a great inventor is instructive; and luckily we have many accounts of Marconi's early life. One of the most interesting is the book by R. N. Vyvyan, formerly engineer-in-chief to Marconi's, entitled "Wireless over Thirty Years". For many years, Vyvyan was in close personal touch with Marconi and took a leading part in the great transatlantic transmission experiments.

Guglielmo Marconi was born in Bologna on April 25, 1874, his father being an Italian country gentleman and his mother the daughter of Mr. Andrew Jamieson, of Daphne Castle, County Wexford, Ireland. He was the younger of two brothers and was privately educated at Bologna, Florence and Leghorn. He attended Prof. Rosa's lectures on physics and studied the works of Prof. Righi. He was familiar with researches that had been made on Hertzian waves. While still a student, he was firmly convinced that just as flashes of light can be used to send signals by means of a heliograph, so, in an analogous way, electric waves could be used for signalling.

Marconi's earliest experiments were made in 1894 before he was twenty-one years of age. He used an induction coil as a Hertz emitter, and, at first, used a ball discharger of the type designed by Righi. It consisted of four brass balls separated by small gaps, immersed in 'Vaseline' oil. He connected one terminal of the secondary of the induction coil to a metal cylinder elevated to the top of a pole, and the other to a metal plate laid in the ground. He thus produced an elevated aerial which discharged across the spark gap to earth. At the receiving end he erected a similar capacity at the top of a pole and connected it to earth through a Branly coherer. He improved the design of this coherer, making it much more sensitive than anything previously made. In 1895 he employed metal cubes, the length of an edge being one foot. With this apparatus he was successful in receiving signals up to a distance of thirty metres. Doubling the height of the poles to four metres, he found that he could transmit to a hundred metres and quadrupling the height to eight metres, he transmitted to a distance of four hundred metres. He next increased the cubes so that their edges were about 3 ft. 3 in. in length. With this new aerial he was able to record Morse signals up to distances of about one and a half miles. He also tried the effect of concentrating the waves by means of large metal parabolic reflectors. This experiment was the forerunner of the beam aerials which came into use in later days when short electric waves were proved to be practicable.

In 1896, Marconi came to England and took out a patent, the first ever given for radio-telegraphy. In July of that year, Mr. Campbell Swinton introduced Marconi to Sir William Preece, the engineer-in-chief of the British Post Office. Sir William gave him every facility to carry out his experiments and with the help of the Post Office engineers, his system was successfully operated between the General Post Office and the Thames Embankment. The attention of the general public to the importance of Marconi's experiments was first attracted by the experiments carried out on Salisbury Plain, where reception over a distance of eight miles was demonstrated in the presence of officials of the Navy, Army and Post Office. In June 1897, Sir William Preece, in a lecture to the Royal Institution on "Signalling through Space without Wires", said that "Marconi had produced from known means a new electric eye, more delicate than any known instrument, and a new system of telegraphy which will reach places hitherto inaccessible". He also said that for shipping and lighthouse purposes it was a great and valuable acquisition.

In 1897, 'The Wireless Telegraph and Signal Company, Ltd.' was formed to acquire Marconi's patents. Three years later, the name was changed to 'Marconi's Wireless Telegraph Co. Ltd.' Marconi's next step was to erect a station at Alum Bay and another in Bournemouth. For this communication system he elevated his aerials to a height of about 120 feet and used a ten-inch spark induction coil. The Isle of Wight station was inspected by Lord Tennyson and Lord Kelvin, the latter paying for two radio messages. One of these, dated June 8, 1898, was to Sir William Preece at the G.P.O., London, and the other to Sir George Stokes.

In 1898, Prof. Slaby, of the Technical High School, at Charlottenburg, wrote an article on the 'new telegraphy' in the *Century* magazine. He pointed out that by a simple, but extraordinarily effective, method Marconi had raised the power of radiation a hundredfold. In collaboration with Count Arco, Prof. Slaby developed the Slaby-Arco system, but the German national wireless system—known as the Telefunken System—was not founded until 1903.

In May 1898, at the request of Lloyds' Corporation, apparatus was installed at Ballycastle and Rathlin Island in the north of Ireland. Uninterrupted

communication was obtained, the lighthouse keepers quickly learning how to use the apparatus. About this period, Marconi greatly increased the range of transmission by inserting the primary winding of a small air core transformer in the aerial, the secondary windings being split by a condenser, the outer ends being brought to the terminals of the coherer. These transformers were called 'jiggers', and their efficiency encouraged Marconi to attempt to communicate across the Channel. The French Government gave permission to erect a mast at Wimereux. A corresponding mast was erected at the South Foreland Lighthouse and Marconi successfully transmitted messages on March 27, 1899. The Wireless Co. had established their works at Chelmsford and had erected a mast 150 feet high. Communication was effected between this station and Wimereux—a distance of 85 miles.

In the year 1900, the technical staff that the Wireless Co. had collected numbered only seventeen. Among them were Eccles, Erskine Murray and Andrew Gray, who was afterwards manager. In 1899, Prof. (now Sir Ambrose) Fleming had been appointed scientific adviser to the Company. The rapid increase in the range of radio communications had convinced Marconi that the curvature of the earth presented no obstacle to the extension of radio communication, and he decided to attempt to telegraph by his system across the Atlantic. In consultation with Fleming it was decided that the station for the transatlantic experiments should be built on the west coast of Cornwall. The site chosen was at Poldhu, on the west coast of the Lizard. In 1900, Marconi obtained his very important patent for 'tuned or syntonic telegraphy'. He used this method in his attempts to send signals across the Atlantic. He erected a station similar to Poldhu at Cape Cod in Mass., U.S.A. Unfortunately, the masts and aerial at Poldhu were wrecked by a storm, and a similar mishap at Cape Cod threatened to delay seriously the experiments. To save time when the Poldhu station was restored he went to Newfoundland and used a balloon to support his aerial. But as this was blown away, he used a kite as the support which, with great difficulty owing to a storm, was kept at a height of about 400 feet. He cabled to Poldhu to begin the pre-arranged programme, consisting of sending the Morse letter S (3 dots in succession) from 3 p.m. to 6 p.m. each day. On December 12, 1901, both he and his assistant repeatedly heard in their telephone the three clicks which proved that the electric waves had traversed the 1,800 miles separating St. John's from Poldhu.

In 1902, the site of a power station was chosen at Glace Bay in Canada, and when completed Marconi left England for Canada in an Italian cruiser, arriving on October 31, 1902. During the whole voyage he was receiving from Poldhu in the night time, but in the daytime he heard nothing after the distance was greater than 500 miles. When transmission was started, the early results were very disappointing. Later on, a site for a new station was found at Clifden, Ireland, and aerials were erected on a new principle Marconi had discovered. The Glace Bay and Clifden stations were opened for unlimited public service in February 1908. During the Irish rebellion, the Clifden Station was put out of action and a new station at Caernarvon in Wales was used instead.

Prior to 1916 it was generally accepted that for long-distance transmission long waves were essential. But in 1916 Marconi began his wonderful experiments on short-wave transmission, the wave-lengths being only about a hundredth of those usually employed. Erecting a small transmitting station at Poldhu, and fitting a receiver to his yacht *Elettra*, he found in 1923 that with a wave-length of 92 metres excellent reception could be obtained up to about 1,200 miles. The outcome of his work was that the Government accepted the Marconi Company's proposals to use the short-wave beam system for Imperial communications and started building stations capable of working with Canada, South Africa, India and Australia. Later on, in 1931, Marconi turned his attention to the systematic investigation of waves only about one metre in length. Using these waves, a transmission system was put into successful operation between the Vatican City and the papal palace at Castel Gaudolfo.

To the end of his life Marconi retained the vigour of youth. His love for experimenting never waned, and he infected his colleagues with his enthusiasm. He worked hard and was very successful in applying his theories.

Marconi married in 1905 the Hon. Beatrice O'Brien, daughter of Lord Inchiquin, who had been lady-in-waiting to the Queen of Italy. The marriage was dissolved by decree granted at Fiume in 1924. In 1927 he married the Countess Bezzi-Scali of Rome. He had one son and two daughters by his first wife and one daughter by his second.

During his lifetime Marconi's achievements brought him many of the highest honours which nations can bestow. His name is a household word all over the world. The patience and equanimity with which he bore the disappointing results obtained by many of his early laborious experiments will be for all time an encouragement to young engineering physicists.

Dr. H. H. Jeffcott

HENRY HOMAN JEFFCOTT, who died on June 29, was born in Co. Donegal in the year 1877. In 1895 he entered Trinity College, Dublin, from the High School, Dublin, and had a very distinguished career there. In 1897 he obtained a senior exhibition at the final freshman examination, and in 1898 he was first mathematical scholar. In 1899 he graduated with a senior moderatorship in experimental science and a junior moderatorship in mathematics and a moderatorship prize. He spent the next year in London, and in 1900 returned to Trinity College and entered the Engineering School, where he obtained his engineering degree in 1902 with honours in all subjects. In the same year he won the McCullagh Prize for a treatise on the theory of elasticity.

Jeffcott spent the next few years in the shops of Armstrong Whitworth and Co., Ltd., and as assistant