# Growth of Radio Communication

**RADIO is younger than the average reader. Within 30 years it has developed from doubtful experiment to a world-wide necessity. It is becoming more than a daily amusement, it is moulding the destiny of civilisation and it is not speculation to say that within the next 20 years communication, both verbal and visual, will be taking forms that the mind cannot picture.**

**The following is the synopsis of an address on this topic delivered to the Wellington Radio Society by our Technical Editor.**

AS early as 1838 the first wireless telegraphic signals were transmitted, when Steinheil was conducting experiments in transmitting wireless telegraphic signals through iron railings. On the completion of the experiment it was found that in more than one place the railings were not touching, and it was realised that such a phenomenon as wireless telegraphy was possible.

In the latter part of the nineteenth century a brilliant young scholar who later was to specialise in mathematics became well known at Cambridge University—this was the now world-famed Clark Maxwell. Working from a hypothesis, Maxwell proved mathematically that wireless telegraphy was possible and that it took the form of waves which could range up to 100 miles long. These had the power of penetrating and could be reflected. He advanced the theory that when a fluctuation of electricity took place in a magnet, a series of surges was set up in the field of this magnet. These surges moved at a definite number per second, and were consequently a definite distance apart, and that if an instrument could be devised to move in harmony with these, signals could be transmitted without wires.

Considerable interest was aroused by these rather startling hypotheses, and in 1887 the attention of a German scienist, Hertz, was drawn to these publications. He was sent to England to prove or disprove Maxwell's theories. In his experiments he constructed an induction coil which fed high-tension impulses to two balls of metal, and at a distance of some 20 or 30 feet was able, through the medium of a bent wire, to get a spark moving in resonance with the surges of current between the two balls. This was the first oscillator, and proved Clark Maxwell's theory. Later, a series of Layden jars was connected between the two balls, resulting in an improved oscillator.

TELEPHONE transmission was at this time becoming rapidly improved, and a Londoner named Hughs became interested in the perfection of the microphone. Hughs discovered that with his instrument he could at some hundreds of yards detect leakages in telephone lines, and he stated that it would be possible to develop a new science on these lines. Hughs became quite a familiar figure in his quarter of London, being known as a "rather queer fellow with funny ideas." He could be seen well into the night moving stealthily along the dark streets, dodging backwards and forwards, holding a strange instrument to his ears. He was intercepting wireless signals. Thus, while Maxwell was predicting wireless telegraphy and Hertz searching for it, Hughs was actually using it. But in common with so very many other genii, Hughs's efforts were frustrated and he, very disheartened, turned from his experiments.

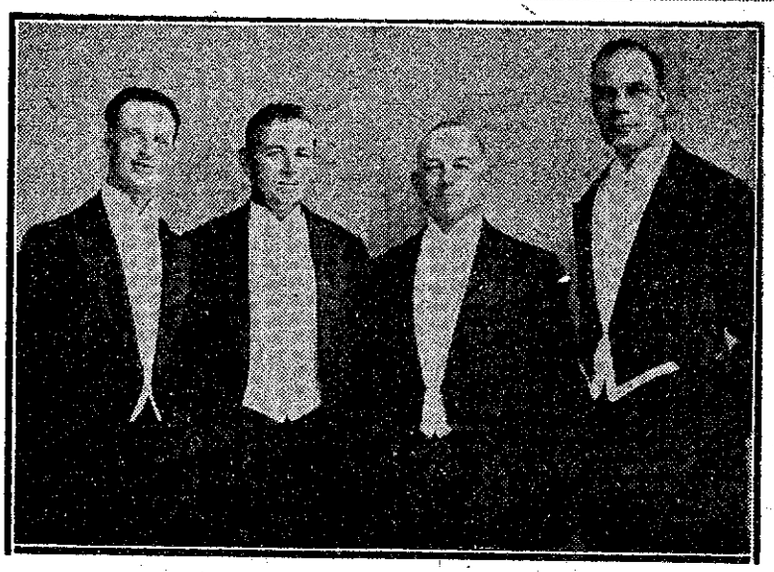
The attention of Sir Oliver Lodge was attracted towards this new science, and he commenced a series of experiments specialising in tuning, and it is to him we owe the variable tuning coil. In 1890 Brandly invented the coherer, an instrument more sensitive than any of its time, for detecting the presence of wireless waves.

APART from all these movements in England, a young Italian, or should it be said, half-Italian, for this boy was born of an Irish mother, was becoming deeply interested in wireless telegraphy. He had rigged up in his father's garden, a transmitter and receiver, and had developed the science along lines of his own. This was the youth Marconi. His first contribution wa an improved Hertzian oscillator, for he found that by connecting one of the balls to earth, transmission could take place from a considerable distance.

By 1896 the science had been developed by Marconi to such an extent that it was able to be used in connection with the illness of Prince Edward (late King) in that bulletins were transmitted from his yacht to Osborne House on the Isle of Wight. In 1899, the first message was transmitted across the English Channel, and in December, 1901, Marconi essayed to fulfil his dream—transmission across the Atlantic. With a powerful transmitter erected in Cornwall, and a receiving station in Newfoundland, Marconi and his two friends set about bridging this great gulf. Conditions were against them, and for three days they listened in Newfoundland without success. Aerials had been suspended from balloons, and two of these had been swept down by the high gales, but undaunted, Marconi persisted, and at exactly 11.30 on December 12, the first faint, but distinct signals, S.O.S., were detected. The Atlantic had been crossed.

UP to this time, all the transmissions had been made on interrupted the grid, and by impressing signals waves, or what is more familiarly known as spark transmission. Series of dots and dashes were all that could be sent, and attention was focused on the sending and receiving of voices, or what is known as continuous wave transmission. The first attempt at this culminated in Pulsen's singing arc, a device which, although very inefficient, enabled music and voices to be transmitted for a short distance. The crystal detector was already in use, but there were so far no means of amplifying the signals.

PERHAPS the greatest impetus that any science has received was given when in 1908 Fleming and De Forrest independently discovered the thermionic valve. Fleming, the Englishman, discovered that if a hot filament and a cold plate were both enclosed in a vacuum tube that signals could be detected. Almost simultaneously De Forrest in America made the same discovery, but introduced a third element, upon this grid enormous amplification was possible.



**The 1YA Lyric Four. Mr. Arthur Ripley (1st tenor), Mr. H. Richards (2nd tenor), Mr. Allan McElwain (baritone and humorist), and Mr. E. Thomas (bass). This quartet has enjoyed a fine reputation for many years and is in great demand at all functions.**

The result of these discoveries is wireless as we know it to-day. The extent to which these discoveries have been developed are realised by anyone who is at all conversant with radio literature. When one realises that in New Zealand he can hear amplified to an enormous extent the natural creakings of a wall in Brisbane, he will realise to some extent the significance of the discovery of these two genii.

Wireless now moved forward at an amazing pace. The Armstrong circuit was probably the most outstanding invention of this period. Armstrong discovered that if the output of the plate was fed back to the grid coil, enormous amplification could take place within one single valve. This we know as reaction.

THE war period, 1914 to 1928, hurried forward the development of wireless telegraphy and telephony. In 1915 the first telephone message was "wirelessed" across the Atlantic, when a man in New York "rang up" another in the Eiffel Tower, Paris. During this period, the wave-lengths ranged between ten and twenty-five thousand metres, or, as we would say now, between three and 12 kilocycles per second. For the reception of these frequencies induction coils of great length were necessary, and visitors to the exhibition will remember the very big coil that was exhibited on "Radio Record" stand. This was a relic of these days.

Prior to this, the shorter waves had been used, but the longer ones were resorted to because of their apparent greater carrying power. Following 1916, experiments were conducted in the use of shorter waves. By 1924 transmission was taking place in the region of 100 metres or 3000 kilocycles.

Broadcasting as we understand it today began in 1921 when a few stations were established both in America and on the Continent, and from this date its permanency as a factor in every home became established. From that date, too, its story is known to all.

### The Beam.

IN 1924 Marconi became interested in beam transmission. It might be explained here that if a parabolic mir-