Living in the Past

Historical perspective

The forgotten genius

In 1897, at age 31, Reginald Fessenden, in a conversation with his uncle, coined the term CW, or *continuous wave*. He and others reasoned that such a wave could be used to communicate a message much more effectively and efficiently than by the conventional spark gap transmitter that ruled the air at the time. Using this idea of a continuous wave, Fessenden made the first AM (***amplitude modulation***) transmission of speech on 23 December 1900. It wasn't until Edwin Armstrong developed the vacuum-tube oscillator in 1912, that Fessenden was able to use an inexpensive means of creating a carrier wave to produce practical AM signals, paving the way in broadcast and amateur radio for decades to come.

One problem that plagued Fessenden's transmitter-receiver was its inability to selectively receive and detect a weak signal. He solved this by combining the received signal with another of a known frequency, and extracted the difference. He called the method ***heterodyning***, which today remains the standard receiving analog circuit. In 1906, experimenting with high-frequency (100 kHz) alternators, *Fessenden made the first two-way transatlantic radio transmission*. (The previous "first transmissions" by Marconi, Tesla, and Loomis were all one-way.)

Other inventions to his credit

Motivated by the 1912 *Titanic* disaster, Fessenden developed SONAR (sound navigation and ranging) on 27 April 1914. Previous to that time, mariners would locate icebergs and other dangers by ringing bells, or detect the depths of the sea floor by dropping long, weighted ropes. With the Fessenden oscillator, one can do both of these by electrically sending out a ping, and then electrically detecting its return. His development has been credited with the saving of countless lives above and below the ocean waves.

He invented silicon steel, which replaced the lossy carbon steel in transformers and motors. He invented microphotography, an early form of microfilm. He invented the pager, the turbo-electric drive for ships, the gyrocompass, the loop antenna, RDF (radio direction-finding, or as we sometimes call it, *fox hunting*), ultrasonic cleaning, electrical conduit, and tracer bullets. He discovered that atoms had a positive center and negatively charged surface. In spite of all of Thomas Edison's advancements, it was Fessenden who transformed the incandescent bulb from a novelty to an everyday necessity. In total, Fessenden held around 230 patents. Yet, today's texts barely mention his name, being overshadowed by larger, more popular notables.