

NICHOLAS CALLAN Physicist

Born: Dromiskin, near Ardee, Co. Louth, 20 December 1799.

Died: Maynooth, Co. Kildare, 10 January 1864.

Distinctions:

Awarded the Degree of STD, University of Rome 1826;
Appointed Professor of Natural Philosophy at
Maynooth 1826.

Callan's most notable contribution to electrical science was the Induction Coil, the forerunner of the modern step-up Voltage Transformer.

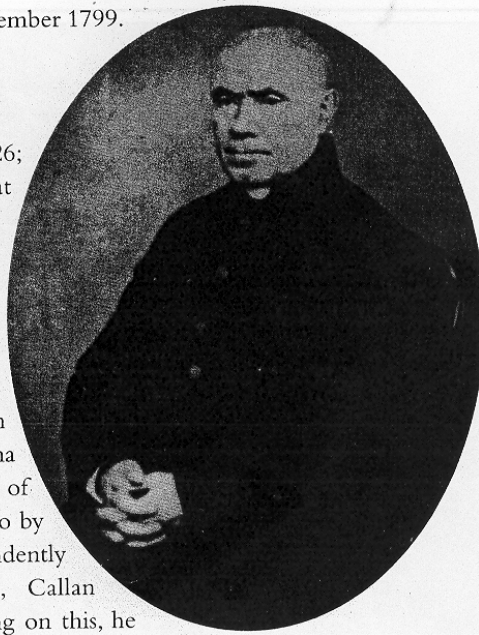
Influenced by his former professor, Dr Denvir, Callan early acquired a great interest in electrical phenomena in general. He constructed several electromagnets one of which had a lifting power of two tons. Influenced also by the work of Joseph Henry of Princeton, who independently discovered the phenomenon of self-induction, Callan constructed a coil for giving electric shocks. Working on this, he first separated the primary coil from the secondary and, more importantly, wound it round an iron core. This apparatus gave shocks of great intensity. Later he increased the number of turns of wire in the secondary coil and obtain sparks from the free ends. In his 'Giant' induction Coil there are three secondary coils connected in series. Each coil contains about ten miles of very fine wire insulated with a mixture of beeswax and gutta-percha. In 1837 this apparatus gave sparks fifteen inches long. Callan devised a 'point and plate' type of 'valve' which rectified the secondary current. This was used later in X-ray apparatus. Also, he was the first to note that the 'intensity' (voltage) of the secondary current depended, among other things, on the rapidity of interruption of the primary current.

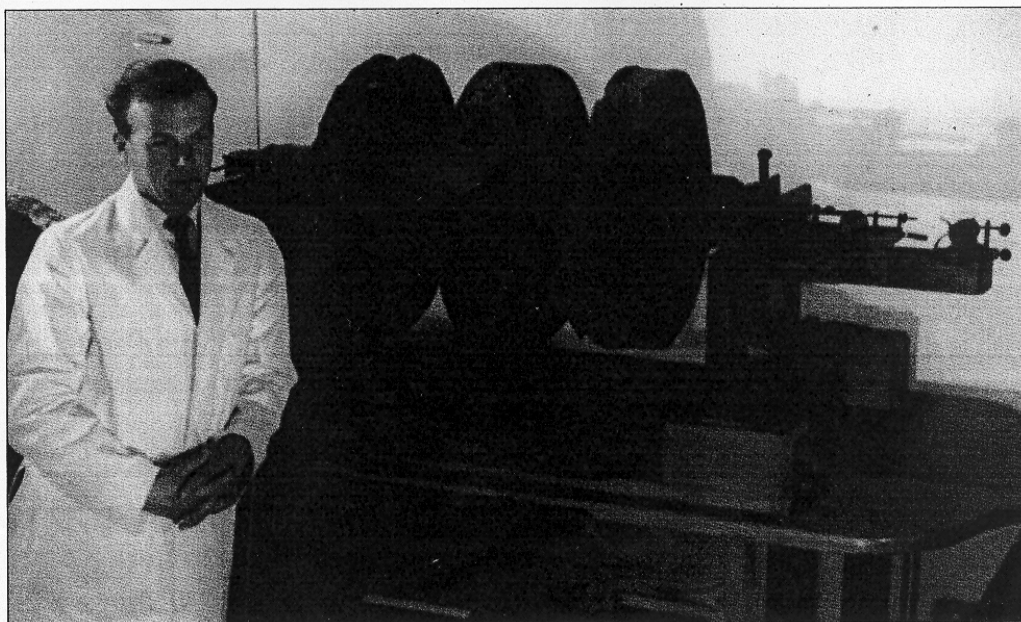
Callan sent a smaller replica of this induction coil to his friend Sturgeon in London who demonstrated it to members of the Electrical Society of London. It evoked great interest amongst the scientific coterie at the time. It was copied by many of them.

The invention of the induction coil made it possible to produce X-rays. It also provided the means of studying electric discharges in rarefied gases. This later contributed to the elucidation of atomic structure.

Callan constructed electric motors and even drew up plans for a battery-driven train to ply between Dublin and Kingstown (now Dun Laoghaire). The plan fell through owing to practical snags.

To supply electric current for his researches Callan experimented with various types of battery. Eventually he arrived at a cast iron/zinc cell. A cast-iron trough acted as positive plate; it contained nitric acid. The negative plate was of zinc standing in a porous pot containing a mixture of sulphuric and nitric acids. This cell gave quite heavy current for a considerable period. It was subsequently manufactured commercially by the firm of E.M. Clarke at the Adelaide Galleries, 428 The Strand,





Callan's giant induction coil gave 15 inch sparks in 1837

London, who named it the 'Maynooth Battery'.

Callan found that the nitric acid rendered the cast-iron highly resistant to corrosion and obtained a patent for this process of protecting exposed iron-work from rusting.

The Museum at Maynooth houses Callan's induction coils, electric motors, his 'Maynooth Battery' and other interesting 'Callaniana'.

Further reading:

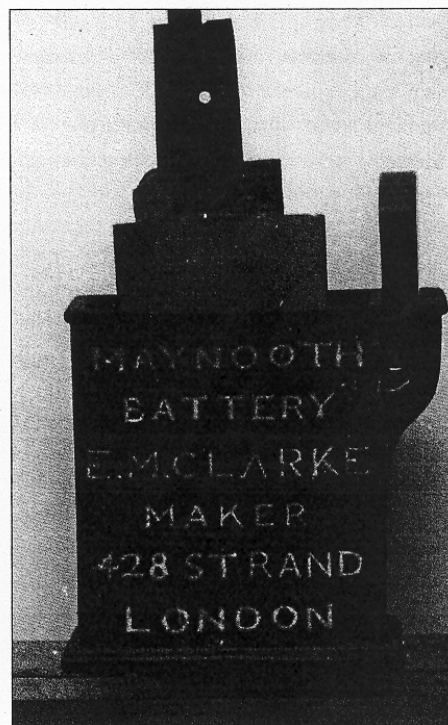
P. J. McLaughlin: *Nicholas Callan, Priest-Scientist 1799–1864*, Dublin, Clonmore & Reynolds; London, Burns & Oates, 1965.

Michael T. Casey: Nicholas Callan; inventor of the Induction Coil, *The School Science Review*, No. 160, June 1965.

Michael T. Casey: Nicholas Callan, Priest, Professor and Scientist, *Physics Education*, 17, 1982.

Charles Mollan and John Upton: *The Scientific Apparatus of Nicholas Callan and Other Historic Instruments*, St Patrick's College, Maynooth & Samton Limited, Dublin, 1994.

Reverend Michael T. Casey, OP, 1902–1997.



Callan's 'Maynooth Battery'