

physical sciences, and coupled with them in a distinguished manner, too. But I apprehend that Dr. Callan was the wrong man in the wrong place, and that with his peculiar capacity, he would have found a wider and more fitting field for it elsewhere than in an institution specially established to educate theological teachers for the peasantry of Ireland. He was a thoroughly accomplished scientific scholar, and within the grand circle of the physical sciences lay the full sphere of his legitimate labours. In the Irish Ecclesiastical College of Maynooth they have a professorship of natural philosophy. This was Dr. Callan's chair, and he filled it well, the only pity being that he had not a larger circle to address his teachings to than a few young students, future curates in a few wild rural Irish parishes, whose interest in chemistry was of the smallest.

I met Dr. Callan only twice, but he impressed me favourably. He was spare and angular, with a hard square, high forehead, and a large deep set eye. His manner was serious and absent; but when he smiled his expression of face was singularly droll; and when he did attempt a joke or two his hits were exceedingly sly and effective. As I said, I am no student of the physical sciences; but it has been my lot to have been present at many a scientific lecture delivered by the ablest "experts" of the day. It was at one of these I first encountered the name of Dr. Callan. The lecturer was preparing his electric battery, and I was struck by the neatness, and the small space it occupied. "That's a pretty thing", I said. "Yes", he answered, "and makes a vast saving of power. It is a circular battery, and we call it the Callan Battery, because it was invented by one Dr. Callan, a professor (of all places in the world) of Maynooth." Afterwards, of course, I found that Dr. Callan's name was one of distinction in the world of science, and that in France; especially, he was better known than in his own country. He was a splendid mathematician -rapid and accurate in his calculations, like all his countrymen who have manifested a proclivity for the exact sciences-and it is a question if there was an abler electrician in the empire. Of course he had his weaknesses; and one was that he thought himself bound to translate for the benefit of the laity of Ireland the works of a well-known Italian ascetic theologian, which works the said laity paid little heed to; plain people cannot help regretting that he did not stick to his useful researches in electricity, and let Liguori's speculations rest in the original.

In character, Callan was an amiable man, modest and retiring, grave and absent-yet not without genuine humour and the power, when needful, of self-assertion. He was always a worker, and when he died, he left some important acquisitions behind him to add to the scientific wealth of the world.

CHAPTER V ARDENT EXPERIMENTER

1. CALLAN'S SCIENTIFIC PAPERS.-The modern reader has to approach Callan's scientific papers with caution on account of the difference of vocabulary (the same word can mean such different things) and the difference in emphasis (the key words in titles often being concerned with what we regard as trifles, while today's really important matters lie buried in the body of the memoir). Thus the Royal Society's catalogue of Callan's scientific papers is not only incomplete, but it is also quite defective because it is based on misleading terms in old-style titles.

As a translator and writer of devotional works, Callan's style is that of his contemporaries, unrestrained and uncurbed. By contrast to his prolific output of popular volumes, his scientific papers--especially in the early phase--are relatively few, and those few tend to be brief, at times exasperatingly so. They illustrate admirably the characteristic which Newman assigned to scientific publications, where the results of years of research may be adequately set down on a single page. In his scientific communications, Callan's style of expressing himself is typical of the scientist--he is at once clear and plain but devoid of sparkle and variety.

It is a point of some significance that Callan's earliest papers appear in the very first ~ and volume of Sturgeon's historic venture, *The Annals of Electricity*. His third paper in that r was periodical is dated "14 June 1836" and it describes experiments that have been carried out with "an electromagnet of great power"--the one constructed in 1834. It introduces us to central thoughts underlying Callan's first researches, and it establishes beyond been question his priority in a wide and important field of electromagnetic investigation. The paper before that, dealing with "electromagnets for magnetic and electric purposes", brings into relief in a masterly if succinct fashion the two themes he studied so fruitfully, namely, the production of strong magnetic fields and the generation of high-tension electricity, basing himself on the electromagnet. Callan's first paper in the *Annals* describes his "repeater" and has the barest mention of its application while suggesting its pregnant quality. A fairly connected account of the matter in these three papers, along with mention of fresh experiments, was sent to the *Philosophical Magazine* in December own 1836. Part of the title of this paper would read in modern terms: "how to transform 20-volt electricity into 1,000-volt electricity", and it pin-points one of Callan's major preoccupations in his first researches. It indicates that his discovery or invention of the induction coil was no accident but the result of a sustained effort and of a pretty clearly envisaged aim. A notable paper on the right way to connect electromagnets appeared in the *Annals of Electricity* on 11 September 1837.

Two other important communications of Callan in this period were likewise made to Sturgeon's *Annals*, one in February 1838, and the other in November of the following year. The first pointed out the priority of the Callan Coil, and described the discovery of the principle of the self-induced dynamo. The second was chiefly concerned with establishing Callan's priority in designing certain kinds of electromagnetic engine. When Callan resumed his scientific investigations after the interruption of the "Hungry - Forties", Sturgeon's *Annals of Electricity* had ceased publication, and we find most of Callan's memoirs from this time on in the *Philosophical Magazine*. A few appear in the *Proceedings of the Royal Irish Academy* (in fact the first of his new series of papers appears there in 1847, significantly enough) and one long paper was published in the , *Report of the British Association for the Advancement of Science* after its Dublin meeting in 1857. During this period, Callan delivered a number of extra-mural lectures on the subject researches, chiefly to bodies interested in the new applications of electricity, such as the Mechanics' Institute at Ardee, as already noted.

LIST OF CALLAN'S SCIENTIFIC PAPERS:

Annals of Electricity 1, Sturgeon (1836), 229-30: The Callan repeater. Plate.
Ibid. 1 (1836), 295-302: Electromagnets for magnetic and electric purposes.
Ibid. 1 (1836), 376-8: Electromagnet of great power.
Philosophical Magazine 9 (1836), 272-8: Results of several years.~ experiments with electromagnets and transformers.
Annals of Electricity 1 (1836), 491-4: On connecting electromagnet-5.
Philosophical Magazine 10 (1837), 459: Reply to Ritchie's criticism.
Annals of Electricity 2 (1838), 317-8: Priority of the Callan Coil; the self-induced dynamo.
Ibid. 4(1840) 333-4: Priority of Callan's electromagnetic engines.
Proceedings of the Royal Irish Academy 3 (1847), 471-6: New battery and experiments.
Philosophical Magazine 33 (1848), 49-53: A new prodigious battery.
Proceedings of the Royal Irish Academy 4 (1850), 152-7: Improved battery experiments.
ibid. 6 (1853), 37: Illumination by the iron battery (title only).
Philosophical Magazine 7 (1854), 73-97: Illumination by the Maynooth battery; galvanometer for large currents.
ibid. 9 (1855), 260-72: Single-fluid cell for illumination.
Report of the British Association for the Advancement of Science, 1857 (pt. 2), 11-13: Improved induction coil.
Philosophical Magazine 14 (1857), 323-40: The induction apparatus; high-tension insulation.
ibid. 15 (1858), 255-9: Contact breakers and condensers.
Ibid. 17 (1859), 332-4: Electrodynamical induction.
ibid. 25 (1863), 413-7: Callan's great coil; sparking potentials; the Callan point-plate valve.

2. Cpo Poggen. *Annal.* 1 (1836), 255.

3. CALLAN'S PATENT PAPERS 1853 No. 2340

STAMP

VICTORIA BY THE GRACE OF GOD Of the United Kingdom of Great Britain and Ireland, Queen, Defender of the Faith, To all whom these presents shall come Greeting. WHEREAS Nicholas Callan of the R.C. College of Maynooth in the County of Kildare Ireland--hath by his petition humbly represented unto us that he is in possession of an Invention for "a means of protecting iron of every kind against the action of the weather and of various corroding substances so that iron thus protected will answer for roofing, cisterns, baths, gutters, pipes, window frames, telegraphic wires, for marine and various other purposes" which the petitioner believes will be of great public utility that he is the first and true Inventor thereof and that the same is not in use by any other person or persons to the best of his knowledge and belief The Petitioner therefore most humbly prayed that We would be Graciously Pleased to grant unto him his executors administrators and assigns Our Royal Letters Patent for the

sole use benefit and advantage of his said Invention within Our United Kingdom of Great Britain and Ireland, The Channel Islands and Isle of Man, for the term of fourteen years pursuant to the Statute in that case made and provided AND WHEREAS the said Nicholas Callan hath purported particularly to describe and ascertain the nature of the said Invention and in what manner the same is to be performed by an instrument in writing under his hand and seal and has caused the same to be duly filed in the Office of Our Commissioners of Patents for Inventions. And We being willing to give encouragement to all Arts and inventions which may be for the public good are Graciously Pleased to condescend to the Petitioner's request Know Ye therefore that we of Our especial grace certain knowledge and mere motion HAVE given and granted and by these Presents for Us Our heirs and successors Do give and grant under the said Nicholas Callan his executors administrators and assigns Our especial licence full power solo privilege and authority that he the said Nicholas Callan his executors administrators and assigns and every of them by himself and themselves or by his and their Deputy or Deputies Servants or Agents such others as he the said Nicholas Callan and his executors and administrators or any of them shall in his or their discretion seem meet And that he the said Nicholas Callan his executors administrators and assigns shall have and enjoy the whole profit benefit commodity and advantage from time to time coming growing accruing and arising by reason of the said Invention for and during the term of years herein mentioned To HAVE HOLD exercise and enjoy the said licences powers privileges and advantages hereinbefore granted or mentioned to be granted unto the said Nicholas Callan his executors administrators and assigns for and during and unto the full end and term of Fourteen years from the day of the date of these Presents next and immediately ensuing according to the Statute in such case made and provided. And to the end that he the said Nicholas Callan his executors administrators and assigns and every of them may have .and enjoy the full benefit and the sole use and exercise of the said Invention according to Our gracious intention hereinbefore declared We do by these Presents, for Us Our heirs and successors require and strictly Command all and every person and persons bodies politic and corporate and all other Our Subjects whatsoever of what estate quality degree name or condition soever they be within Our United Kingdom of great Britain and Ireland the Channel Islands and Isle of Man that neither they nor any of them at any time during the continuance of the said term of Fourteen years hereby granted either directly or indirectly do make use or put in practice the said Invention or any part of the same so attained unto by the said Nicholas Callan as aforesaid nor in anywise counterfeit, imitate or resemble the same nor shall make or cause to be made any addition thereunto or subtraction from the same whereby to pretend himself or themselves the Inventor or Inventors Devisor or Devisors thereof without the consent licence or agreement of the said Nicholas Callan his executors administrators or assigns in writing under his or their hands and seals first had and obtained in that behalf upon such pains and penalties as can or maybe justly inflicted on such Offenders for their contempt of this Our Royal command. And further to be answerable to the said Nicholas Callan his executors administrators and assigns according to Law for his and their damages thereby occasioned AND MOREOVER WE do by these Presents for Us our heirs and successors Will and Command all and singular the justices of the Peace Mayors Sheriffs Bailiffs Constables Headboroughs and all Officers and Ministers whatsoever of Us Our heirs and successors