National College of Art and Design
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LIKE MOTHER, LIKE SON.

An account of the ways in which Marconi's scientific work at Clifden and Kingstown was influenced by his Irish mother.

by
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DEPARTMENT OF
INDUSTRIAL DESIGN

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submitted
By
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INTRODUCTION

The topic for this thesis was suggested while studying in the Faculty of Architecture at the Politechnico di Milano in 1993. At the Leonardo da Vinci Museum of Science and Technology there is a small exhibition on Marconi and his extensive work on wireless telegraphy. There was a reference to work carried out by him at Clifden, in Co. Galway, and also at Kingstown (presently Dun Laoghaire) in Co. Dublin.

His involvement with Ireland was of immense interest to me. Research included information from the museums exhibition (photographs, and dates of pulications of newspapers and articles etc.)

The main books consulted in the writing of this thesis were *My Father Marconi*, written by his daughter Degna, which gives great insight into the real Marconi, and also *Marconi* by W.P. Jolly, which concerns itself with both technical information and a overview of Marconi's backround.

It is indeed rather difficult to attempt to address the work of such a man as Signor Guglielmo Marconi in a matter-of-fact way, for the simple reason that it is so essentially romantic that a simply descriptive history-book treatment does not suffice. This thesis explores Marconi the man, but it also looks at some of his technical work, thus giving a broader picture of him and his style of experimenting. He made many great inventions and went about his work in a off-beat manner.

By his very nature he approached his work in a wonderfully simple manner :

> What is jolly about science is this: it encourages one to go on dreaming. Science demands a flexible mind. It's no use interrogating with a formula. You've got to observe it, take what it gives you and then reflect upon it with the aid of science and reason. (Marconi, 1962, p.210).

This thesis focuses, for the most part, on the work carried out by Marconi at Clifden in Co. Galway and Kingstown in Co. Dublin. Looking at how his childhood, education and Irish mother influenced and moulded him into the great man he was, and how this shone through in his work at Clifden and Kingstown.

It is impossible however, to describe the sheer immensity of Marconi's lifetimes work, or appreciate in full, the contribution which his discoveries and inventions have made to the progression and development of almost every aspect of life.

For this reason, it is the intended purpose of this thesis to identify and describe just two of those contributions, but yet through just two, embody the spirit which was contained within everything he did during his lifetime.

Chapter 1 looks at Marconi's youth and education, and also the childhood of his mother, with regard to their upbringing.Chapter 2 gives a descriptive account of his work at Clifden highlighting examples of how his work was influenced by his mother and homelife.

Chapter 3 adopts the same approach to chapter 2 but in relation to work at Kingstown.

CHAPTER 1

MARCONI'S YOUTH AND EDUCATION

Section 1 of this chapter focuses on the childhood of Marconi and also that of his mother, so that parallels can be drawn between both.

Section 2 focuses on the significances of these common personal characteristics, and how they affected Marconi as both man and scientist.

SECTION 1.

This chapter focuses on Marconi's backround and education, which is very important for this thesis because it places the events that took place in Ireland, at Clifden and Kingstown, in context with his career as an inventor.

The fact that Marconi's mother was Irish had a very important role to play in his life and career. Marconi displayed many characteristics in himself and in his style of work, which can be attributed to the influence of his mother. Because of this Irish connection, this thesis will focuses on two of Marconi's most important experiments in Ireland, which were carried out at Clifden and Kingstown.

This chapter will also look at the backround of Marconi's mother, Annie Jameson, and highlight the influences that her own childhood had in the upbringing of Marconi.

Gugliemo Marconi was born in Bologna on April 25th, 1874 of an Italian father and an Irish mother named Annie

Jameson, from Wexford. Educated first in Bologna and later for a time in Florence, he subsequently went to technical school in Leghhorn, to study physics.

Here he had every opportunity to study the subject which would carry him to his greatest successes in life, electromagnetic wave theory, following closely the work of renowned phyicists James Maxwell and Heinrich Hertz.

Little did anyone know that from these beginnings, Marconi was to become a Nobel Prizewinner, a world famous pioneer of wireless telegraphy, and founder of the Marconi Wireless Company which would develop and exploit the full potential of the radio.

This scientific fame was to bring him a myriad of highly influential friends and acquaintances, which spanned from the Pope to Queen Victoria and a handful of others such as Mussolini and a few Presidents of the United States. These involvements with internationally famous politicians led to his own involvement in politics, when in 1919 he became Italy's emissary at the peace conference, and hence followed several other diplomatic occasions.

As can be seen from this extremely condensed account of just some of his activities, it would be fruitless indeed to endeavour to cover such an expanse of events in this thesis. And so, firstly we will look at his childhood, out of which, developed the man who became all of the above.

Marconi was born at No.7 Via delle Asse in the Italian city of Bologna. He was the second son of Giuseppe Marconi, a well-to-do landowner who was married to Annie (nee Jameson)

who came from a distinguished wealthy Irish family, associated with distilling.

Having an Italian father and Irish mother was to play a significant part in young Marconi's childhood:

> The pattern of characteristics inherited by Marconi from his enterprising and unconventional parents produced a single-minded, almost obstinate, determination, and enabled him methodically to pursue and bring off scientific and business coups even when 'responsible' opinion dismissed them as airy day-dreams.(Jolly, 1972, p.52).

Prior to her elopement to Italy to marry Giuseppe, the whole idea of emigration had played a large part in Annie's life. Her father was a native of Scotland, but left with his brothers for Ireland, where he set up his own distillery. Also during her childhood, the potato crop, on which the entire population of Irish peasants depended on for survival, failed. The subsequent Famine which followed forced thousands to emigrate to America to try and support those that they left behind.

Annie came from a very wealthy family and therefore did not feel the strains of this deprivation and hunger which spread throughout the country, but could not be left unaffected by the pain and suffering endured by the many that were driven from their homes like animals.

From a young age she possessed a very talented singing voice and subsequently secured an engagement to sing at Covent Garden at the exclusive opera house. Her parents, however, would not hear of it, and felt it highly improper for a

young lady to engage upon a career in the theatre. To try to compensate for this disappointment they arranged for her to travel to Italy to extend her singing studies, where it was a highly fashionable activity.

Annie was to stay in Bologna at the home of the de Renolis family, bankers with whom the Jamesons had business contacts, where, daily she would attend music classes at the conservatoire.

One visitor to the house was a little boy by the name of Luigi, whose mother, the daughter of the house, had died soon after he was born. Luigi was brought to visit his grandparents by his father Giuseppe Marconi who had been a widower for many years. Annie, immediately fell in love with Giuseppe, for whom she curtailed her studies at the conservatoire, and returned to Ireland to ask permission to marry.

If they had been unhappy with her singing engagement at Covent Garden, then they were absolutely disgusted with her choice of suitor. To begin with he was too old, foreign, and worst of all secondhand! Once again it seemed that Annie was denied that which she most desired. She was subsequently introduced to many 'suitable' young men by her parents in the hope that she might forget Giuseppe.

This, however, was not the case, as they smuggled messages and notes to each other, in a very romantic relationship. As soon as she became of age she disobeyed her parents wishes and returned to Italy and Giuseppe. This trait of single-mindedness and determination was certainly something that young Marconi was to gain from his mother.

Annie travelled with her husband Giuseppe to his town house in Bologna, but this was not the family home of the Marconi's.

The modest affluence of Giuseppe's upbringing in a home surrounded by peasant country was much akin to Annie's upbringing. National unrest and oppression had played as much a part in her childhood as Giuseppe's. Ever since he had been a young boy there had been constant political and military struggles under Mazzini, Cavour, and Garibaldi to expel the French and Austrians from the Italian Peninsula.

And so it is evident from all these events that Marconi had parents of extreme willpower, who followed their hearts desires with proprietary pride and determination, these were characteristics which were to have enormous influence on decisions which he was to make in the future.

Marconi was the second fruit of this runaway romance, with his brother Alfonso born nine years previous. Giuseppe was now forty-eight and for him a new arrival in the house was a little tiring, and so Marconi's mother became much more concerned with his upbringing than her husband.

These frustrations caused by having an Irish mother and Italian father were many to the young Marconi. At the age of three he was taken to England for three years to study English, as his mother felt that this was important. By the time he returned to Italy he had spent half of his life away from his native country.

His father was not enamoured by this since he became concerned with his sons almost non-existent knowledge of Italilan, and went about rectifying this situation with intensive

schooling. Just as both parents had no wish to neglect in teaching their sons their own native languages, they were equally determined that they should both share their religions. Annie was a Protestant and Giuseppe a Catholic. In the end both sons were baptised Roman Catholic.

Neither did Marconi relish schoolwork an was at times a very irritating student, often playing truant from the hired tutors lessons from his father. His early scholastic life was, to be fair to him, not made very easy for him by his parents. Having been introduced to two very different languages, he had also been introduced to two largely incompatible religious faiths.

The Marconi's owned a country estate outside Bologna called the Villa Grifone, and it was here that they spent most of their time as a family. But Annie did not share her husbands contentment with a simple life at Villa Grifone, and so during the winter months at Villa Grifone she travelled with her two sons to Florence and Leghorn.

Alas at the end of every winter they had to return to Villa Grifone, where harsh friction and sometimes rows ensued between the incompatible Marconi and his father. Marconi would be severely scolded by his father for as much as being a few minutes late for dinner. Mealtimes, which are for many growing boys a time for gross over eating, often provided a stiff daily examination for the young Marconi, and it seemed he was never safe from his fathers harsh words. His only hope was that his mother would stand up for him, a service many young boys require when necessary!

But Marconi found refuge in his isolation by focusing his attention on constructing small machines, and even at a young age, was interested in how things were put together, always constructing some apparatus that he had read about, revelling in the sheer immensity of Villa Grifone, he always found something to occupy himself.

But his growing talent for concocting scientific machines was not matched in an improvement in his scholastic abilities, and his father was extremely disappointed when Marconi failed to gain entry into the Naval Academy. This was the final straw for his father who had had enough of his sons scientific experiments and mechanical rubbish, when he felt he should be studying hard toward a decent profession. Giuseppe was humiliated by his sons failure.

His teenage years were unusually independent, becoming more enclosed in his fathers library, and to his own company, own amusements , and in general his own approach to life :

> But what is amusing mischief in the child is soon regarded as wayward stupidity in the adolescent boy, and as poor Guglielmo grew into youth the world - contemporaries, adults and especially his father - made him suffer for his non-conformity.(Jolly, 1972, p.13.).

From this failure Marconi was forced to conspire with his mother against his father to try to create some worthwhile occupation from his scientific hobby.

As a first step towards achieving this, in 1887 Marconi attended the Leghorn Technical Institute, where he was

introduced to the formal study of physics and electricity. Here his studies prospered under the guidance of a Professor Bizzarini. Marconi became single-minded in his study of physics and chemistry, both for their own sake and also because he knew that if he succeed, he could possible make a career from them.

He devoted hours of time towards experimenting, during which time his father, begrudgingly, supplied financial support, due to constant pleading from Annie. But the lectures at Leghorn did not satisfy Marconi's hunger for knowledge and so he attempted to enter the University of Bologna to study science, something which his father agreed with since it was a very reputible institution.

But once again Marconi failed the matriculation examination and was refused admission. He was once again a failure in his fathers eyes. It was here again that Marconi received the unabiding support and sympathy of his mother. Annie used her social influence to persuade Professor Righi, a lecturer at the University, to allow Marconi to use certain college equipment. Here Marconi was able to set up his experiments on his own, and was even allowed to bring certain equipment home.

This approach was very prominent in his work at Clifden and Kingstown, at which we are going to look closely. Since he was not officially attending the University he could not partake in lectures, which resulted in him having little knowledge of the fundamental theory of physics, except for information he could gather for himself.

Many of the great engineering achievements which Marconi read about in the University library, were commendable technical solutions to problems created by the immense need for improved communications, in the world of the nineteenth century. These solutions took the form of railways, canals, and steamships, but there was a need too, for the transport of something a little less tangible- information. This is the subject that the often uncertain and withdrawn Marconi allowed his fertile mind to envelop. Marconi began in earnest to experiment with Hertzian waves, but the reasons for his interest in them, was entirely in making them carry messages through space, rather than any theoretical interest. He didn't allow wider intellectual implications, which often distracted many of the scientists at that time, to divert him from the well defined targets he was setting himself.

The earnest experiments which he undertook were, as usual, not taken seriously by anyone but his mother, and it was suggested by Professor Righi that since he had not had a proper science education, and also because experimental scientists had been studying these waves for years, he was unlikely to be the one to make a breakthrough in their application.

And so in the face of constant rejection, Marconi set about proving his vision of wireless communication in the two attic rooms of the Villa Grifone. It was here that he worked through dark, chilly days and often far into the night. His mother was again his main source of inspiration and support, making sure that he had everything he required and that nothing interrupted his concentration.

Here he worked ceaslessly, occasionally preforming demonstrations, but only for his mother, whose appreciation he was guaranteed. Through experimenting with apparatus which had been invented by Hertz, he tried innumerable systems and circuits until he finally succeeded in sending waves through air and receiving them again at a distance, and by 1895 he had created a wireless telegraph system with a potentially useful range.

SECTION 2

Having looked at his childhood and indeed the childhood of his mother, what effects did they have on Marconi as a young man and as a scientist? How did his education influence his method of working? What influenced him in his work in Ireland? Why did he choose to carry out such important experiments in Ireland? These are some of the questions which are going to be answered now that his youth and education has been studied.

Having the total support of his mother as a young child and the often unrelenting obstruction of his father, Marconi was forced to make important decisions at a very young age Being introduced primarily to two different languages and then subsequently to two different religious faiths as a mere child. Marconi found himself in a constant struggle as a young boy, having to alternate between the wishes of both his parents. This dilemma worked worked to his own advantage as it

formed a strong independent character within him which developed to guide him to his success.

This introduction to life forced Marconi to choose his allies very selectively, the most prominent of which was his mother. As a young boy when he needed the support of both his parents, Marconi found himself isolated. This isolation allowed him to discover himself, because he had to think for himself. This nutured a hard exterior shell which he used to protect himself during his life when confronted with rejection. This is apparent in his failure to gain entry to the Naval Academy and the University of Bologna for which he was scolded by his father, who considered him an embarrassment. Yet he continued to believe in himself, and in his own ability.

Marconi's mother recognised his need for guidance and never pressured him into something he didn't want to do, instead she did everything in her power to assist him, using her wealth , social status, and no doubt a certain degree of her Irish charm to convince Professor Righi of the University of Bologna to give him some private tuition and use of college equipment. Here he was able to set up his own experiments and allow his thoughts and ideas to take shape. His mothers influence must have been quite incredible to be able to pull off such an unofficial arrangement, which, had it been discovered would have cost Professor Righi his job.

This one occasion alone illustrates how Marconi's mother influenced her sons work, for she practically secured for him his education when all academic doors seemed to have shut in his face. Perhaps she saw more than a little of herself in her sons non-conformity and self-belief, especially since she

had gone through similar stages of uncertainty when she followed her hearts desire, and eloped to Italy as a young woman to marry Giuseppe. She knew what it was like to have to go against her parents wishes, and she knew also the pain involved in losing their support.

She was determined not to allow the same thing to happen to Marconi. He had already broken links with his father, and so she ensured that he had at least one parent who would be there to give him advice and support.

As he grew a little older and found constant barriers blocking any chance of a relationship with his father, he became emotionally stranded within the growing divide between his parents. He received an unbalanced amount of varying attention which led to him becoming self-enclosed in a world of his own, building and designing small mechanical objects as a young teenager. This situation had a great effect on the way in which he worked as an inventor and is reflected in the work that he carried out at both Clifden and Kingstown, which will be covered in detail in chapters 2 and 3. Due to this style of childhood he was never allowed to be lulled into the unthinking acceptance of authoritarian view, he never allowed himself to be influenced by people who thought his work to be trivial. He always thought things out fully and was never overawed by the task at hand, even if it was the constructing of a small mechanical toy:

> He made a miniature still which actually produced crude spirits, he converted cousin Daisy's sowing machine temporarily into a

> turnspit, and he rigged wires and batteries for an electric bell. (Baker, 1970, p.13).

This quote conveys the feeling for the type of world in which Marconi immersed himself to try and escape from all the turmoil which surrounded him. The confused Marconi began to construct machines so that he could experiment with the ideas he had in his head. During the time in a boys life when he should be getting to know his father a little better and spending more time with him, he was pushed into a world of his own, and instead received no attention from his father.

This fascination with engineering was followed up at Leghorn where he used the same approach in his laboratory work, repeating many of Hertz's basic experiments in relation to electromagnetic waves. He re-arranged circuit connections and materials, always trying to extend the function of whatever apparatus he was working on, in much the same way that he had altered the function of cousin Daisy's sowing machine.. It is clear that his erratic homelife was playing a big part in the way that he studied and worked. Finally he had found a method by which he could escape from the rather hapless situation that his upbringing had brought upon him.

When Marconi's mother secured private tuition for him with Professor Righi at the University of Bologna, he received a very unorthodox education. Since he wasn't officially attending the University he could not partake in the lectures that were held for the students. This resulted in Marconi gaining little knowledge of the fundamental theories of physics,

instead he concentrated on the more practical applications of experimentation.

This style of education was a major influence in Marconi's work, especially in Ireland at Kingstown and Clifden. As will be shown in chapter 2 at the Kingstown Regatta where he utilised his invention of wireless telegraphy in a very practical manner by using it in correlation with journalism It was much more important to him to see his inventions be of practical benefit to society as a whole, rather than mere experiment results in a laboratory.

His practical approach to his work is also apparent in his work at Clifden. Having succeeded in inventing a system of wireless telegraphy in Italy in 1895, he went to the Italian government too see if they would fund him in further research, but they declined, seeing no commercial applications in his invention. So he came to Ireland, to try to set up wireless links with America. He chose Ireland because of it's relative closeness to America, and also because the area at Connemara offered a large expanse of ground with little mountains, which benefitted the transmission of air waves. The whole situation bore a resemblance to his homelife as boy. He was shown no support by his Italian father, who was never satisfied with him, so he fled to find refuge in his Irish mother's affections.

Marconi also found he could work well in the solitude of it's countryside, thinking about experiments while admiring the scenery. Its rugged landscape held an inner feeling of hope and wonder for Marconi and seemed to echo his enthusiasm for science and it's seemingly limitless capabilities, in much the same way that his Irish mother held an inner belief that her

son would be successful in his work. In this respect Ireland was very important to Marconi, knowing that he could depend on it and it's people almost as much as he could on his mother.

In Chapter 3 it will be shown how Marconi came to respect the land on which he worked, and also the local people that he employed to help create the wireless station at Clifden. His mothers influence had always taught him to respect people, because he knew what it was like to be neglected by his father, and he was extremely grateful to have someone like her to guide him through difficult times.

Throughout his work Marconi always had the needs of ordinary people in mind. To him it was much more important that his work made these people's lives more comfortable, rather than being praised for his achievements. Even after several successes in the field of science nothing relieved him of the inexorable need to continue, to progress and develop his work. He lived his life as a hard worker, not as a laboratory inventor, but more of a practical electrician. His hard working nature displayed the greatest resolution before many unexpected difficulties. All of these characteristics stemmed, without a doubt, from his upbringing by his mother and his education.

This chapter has focused on the childhood of Marconi and also that of his mothers. It has shown how his childhood education and influence of his mother had a major influence over his work and the unique way in which he approached his work. Parallels have been drawn between Marconi and his mother in relation to personality and childhood.

This chapter has built an image of what Marconi would stand for throughout his life, a determination and inner-belief in himself and in his scientific experiments. He carried through innumerable traits and characteristics passed onto him by his mother, and displayed these in his approach to science. Two instances of this work will now be studied in dept, so that it might become clearer as to how these characteristics, endowed upon him in his childhood, manifested themselves in his work.

CHAPTER 2

THE WIRELESS STATION AT CLIFDEN

This chapter looks at the wirless station at Clifden in detail. It also looks at how his approach to working his experiments as a young teenager, was evident in the way he worked at Clifden.

Although Clifden in Connemara served as an address for Marconi's wireless station, the station itself was located miles from any town, in a very desolate and lonely area which was surrounded by spongy bogs.

Cold dampness rose from the surrounding marshes and saturated almost everything, making it difficult to even light a fire. Yet for Marconi it was a very special place. His daughter Degna wrote : " Yet that coast could be beautiful when the heavy sea mist swirled back and a pink sunset sky was reflected across the grey ocean ". (Marconi,1962, p.180).

This rather barren land in appearance held an inner feeling of hope and wonder for Marconi and seemed to echo his enthusiasm for science and it's seemingly limitless capabilities:

> It is in this world of eerie fog that I think of him when I read his words.....' The messages wirelessed ten years ago have not yet reached some of the nearest stars, when they arrive there why should they stop? it is like the attempt to express one-third of a decimal

fraction: you can go on forever without coming to any sign of the end .

(Marconi, 1962, p.181).

On the 25th. of July 1905 Marconi and two companions travelled to Cashel in Co. Galway and carried out tests to examine the prospects of the site for his wireless station. A site at Derrygimla, approximately three miles south of Clifden was selected. The station was compiled of a very large amount of technical equipment. The aerial for the transmitter consisted of eight wooden masts, each measuring 210 ft. in height, on which the aerial wires were suspended. The earth system consisted of two sheets of heavy copper gauze, 600 ft. long and 4 ft. wide,buried in line with aerial. Approximately 200 ft. of these strips were laid at the bottom of the lake, which was about 10 acres in area.

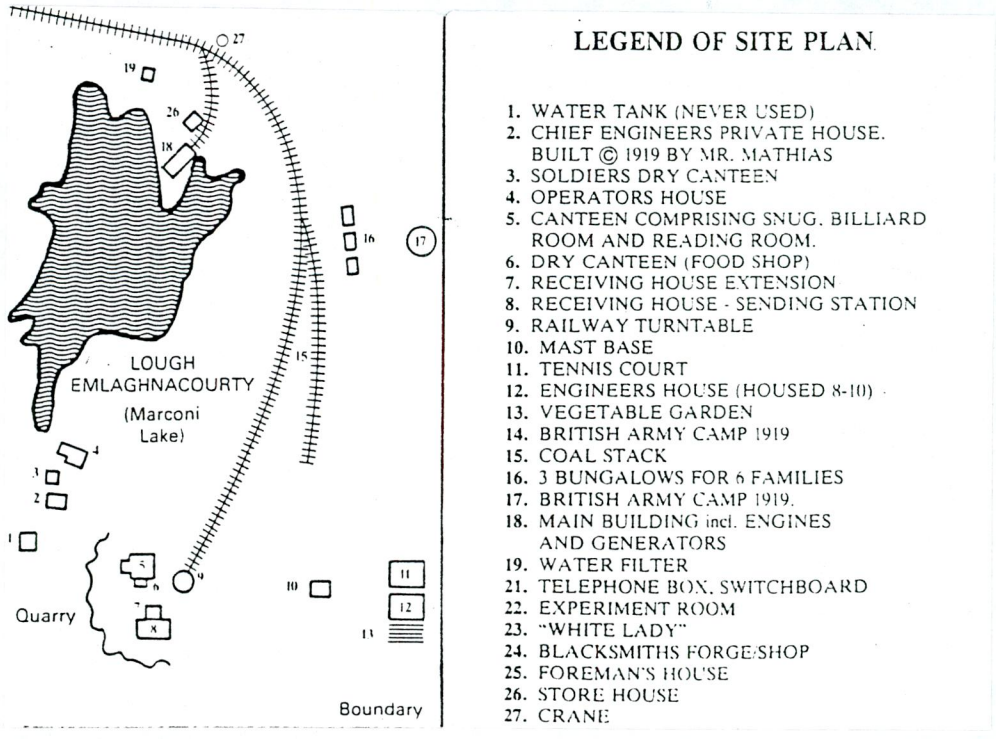

Fig.2. Approximate plan of Derrygimla station.

The generating plant provided an output of 300 kw at 20,000 volts. The generators were driven by six steam engines .and the receiver house was located across the lake from the generator in a disused quarry. The engineers house, operating bungalow, and canteen were all located nearby. The receiving aerial originally employed consisted of two wires, each about 2,100 ft. in length, supported at the tops of the masts of the transmitter aerial.

The large condenser was housed in a building composed of galvanised iron, and measured 350 ft. in length by 75 ft. wide. This condenser was different from previous ones in that it used air between the plates instead of glass.

At the Derrygimla station a newly patented disc discharger was used, which allowed continuous oscillations to be produced, facilitating more precise tuning at the receiving end. The introduction of this disc discharger proved to be one of the most important steps in Marconi's development of long distance wireless telegraphy. This discharger and directional aerial paved the way towards the success of the station.

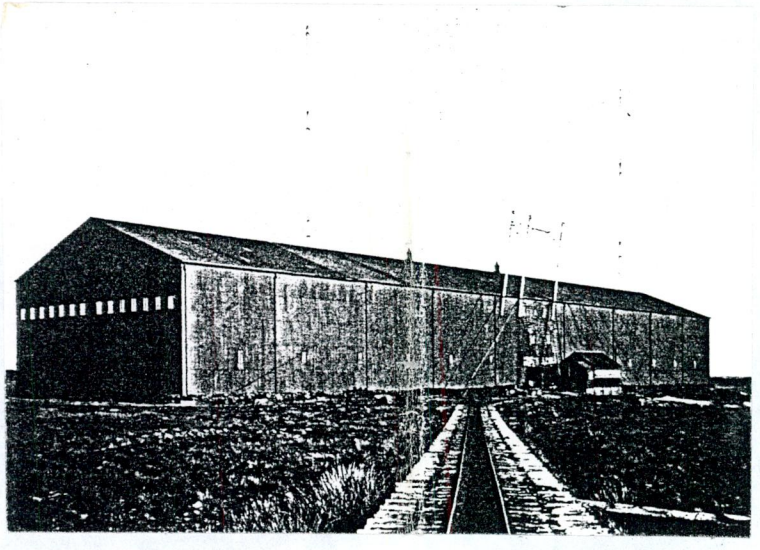

Fig.3. The Condenser House at Clifden.

Although this station served mainly as an outpost of the Marconi establishment which was located at Poldhu in Cornwall, Marconi treated it as another important project which would take him a step further in attaining his dream, of spanning the world without wires.

This rugged and rather barren area of Connemara, which was located some miles from the Clifden terminus of the Midland Great Western Railway, at times suffered the severe brunt of Atlantic gales. This, however, did not deter Marconi. as his had mother had taught him to be resiliant.

The Derrygimla site offered Marconi advantages over other areas in that it was the shortest wireless link with Glace bay, and also it provided the necessary area of ground required for erecting such a station. On the other hand the location produced various problems, one of which was, how to transport all the necessary materials required for building, to the site. Boilers , machinery and fuel also had to be transported to the desolate location where the station was to be located.

Used to problem solving as a boy, Marconi found a novel solution in the form of a light railway system which extended approximately 1.5 miles from the station. It's purpose was to transport turf and coal to fuel the furnaces and also for transporting equipment and supplies from the road at Ballinaboy.

This railway line consisted of two branches, one running right into the boiler house, and the other to a coal dump. The trolleys in which the turf and coal were carried were known as colliery buckets. The track gauge was 3 ft. and there were three locomotives and two rail cars. From the beginning the

boilers at the station were fuelled with coal and turf. It was hoped that in time turf could be utilised as the sole form of fuel, because the economies of using turf were attractive. At the time it was calculated that 2.5 tons of turf emitted the same steam producing capacity as one ton of coal. The nearby bog was expected to supply the station for up to twenty years.

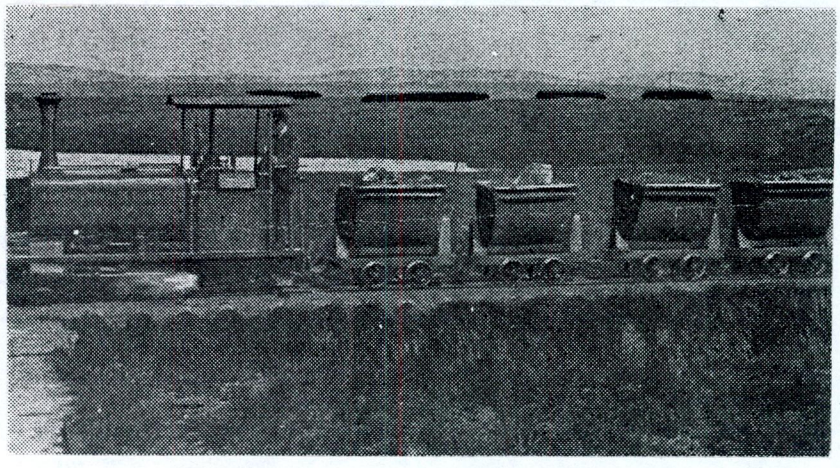

Fig.4. The " Marconi Express " carrying coal and employees across Clifden bogs in 1907.

The firm of Dick, Kerr and Co., Kilmarnock, built the engine for the line, to the order of the Marconi Company, with the words " Marconi Wireless Telegraph Company L.t.d " painted across it's tank. It was hoped to open the station on Tuesday the 15th. of October 1907, but by this time the only building complete was the condenser house. All the other buildings had only been partially completed, and the whole site looked like nothing more than a shanty town.

Finally on Thursday the 17th.of October official messages began to be received from Glace bay. At the time the messages were referred to as " Marconigrams or aerograms " and a

charge of 5d per word for ordinary messages and 2.5d per word for press reports, were equal to half the charges existing at the time for use of the Atlantic cables from Valentia. There were three operators at the station and they were kept very busy, receiving messages at a reported rate of 30 words per minute, compared with 22 words per minute rate over the Atlantic telegraph cable.

On that Thursday morning, the 17th, Marconi was present at Glace bay station, and at approximately 11.30 am the first messages were sent out from Derrygimla. One of the first official messages was directed by a Mr David Lyold-George, President of the board of Trade. His message read :

> Every improvement in the communications between various parts of the British Empire helps to consolidate and strengthen it. All well-wishers of the Empire will welcome therefore, every project for facilitating contact between Britain and the great Dominion across the Atlantic.(Clarke, 1986, p.4).

Although the whole project provided much needed employment for the residents of the surrounding area, their jobs were confined to labouring on the rail line, transporting the turf and coal to the station. Nonetheless the station at Derrygimla was greatly received by the inhabitants of the Clifden area, for at that particular time Clifden was a region of little employment and high emigration. When fully operational the station employed over one hundred permanent staff, and casual staff of approximately one hundred and forty people.

While most of the permanent staff of engineers and operators came from England, Marconi's utilisation of the local

labour force showed, on the one hand, good economic sense,but also his attitude to the ordinary folk. Since he hoped that his work would be, in time, of benefit to all the people of all the nations and not solely the rich, he presented the rather poor inhabitants of the region an opportunity to play a significant role in the development of wireless telegraphy.

The fact that Marconi's Mother was Irish was evident in the respect that he had for the locals and their land, and by allowing them to participate in his dream for mass communication maybe he was secretly thanking his mother for the many times she supported his work as a young boy in Italy.

A social club was organised by the employees and a premises for their activities was provided on the site. It was well organised and very popular. There was a great sense of friendship and togetherness within the club, and also a great deal of friendly rivalry between the Marconi club teams and locals in various competitions. This whole social set-up conveys the understanding of the Irish working mentality that Marconi must have had, realising that his staff would work much better as a team if they socialised together as one large group.

The income from the employment at the station resulted in a much appreciated general increase in the standard of living, particularly in Clifden itself, where at the time it was said to have progressed and developed, socially and economically ahead of the rest of Connemara. While generally there was family atmosphere about the project, when the station was opened only reporters who had received special passes from The Marconi Company in London, were permitted to enter inside the station area.

Marconi was happy to see this family rapport which existed between the staff, and from his own personal experiences he knew that operations would run much smoother this way, having spent most of his younger days in an environment of the complete opposite.

It was noticed that for several days after the initiation of operations at the site, the whole area experienced a torrential downpour which exceeded the usual amount. At the time *The Connaught Champion* quoted local people in a somewhat apprehensive state " lest the downpour should be caused by the penetration of the clouds by the electricity which gives impetus to the Marconigrams ! (Clarke, 1986, p3).

In 1912 it was decided that another receiving station should be built, to allow simultaneous transmission and reception.

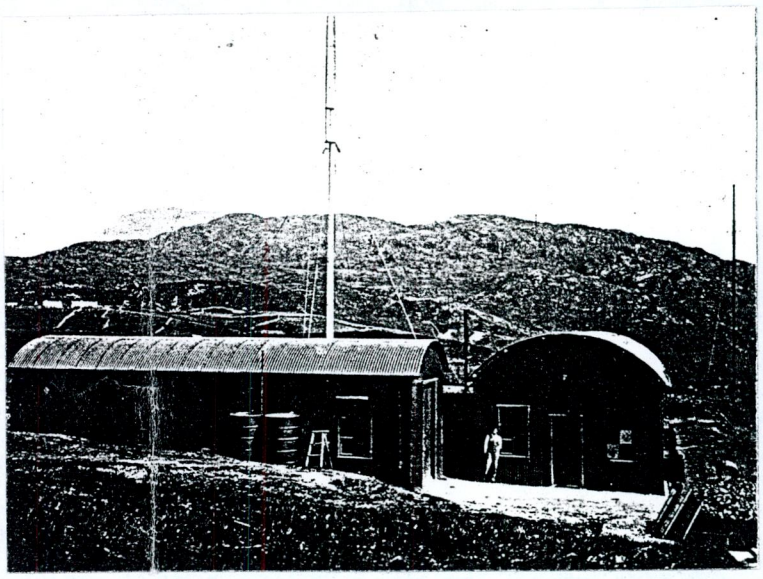

Fig.5. The receiving station at Letterfrack.

The location chosen was situated ten miles from Derrygimla, at a place called Letterfrack. This site was chosen

not only for it's proximity to the coast, but also because it was slightly shielded from the signals of the Derrygimla station, and had a clear path along which to receive signals from across the Atlantic.

The station was completed in 1913 and was connected to the Derrygimla station by a land line. When the station was working to maximum capacity, it employed a workforce of over one hundred men. At the time this was deemed to be uneconomic as this was more than the labour force required at Derrygimla when it was functioning as a receiving station.

In 1916 the station was closed for financial reasons, with the operators and engineers returning to work at Derrygimla. Most of the unskilled labourers lost their jobs.

All this occurred during World War 1 and for security reasons the Derrygimla station was taken over by the British Government. In 1916 when the rising broke out, precautionary measures were installed in order to prevent the news of this event reaching the United States. Eventually news did reach across the Atlantic via the Atlantic cable in Valentia.

At the time the Republicans held large areas of the country, including Clifden, and the area surrounding the Clifden station. All private wireless messages sent from the station were censored, except the international service. The ostensible reason for the attack seems to be because it was regarded by the Irregulars as a British concern.

The receiving house was practically destroyed and the condenser house considerably damaged. The local population were extremely dismayed at the event since it forecast the loss

of some 250 jobs, with one thousand people being deprived indirectly, of their livelihood. The station was never rebuilt.

By the early 1920's the reliability and speed of the wireless link were proving more effective than those of the land line connection between Clifden and London. No longer was the shortest section possible an important factor. The service was in time transferred to Wales.

Although the station at Derrygimla had been commercially quite successful and had played a major part in restoring the company to profitability from it's near bankrupt state in 1907, it was decided to close it down.

As was to be expected amongst the local people, there was extreme disappointment and worry. The reliable weekly income which the station promised was sadly missed. Most of the locals returned to unemployment, while the English and Welsh staff returned to jobs in Britain, at various other Marconi establishments. In a way the locals felt cheated by the loss of their livelihood, but it was through no direct fault of Marconi. The direct cause of the initial damage was a result of the Civil War. This situation, combined with the subsequent progression of technology, resulted in there being no need to rebuild the station. There existed stations in Wales which were now developed enough to carry out the same duties as the Clifden station. The station was outliving it's own usefulness and Marconi was left with no choice but to close it.

Up until 1925 negotiations between both the Irish and English governments continued regarding the future of the station, but in the end all talks proved to be fruitless. Whatever could be salvaged from the somewhat derelict buildings was

gathered and transported back to England for subsequent installation in other stations.

In addition to this authorised salvage, other items from the site were removed in an illegal manner, with people helping themselves to whatever. they could find of value.

Having being the first point-to-point wireless service in the world, so the wireless station at Derygimla came to a rather sad end. The barren desolate landscape, which had once captured an incredible feeling of excitement and anticipation, culminating in the successful transmitting of wireless messages from Clifden to America, was returned to state in which it was discovered. Somehow akin to the empty set from a movie left as a reminder of what was once there.

And so finally the station came to it's end having played it's role in Marconi's dream to it's fullest. Everyone associated with the building and running of the station had great admiration for Marconi's dedication, patience.and will to succeed. The engineer in charge of the Glace bay station that had recieved so many messages from Clifden expressed the feelings of everyone when he wrote:

> Only those who have worked with Marconi throughout these past years realize the wonderful courage he showed under frequent dissapointments, the extraordinary fertility of his mind in inventing new methods to displace others found faulty, and his willingness to work, often for sixteen hours at a time, when any interesting development was being tested. (Baker, 1970, p.124).

Apart from the electrical and scientific experiments which were carried out by Marconi at the station, one must not

forget the trojan work which the labouring local people put into the station. The sheer task of erecting brick buildings and huge masts on such boggy and unstable foundations was a tribute to theirs and Marconi's dream of world wide wireless communication.

CHAPTER 3

THE KINGSTOWN REGATTA

This chapter focuses on the first application of wireless telegraphy to practical journalism, one of Marconi's most significant achievement, not only in Ireland, but throughout the whole world.

On the 20th and 21st of July 1898, the Dublin *Daily Express* succeeded in their attempt to apply Signor Marconi's system of Wireless Telegraphy to the use of Journalism. This was achieved through a series of experiments which were successfully executed in Dublin Bay in connection with the Kingstown Regatta.

. This was the first occasion that Signor Marconi's invention had been used in such a venture, and with the event being of such historical importance, it was subsequently covered by the *Daily Express* and *Evening Mail,* who felt that that it would be beneficial to the general public to report and record such an event, in conjunction with Signor Marconi.

This was a very significant occasion in that, for the first time , the information being relayed was for the sake of the information being sent and not for the sake of those sending it.

All the experiments which had been previously carried out to test wireless telegraphy were finally coming to fruition in the form of this momentus event. The public had been

reading of experiments in this field and were wondering of it's applications and benefits to society. Up until then ' Wireless Telegraphy ' had been used to examine it's own capabilities and faults, so that they could be corrected and the system improved, but it had never been used in journalism.

The experience itself of the reporting of the Regatta exceeded the mere advances in Wireless Telegraphy from an experimental subject, to a viable commercial project. The fact that it possessed commercial capabilities, presented solid reasons for a broad foundation of alternate applications. Some suggestions as to it's future applications were forwarded by Professor Fitzgerald, writing for the *Daily Express* :

> ...the Kish Lightship might be kept always in communication with the shore, and that similar lights all around our coasts might be able everywhere to communicate with those who could help them and ships near them in case of human lives being in jeopardy.
> (Fitzgerald, 1898, p 4.).

While the above statement from Professor Fitzgerald augered well for the future possibility of wireless telegraphy helping to save human lives, in the same article he also commented on it's inevitable application to wartime situations :

> Think what this means, in war, for instance, if, without laying telegraph wires, over hill and dale, in thick weather as in clear, bodies of troops and ships could communicate with one another. No doubt, an enemy might, in certain circumstances, either interfere with or read the signals. But so they can in any other known mode of communication, and yet

> nobody disputes the value of horse and rider.(Fitzgerald, 1898, p.4).

The majority of the general public were a little bemused, to say the least, by the whole concept of wireless telegraphy, and considered it as " something that no fellah can understand " (Fitzgerald, 1898, p.4).

Thus followed a series of analogies from the newspapers, put in very simple terms for the benefit of the public, as to how Marconi's invention worked. This was very important to Marconi because he wanted the public to be totally aware of what he was trying to achieve.

On the days of the Regatta, the 20th and 21st of July, the operating procedure adopted was as follows. The steamboat the " The Flying Huntress " was chartered by the *Daily Express* , with Signor Marconi's apparatus installed on board. In the grounds of the house of Captain Crofton, Harbour Master, at Kingstown, a land station was built, where a special telephone wire was laid down by the National Telephone Co., from there to the offices of the *Daily Express* and *Evening Mail.*

It was Signor Marconi himself who superintended the whole experiment, reiterating his style as a young science student of always being practically involved in his work. He did not work alone however, bringing along with him his able assistants, in Mr Kemp, Mr. Bullock, and Mr. Glenville.

The " Flying Huntress " followed the yachts out to sea, to points where they were not visible from the shore. On board the " Flying Huntress " was a yachting expert whose descriptions of the different stages of the race were

transmitted back by Signor Marconi to the land station at Kingstown, where they were telephoned to Dublin, and published in successive editions of the *Evening Mail.*

The apparatus on board the " Flying Huntress " on those two days were a transmitter, a receiver, a Morse taping machine, and two batteries. These instruments were connected by a long strip of ordinary galvanised iron wire netting, hung from the top of the ships mast.

A more indepth account of the apparatus on board is necessary to fully explain Marconi's ideas and achievements. Fig .6a and 6b are two photographs taken in the Leonardo da Vinci Museum in Milan of the transmitting device, used by Marconi on board the " Flying Huntress "

Fig. 6a. The Ruhmkoff Coil. (Transmitter).

The large dark cylinder in fig 6a is the Ruhmkoff Coil, which is powered by a galvanic battery, by means of which

sparks are produced. Shown in fig.6b on a wooden stand, are a number of brass spheres between which the electric sparks are produced. These are supported by pillars of insulated material. These two items make up collectively what is known as the transmitter.

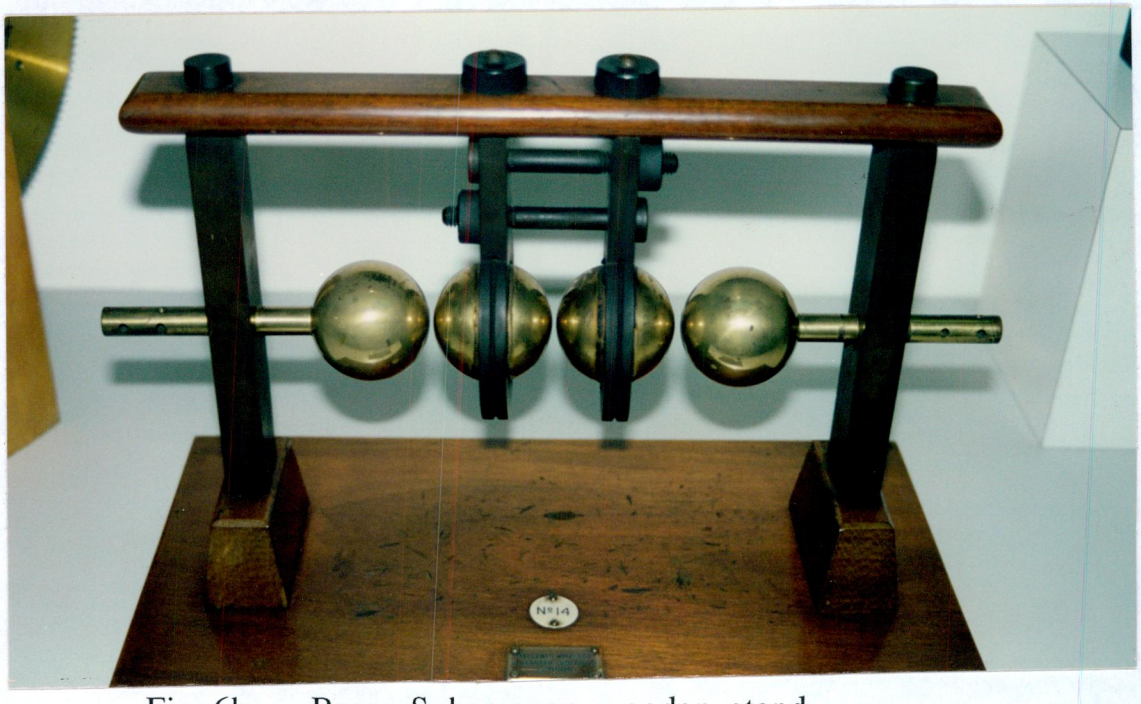

Fig 6b. Brass Spheres on wooden stand.
(Transmitter).

The right hand sphere is connected to the high vertical conductor made of galvanised wire netting, that stretches from the deck to the top of the ships mast. The left hand sphere is connected with a similar wire that acts as an earth.

At the right hand of the coil (fig. 6a), is a key by which the current is sent into the coil. If this key is depressed for a short time it transmits a short series of electric claps,If the key is depressed for a long period of time it sends a long succession of claps. It is by these long and short signals that the telegraphic alphabet is compiled. Fig. 6 shows a photograph of how these long and short signals, known as Morse Code,

actually correlate to the letters of the alphabet. When these coded messages were received they could be changed into logical text by exchaniging each code for it's corresponding letter.

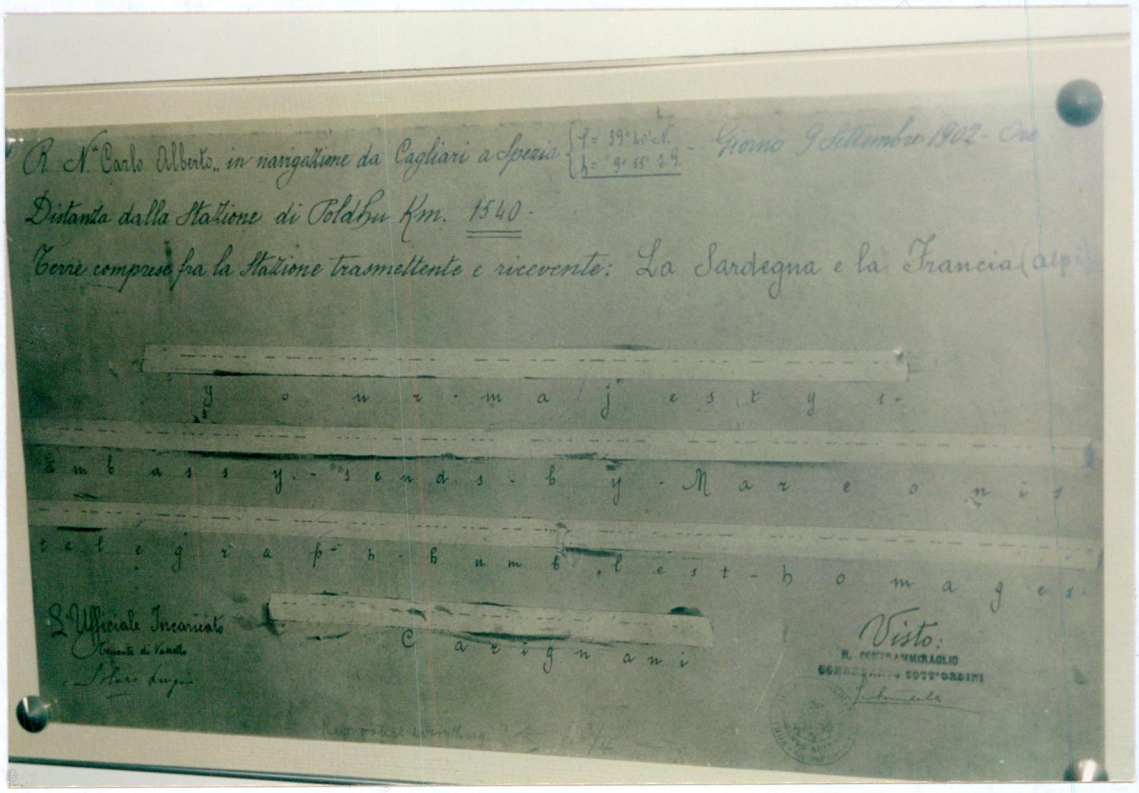

Fig.7. Photograph of Morse Code message sent from Poldhu in Wales in 1902.

In short the transmitter shown in Fig 5a and 5b operates as follows. When the operator presses down the key, the coil sends a succession of sparks between the brass spheres, and from the wire netting connected with the spheres a series of ether claps is sent out through space to the receiver.

The receiver consists of three distinct parts, two of which are illustrated on the right hand wooden block, and the

other on the left hand block., of fig.7. The most important piece of the receiver is the glass tube, which is positioned horizontally in the upper right hand part, of the right hand block.

It's ends are connected with two wires, one of which is connected with the earth and the other with the high wire netting of the receiving station. These wires are attached to the terminals of a weak cell, through the instrument contained within the drum shaped box, represented on the right hand block. This is a delicate instrument called a relay.

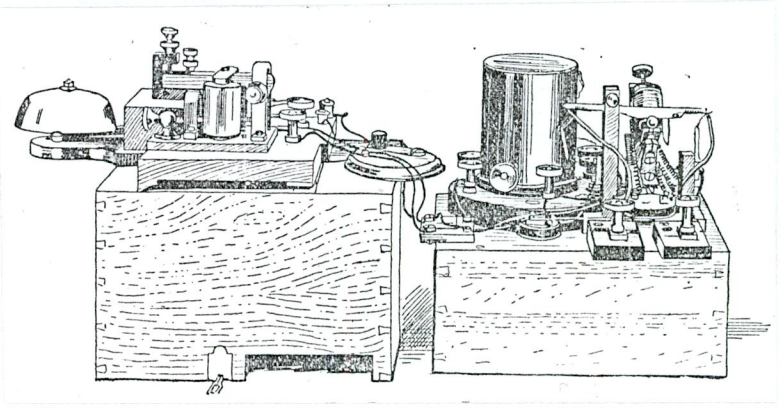

Fig. 8. The Receiving Apparatus.

The instrument on the left of this illustration is the one which produces short and long marks on a paper tape, or rings an electric bell. The delicate parts of the relay are not sufficiently powerful to do work of this kind, but the relay can make or break contacts which activate the unit.

Returning to the glass tube, this contains the extremely sensitive part of the instrument. It houses the part which is irritated by the ether claps. This consists of two metal filings placed between two metal wires.

The weak current from the battery finds great difficulty in passing from filing to filing through this tube,. however, when the wire netting receives an ether clap, the filings become better connected, and a current can easily pass. This sets the relay in motion, which in turn calls the telegraphic instrument into operation and a mark is made on the tape or a click is heard from the bell.

The instruments on board were connected with the outside world via a copper wire, which was attached to the wire netting, which ran to the top of the mast. Within it's meshes it caught millions of electric waves which (when replies were coming in) were generated at the land station, and sent into the cabin of the " Flying Huntress "

On shore, at the land station, in a room at the rear of the residence of the Harbourmaster were duplicates of the instruments on board the " Flying Huntress ". The receiver, transmitter , and Morse Tape- machine were controlled by Mr. Kemp (Signor Marconi's chief assistant), and Mr Glenville a graduate of Trinity College and a pupil of the inventor. The procedure for operation on shore was the same as with Marconi on board the " Flying Huntress " with one sending and the other receiving and vice-versa.

All in all, stripped down to it's most fundamental, the whole process seems quite simple. But then again so do most problems when worked back from the answer to the original

question. Much of the information required to solve this problem of transmitting and receiving had already been gathered when Marconi unveiled his discovery.

During the1890's a number of scientists from America and Europe were experimenting on the subject of transmitting and receiving information, these included such scientists as Heinrich Hertz, Sir Oliver Lodge, and Augusto Righi. Each contributed new knowledge and invention to the sum of understanding that already existed on the subject. Indeed it was the experiments of Hertz which sparked off the whole idea of wireless telegraphy to Marconi. Marconi used his practical approach to science by gathering all the existing information and using it to compile his own experiments.

Hertz was a German who had set about proving a theoretical prediction made by a Scottish physicist Maxwell, that there was a new type of wave which he called an electromagnetic wave. Such waves would have a frequency and wavelength like water or sound waves, but they would travel at the speed of light, and would pass through solids, liquids and gases, but most surprisingly of all, and unlike any other type of wave, they would travel easily through a vacuum.

In 1887, eight years after the death of Maxwell, Marconi showed that electromagnetic waves existed in an experiment, which had been devised by Hertz. In the experiment he connected the two ends of a coil of wire to the opposite sides of a gap, across which a spark would jump when he pressed a key connected to a source of high voltage. This

acted as the transmitter, and a coil of wire some distance away, attached to a much smaller spark gap acted as the receiver.

In the summer of 1894 Marconi was on holiday at Biellese in the Italian Alps, when, upon reading a description of Hertz's work, he said that the idea of wireless telegraphy using Hertzian waves had come to him.:

With the principle established and demonstrated, Marconi endeavoured to modify and develop the finer points of the system. He was adepth at this improvement and consolidation phase of scientific innovation/design, which no doubt stemmed from his rather unorthodox education as a young science student, and also from the guidance of his mother. His great level of patience and determination forced him to attempt almost every conceivable circuit in his apparatus, even when there was little or no scientific evidence to support the modifications. This was evident at Kingstown which required much painstaking experimentation before the actual apparatus used was finalised.

To Marconi it was enough that the modifications could be made, for the simple reason that if one of them proved to be successful, then a scientific explanation would eventually be found. His practical, if somewhat unorthodox education at Leghorn and .the University of Bologna are testimony to his work being very much a case of trial and error.

Coupled with this patience and determination for success, it must also be said that he had more than his fair share of luck (perhaps inherited from his Irish mother) always seeming to choose the right experiments under the right

conditions. He was conscious of this when he made the following statement about how he came upon a discovery:

> By chance I held one of the metal slabs at a considerable height above the ground and set the other on the earth. With this arrangement the signals became so strong that they permitted me to increase the sending distance to a kilometre. (Jolly, 1972,p.27).

This statement enhances the rather mysterious and romantic nature of not only his work, but also his style of of work. It imbued upon him a sense of wonder and expectation of the improbable, his work at Kingstown perhaps reminded him of his childhood where he revelled in the expansive world of thought and imagination.

Most of all he was an incredibly hard worker, not just in the sense of theoretical experimentation, but also on a physical scale, as we have seen in his work at both Clifden and Kingstown, where he adopted an approach of always overseeing his experiments by being there to make modifications and changes if needed. This resembles his work as a young teenager when he began to construct mechanical toys from whatever he could find forever changing and re-arranging their structure.

> Science keeps one young. I cannot understand the savant who grows bowed and yellow in a workroom. I like to be out in the open looking at the universe, asking it questions, letting the mystery of it soak into the mind, admiring the beauty of it all, and then think my way to the truth of things. (Marconi, 1962, p.181).

This triumph of determination and perseverence was well reported in Ireland by the *Daily Express* and *Evening Mail.*, and also by the Irish Daily Independent, the Freemans Journal, the Ulster Echo and the Limerick Chronicle, who wrote

> Indeed the experiment is destined to have far reaching results in almost every phase of life.....it was the first occasion on which wireless telegraphy has been applied to practical press work, and certainly the proprietors of our contemporary are to be congratulated on their highly interesting and most successful achievement. (Anon, Wireless Telegraphy and Journalism, *Daily Express*).

The historical event also gained great exposure and newspaper coverage in Britain. They printed notices and articles praising Signor Marconi aswell as the *Daily Express* on their joint achievement, since it was the combination of both that made the event so unique.In praise of Marconi the *Newry Telegraph* wrote:

> One experiment has shown that Mr. Marconi's invention is not an imaginary thing, but something real, something that will make electricity even more popular still. He has taken wireless telegraphy outside the domain of speculation. He has shown what he can do, and no wonder the general public stand aghast.....these practical demonstrations are far more useful and impressive than obtuse speeches and technical descriptions.
>
> (Anon, Wireless Telegraphy and Journalism, *Daily Express*).

CONCLUSION

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In section 1 of chapter 1 the childhood of Marconi and his mother was covered in detail. Subsequently in section 2 the significance of both on Marconi's style of work was brought to light. This chapter showed also that Marconi's mother was a major influence in his life, and that the way in which he was brought up moulded a character within him which was to enable him to contribute so much to society.

Chapters 2 and 3 looked at Marconi's work in Clifden and Kingstown respectively, covering in detail much of the technical work involved, but also relating it to his childhood, the transgression from building small mechanical toys in his attic to creating the first wireless and using it to report on a Regatta and also to transmit signals across the Atlantic to America.

The seemingly small and insignificant events which occured in Marconi's childhood accumulated and slowly developed into great scientific achievements, the fruit of many years of failure and experimentation. Experience has forced us all to concede that there exists a long time between the conception of an idea and it's actual realisation. New inventions always seem exciting to those who have created them, however they cannot be presented to society as a mere idea.

This was one of Marconi's greatest attributes, his ability to carry an idea through to it's fullest, to bring it to it's fruition in a practical form. A style which originated in him as a young teenager in the attic of his home at the Villa Grifone. Marconi always had ordinary people in mind when he was developing an experiment and only ever considered his work a success if he managed to create something which could benefit society as a whole.

An example of this was shown at Kingstown, where he succeeded in using his invention of wireless telegraphy in collaboration with practical journalism. It was all very well to be able to send messages through space, but this alone amounted to nothing. He managed to utilise his invention to it's maximum by allowing it to benefit the development of the whole of mankind.

At a time when the general public was not too well informed on the subject of science, Marconi refrained from alienating society from what he was experimenting on, instead he sought to bring them to terms with his inventions, by involving them. At Kingstown and Clifden he worked with the people as much as for the people.

And so we have seen that Marconi was an enthusiastic leader and an active participant in all his experiments, although his senior position would have made it very easy for him to have acted as a mere on-looker. He seemed to revel in the hard, and often dangerous work which he involved himself with.

It is hard to ascertain the influences which drive a man's interests and ambitions in a certain direction in his life, but in the case of Marconi there is one for certain, his mother.

She endowed upon him characteristics of her own behaviour, single-mindedness, self-belief, and a stubborn will to succeed. Never given the correct solution, it seemed he always had to choose from two, one supplied by each parent. This parental difference towards him sharpened him as a person. He was forced to make difficult decisions at a very young age, but although she couldn't make his decisions for him, she gave him constant assistance and support.

Marconi's mother, an Irish woman, played a major part in his life. She substituted for the father who so often neglected him, she substituted for his lack of formal science education by arranging tuition for him, she substituted for an objective bystander in commenting on his early scientific work, when he had no one else to confide in. She was so many things to her son, that there was simply no substitute for her.

Marconi became the most famous name to be associated with the wireless. His trojan work beams immortal for all to see. Hardly any aspect of our lives remain untouched in some way or other by his development of the wireless. His work has enveloped the whole world and beyond into space where orbiting satellites beam messages across voids larger than Marconi would have ever dreamed possible.

And all this owing to one Italian boy who sent a signal from the attic of an old house in Italy over a small hill and into a vineyard, on an autumn day in 1894.

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