Extracts from....

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British Patent No. 7777 "for improvements in apparatus for wireless telegraphy"

Saturday April 25th 1874 was the birth date of Guglielmo Marconi and there will be several on air events arranged by various organisations in his memory on what has become Marconi Day. It is fitting that we should remember his tremendous contribution to the development of wireless communications.

Anyone using the chain ferry to take their car from Sandbanks across the 400 yard-wide Poole Harbour entrance to Studland Heath during the high summer holiday period will have queued for over an hour alongside the Haven Hotel. How many of us waiting in that line of cars will have realised that we are at the very site where Guglielmo Marconi completed the final experiments which enabled him to submit his patent and his claim to be "the inventor of wireless", resulting in him being granted the famous Patent Number 7777 by the British Patent Office in April 1901, a year after his first application?

Marconi had moved to London from Bologna in 1896 to seek patronage for his embryonic wireless telegraph apparatus experiments after failing to find support in Italy. His cousin, Henry Jameson-Davis, introduced him to William Preece, Chief Engineer of the General Post Office, who immediately recognised the enormous potential of both his wireless experiments and of the charismatic Marconi himself. At 40 years Marconi's senior, Preece was no push over. He had studied electrical engineering under Michael Faraday at the Royal Institution in London and was himself an accomplished experimenter in telephony and wireless telegraphy. He was a shrewd and capable engineer who adopted Marconi as his protégé and provided him with every facility to conduct experiments, demonstrations and field trials. In December 1896, at a Royal Institution conference, Preece publicly announced the exciting new wireless communication system, stating that Marconi would receive the full support and assistance of the GPO in its further development, a situation that was doomed to last for only a short period. Working for the GPO at the time was 39 year old George Kemp, who had served as an Electrical Instructor in the Royal Navy and whom Preece recommended to Marconi for his development team. The two men hit it off and Kemp joined Marconi as his personal assistant in July 1896, working with him at locations on the south coast of England, organising the logistics of his experiments and helping him with all of his key successes across the Atlantic.

George Kemp, Marconi's irreplaceable personal assistant and good friend

To the dismay of William Preece, the Wireless Telegraph & Signal Company was formed by Marconi with his cousin, Jameson-Davis, in 1897. Preece had entertained ambitions for the GPO to take on the mantle of wireless development using Marconi's expertise and to commercialise it for the benefit of the General Post Office. He felt that Marconi had betrayed his good offices to gain a foothold in England before discarding the support of the GPO and forming his own independent research and development team, causing the relationship between Marconi and Preece to cool significantly. Marconi set up an experimental wireless station and research facility at the Madeira Hotel in Bournemouth but, in 1898, following a serious disagreement with Mr Miller, the hotel manager, over the costs of maintaining his 115 foot wooden wireless mast in the hotel grounds, Marconi relocated his experimental station to the Haven Hotel at the tip of nearby Sandbanks, where he took a long lease on the building. Here he could dedicate himself with his carefully selected team of twenty able technicians and scientific researchers in relative obscurity and privacy, away from rivals and prying eyes. To that date, the principal scientific input to his research and advancement had come from Marconi himself through his dedication to continual trial and error in adapting and applying the research of physicists such as James Clerk Maxwell, Heinrich Rudolf Hertz, Oliver Lodge and fellow Italian Augusto Righ, who was Marconi's tutor at Bologna University. Marconi's skill had been to refine and utilise a variety of innovations and techniques to develop a viable wireless transmitter and receiver coupled to his own aerial designs. It was at the Haven Hotel, with the appointment of Dr James Erskine-Murray, that Marconi began to assemble a broader scientific team to strengthen the research capabilities of his Wireless Telegraph and Signal Company, later to be re-named as Marconi's Wireless

Telegraph Company Limited. Dr Erskine-Murray had been the assistant professor of physics at Heriot-Watt College, Edinburgh and with his new wife he moved to take up residence at the Haven Hotel as Marconi's principal scientific assistant. He was an early proponent of the existence of the Heaviside layer region, the 'E-layer', predicted by Oliver Heaviside to facilitate long distance transmission of 'Hertzian Waves'. Visitors to the Haven included the distinguished professor Sir John Ambrose Fleming, holder of the chair of Electrical Technology at University College, London, who was later to hold the patent for the invention of the thermionic diode. Marconi had appointed Fleming as a scientific consultant, along with other carefully selected scientists from Britain, Europe and the United States who held useful positions at universities. The relaxed atmosphere at the Haven Hotel was perfect for the interchange of ideas between all members of the development team who each reported personally to Guglielmo Marconi without the strict hierarchical management structure practiced by the GPO. He was often joined at the Haven by his mother and his brother Alfonso and meals were taken at a communal table where the researchers and technicians would also congregate. Along with the ever present George Kemp, there was Chief Engineer Richard Vyvyan, Charles Samuel Franklin, inventor of the variable capacitor, coaxial cable and the Franklin Oscillator, Captain Henry Round, who was granted 117 wireless-related patents, and Andrew Gray, inventor of the AC circuit breaker and destined to become General Manager of the Marconi New Street Works, who were all notable scientific researchers of the day. They were joined by the two Cave brother technicians and Mr Paget, who was Marconi's skilful choke winder, scientific advisors and assorted dignitaries as well as visitors from the Post Office which, despite the fall out, maintained a close interest in the work being undertaken. Evenings were often filled with musical entertainment with accomplished performances from Guglielmo playing the piano, Alfonso the violin and Erskine-Murray the cello.

During the early trials on the south coast, George Kemp was tasked with setting up a second experimental wireless station located in the Needles Hotel at Alum Bay on the Isle of Wight. Kemp delivered the huge wooden mast to Alum Bay by sea, reportedly complaining that it had required considerable effort to haul it up the steep cliffs and into position. On the mainland at Lymington Harbour, directly opposite the Isle of Wight, there was a LSWR railway terminus connecting with the ferry services to Yarmouth, which proved useful for bringing in the heavy apparatus that made up the wireless stations and from here Kemp arranged the charter of local steam tugs to undertake the first trials with sea going wireless apparatus.

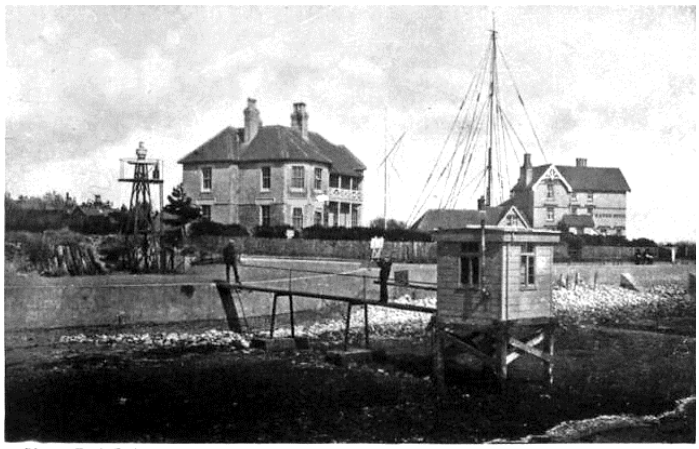


Photo : Fred. Cathery.
THE HAVEN, SANDBANKS (SHOWING MARCONI WIRELESS TELEGRAPHY STATION).

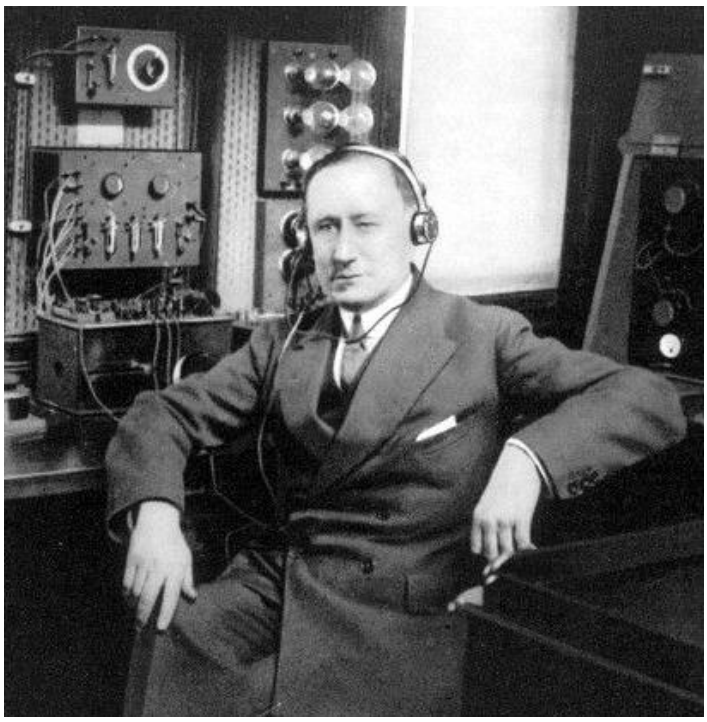
The Haven Hotel on Sandbanks with Marconi's 115 foot aerial mast in front. In the foreground is the landing stage for the passenger ferry between Sandbanks and Studland Heath, operated today as the busy vehicle chain ferry.
Photograph reproduced with the permission of the Poole Museum

These trials quickly proved to be successful, with good three way signals being established between the Haven Hotel, the Needles Hotel and the tugs, a result that encouraged Marconi to seek methods of improving the working range of his apparatus. One of Marconi's most successful experiments of this period was carried out from the 14000-ton German liner, *Kaiser Wilhelm der Grosse* on 28th February 1900 as she sailed from Bremerhaven with George Kemp on board. She was the first liner to be fitted with wireless and, as she entered the English Channel, the ship's wireless operator made contact with Marconi's stations at the Needles and Haven Hotels. For Marconi this was positive proof that his wireless sets could be adapted successfully for commercial use and resulted in his final decision to lodge his patent application.

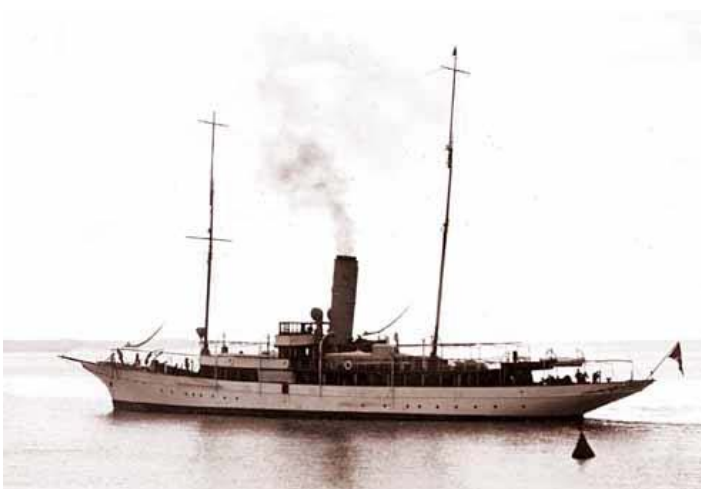
It was while working at the Haven Hotel that Marconi formulated his patent application employing a 'Syntonic' tuning system – tuned circuits for transmitter, receiver and aerial which enabled multiple transmissions to be made on separate frequencies without interfering with each other. 'Syntonic' tuning had been shown in public experiments made by Oliver Lodge, then Principal of Birmingham University, and had been patented by him in 1898. These techniques were undoubtedly seen and were refined by Marconi's team who claimed that they had been developed independently of Lodge and were incorporated into the final submitted designs, forming the basis of Marconi's patent application made in 1900 and granted as British Patent 7777 in 1901. The Haven Hotel was occupied by the Marconi Company as a research and experimental station for many years after Patent 7777 had been granted, before finally moving out in 1926. During that time Guglielmo Marconi still occasionally visited the hotel to review developments taking place there and to undertake seagoing trials using his sleek yellow funnelled steam yacht *Elettra,* which was moored a short distance from the Haven Hotel, just off Brownsea Island. From here the yacht could be used to undertake seagoing wireless communications between the yacht and the Haven Hotel and to undertake experimental AM broadcasts using a valve-based transmitter to broadcast gramophone records and live commentaries of local regattas. *Elettra* was a 67 metre 700 ton steam powered yacht with a crew of 30, which had been built at Leith for the Archduchess Maria Theresa of Austria. She was never able to take delivery of the completed vessel, which was commandeered by the

Royal Navy and used as a minesweeper in WWI before being purchased by Marconi in 1919, probably with some of the £590,000 he had just been awarded by the English courts following a successful legal claim against the British Government. After her purchase, *Elettra* was returned to Leith for a complete refit for long distance cruising as a mobile wireless laboratory and was used extensively by Marconi and his family. *Elettra* travelled much further distances during which Marconi undertook trials comparing the use of VLF frequencies to the newer short wave frequencies being used successfully by radio amateur experimenters to communicate over long distances. Successful trials were also made using Samuel Franklins beam aerial design for communications between Poldhu in Cornwall and *Elettra* in the South Atlantic. When he died in 1937, Marconi's family sold the yacht to the Italian Government, but it was again commandeered, this time by the German *Kriegsmarine* in 1943 while she was alongside in Trieste at the time of Italy's capitulation to the Allies. *Elettra* was rapidly converted to a lightly armed escort vessel. Between 24–30th January 1944, while escorting a small flotilla of converted fishing boats and inshore transports, she was attacked by several Allied aircraft near the ancient village of Trogir, on the Croatian Yugoslav coast, before being sunk by a torpedo fired from a Royal Navy submarine.

Marconi never claimed to be a physicist and, on his patent application, he described himself as an electrician. His real genius was his ability to recognise other people's scientific research which could be utilised in the developments of wireless, bringing them together to form a viable working system and in recognising their commercial potential. Having obtained his early patents, Marconi quickly and relentlessly set about exploiting his commercial advantage and fought numerous legal challenges to his patents. Sir Oliver Lodge, as he had by now become, fought a legal case for many years over his own claim that Marconi had infringed his patent rights to 'Syntonic' tuning and it was not until 1912 that the case was finally settled when Marconi purchased the patent from Lodge.



Marconi on board his yacht



Marconi's 67m steam powered yacht *Elettra*