

Monday Morning, November 9, 2009

History Session: Centennials of Wireless Broadcasting
Room: B2 - Session HI-MoM

History Session: Centennials of Wireless Broadcasting
Moderator: R.K. Waits, Consultant

8:20am **HI-MoM1 Marconi and the First "Vacuum Tube": More than 100 years of Nothing at Work, B. Lee, San Francisco Attorney INVITED**

The history of the discovery of the uses of nothing, i.e., vacuum, pleases the mind. In communications, Guglielmo Marconi utilized a vacuum device about 1898. The "coherer" detected radio frequency energy rendering it sensible to people through other devices. Marconi evacuated this device to improve its performance. In doing so, he illustrated a deeper principle: eliminate the equivalent of "friction" and see (and enjoy and exploit) the true operation of nature. Newton's celestial mechanics also illustrate this principle, which has an analogy in economics as well.

Other communications pioneers also used vacuum devices to detect the signals of the then new wireless telegraphy. Notably, Marconi, through the work of John Ambrose Fleming, implemented the vacuum diode, the "Fleming Valve," thereby advancing the art. Lee deForest put the famous "grid" between the filament cathode and anode of the Fleming vacuum diode, and created the primary technology of 20th century communications, the triode vacuum tube as an amplifier and oscillator.

When Fleming heard about that innovation, he is reported to have said: "I wish I'd thought of that!" Marconi, being the businessman he was, implemented these new vacuum devices as quickly as he could, as did all the other wireless pioneers. ##

9:00am **HI-MoM3 Charles Herrold, Inventor of Radio Broadcasting, M.H. Adams, San Jose State University INVITED**

The Charles Herrold story was almost lost in history. It began in 1958 with San Jose State University Professor Gordon Greb's class project to identify and honor a pioneer in broadcasting. Professor Greb accidentally uncovered the Herrold information at a local museum, research was done, and an event introducing the story was sponsored by the university and KCBS, the direct descendant of Herrold's original 1909 work. Greb then wrote a 1959 journal article, "The Golden Anniversary of Broadcasting" in the *Journal of Broadcasting*, based on collected family papers, oral histories/interviews of eyewitnesses, and other evidence.

It was the first time a national academic audience heard about Charles Herrold. Most just assumed that broadcasting began in 1920 with KDKA. San Jose State University Professor Mike Adams joined Greb in 1988 to revive the Herrold story. Adams believed that the Herrold evidence, while based on eyewitnesses and original family documents, remained a local story, not taken seriously by anyone beyond the Bay Area. A PBS documentary, "Broadcasting's Forgotten Father: The Charles Herrold Story" resulted. Adams and Greb also knew that the only way for the Herrold story to gain national credibility was for a well-researched, scholarly book to be published. The authors made trips East, to the Clark papers at the Smithsonian Institution, the New York Public Library, and the Antique Wireless Association archives in Rochester NY. Their goal was to find other examples of pre-1920 broadcasting similar to that carried out by Herrold in San Jose. The two found several important primary research documents showing Herrold broadcasting pre-1910, further evidence not in the original Herrold papers. Several major articles and the book, *Charles Herrold, Inventor of Radio Broadcasting* (McFarland Press 2003), resulted. The book presents the evidence of Herrold's first broadcasting station, and puts it into the context of other pre-1920 radiotelephone inventors.

Today, there is no real agreement as to a single "first station." Most historians agree that KDKA gets credit for the first "commercial" license in 1920, de Forest for his 1916 broadcast of the Hughes-Wilson presidential election, and Herrold for broadcasting entertainment on a regularly-scheduled basis, pre-announced, to an audience, 1909-17. What is known and stated in the Herrold book is that the authors found first person, written evidence indicating that Herrold beginning in 1909 was the first to intentionally broadcast entertainment programming to a known audience.

9:40am **HI-MoM5 Mutual Evolution of Vacuum and Broadcasting Technology, S. Rutherford, Duniway Stockroom Corp. INVITED**

Since the earliest days of radio tubes/valves, there has been a mutually beneficial evolution of radio and vacuum technologies. Whether broadcasting or transmission, receiving or amplification types of tubes; whether vacuum tubes or semiconductor circuits - vacuum production, processing, measurement and maintenance have all profited from the

evolution of radio technology. The 'discovery' of vacuum involved observations of the operation of a mercury barometer. Early vacuum pumps refined the mercury-piston approach, but then relatively rapid evolution of both compression mechanism and sealant/medium took place. In later years, the introduction of a variety of traps and capture pumps, starting with flash getters and leading to getter-ion pumps, greatly improved the cleanliness of the vacuum tube environment. Pressure measurement likewise evolved from the barometric model to include thermal gauges, based on observations of thermal effects in vacuum tubes; ionization gauges based directly on the triode radio tube; and cold cathode gauges related to magnetron and ion pump technologies. This rich history of mutually improving development of vacuum and radio technology has also resulted in enhancing the application of vacuum technology to many other new and expanding applications. In fact, some of these new applications have led to the continuously advancing replacement of vacuum tubes!

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