

*From 'Electric Universe' - the end of Chapter One - looking at subtle consequences of the telegraph - then on to Chapter Two, and a couple who in love. (I've edited the extracts lightly so they stand alone.)*

...Before the telegraph a horseman carrying a message between two cities had to transport the bulk of perhaps one thousand pounds of equine animal over rocks, muddy ruts, and the occasional fallen tree. That took food for the two mammals, as well as the bulky technologies of saddle, stables, horseshoes and more. With few exceptions, information at the start of the nineteenth century travelled at about the same rate it had manage in ancient Sumeria.

A thin copper telegraph wire, however, carrying the same message, merely had to move an electric current composed of some mysterious objects which weighed less than a millionth of an ounce each, and also travelled immensely faster.

As a result, the world changed. Financial news could now [from the 1840s] be sent instantly between cities, and – along with enhanced opportunities for insider trading - a new style of corporation arose, as office in far distant cities could be easily linked.

There were psychological shifts. Before electricity became widespread, time had been something local, variable; almost personal. New York and Baltimore, for example, had kept their clock systems several minutes apart since they were at different longitudes, and noon arrived a few minutes later in Baltimore than it did in New York. Now these worlds came to be synchronized.

It was an early form of globalization. As the telegraph spread into central and eastern Europe, millions of peasants were forced to take on last names, the better for newly enlarged government bureaucracies to educate them, or tax them - or enlist them. By the mid-1800s tens of thousands of bewildered military recruits found that train transport, synchronized by telegraph delivered them uncomfortably close to where thousands of armed enemy soldiers were similarly being assembled.

Newspapers stopped being journals of slow discussion or courtly gossip. Diplomatic crises had less time to calm down, as foreign-office lassitude was regularly broken by 'urgent', just-arrived messages. Mass political movements sprang up faster than before; new factory techniques spread more quickly as well.

## CHAPTER TWO - ALECK AND MABEL (Boston, 1875)

For several decades the steady transformation of the world continued – but then in the hot summer of 1875 a fundamentally new invention appeared. It was the work of several individuals, but here we'll look at a twenty-eight-year-old teacher of the deaf who had set up his own tutoring business in Boston. He was driven neither by avarice nor by the urge for power.

His invention came because he was in love.

Unfortunately, the object of his affections, Mabel Hubbard ('you do not know,' he desperately wrote, 'you cannot guess – how much I love you') was one of his students, and this meant he felt obliged to declare his interest to her parents first. But although he emphasised his fine prospects, and even made sure her parents had seen his flourishing signature, where an added k made his name Aleck and not the humdrum Alec, they were unimpressed. Mabel was from a very rich family (her father owned much of downtown Boston), she was also barely seventeen, and, most important, she'd had scarlet fever when she was a child. The infection had spread to her ears, destroying her hearing. She'd learned some signing and lip-reading, but lived a protected life. Aleck, her teacher, was firmly forbidden to declare himself.

Their first attempt to keep their courtship secret lasted about twenty-four hours, for Mabel's older sister decided to help things along by inviting this intriguing older teacher to the family house. Mabel's parents gave Aleck another talking-to, and a few weeks later her mother read him a letter that, she explained, would finally prove that it was over. In it Mabel seemed to be saying that she was not in love with her teacher, and that was that.

It's said that blindness separates you from things, but deafness separates you from people. Aleck had been determined to bridge this separation, and was disconsolate all the way back home. But he was also bursting with ideas, and he had spent almost a year now coming close to a very good one indeed. For his full name was Alexander Graham Bell, and he was about to create the telephone.

His own mother had been unable to hear: that was what had led him to start his tutoring business in the first place. Understanding how vibrations produced sounds had been central to his teaching. When some of the younger children at the Boston school he had founded were endangered by fast-racing horse-drawn wagons – which they couldn't hear coming – Alec had them try holding balloons in their bare hands when they walked outside. Vibrations from the unheard wagons would travel along Boston's cobblestones and make the balloons shudder, alerting the children to hurry aside.

This had been central to the way he and Mabel had fallen in love, with neither admitting it, over a year before. They'd developed an intimacy during the months of teaching. She had found someone who would see through her deafness; he

had found a woman who was confident enough to match his wide-ranging interests. When she was late he'd meet her carriage and they'd run together through the snow to his schoolroom; they talked about politics and families, and sometimes just gossiped. Time after time, as she tried different sounds, he touched her throat, and she touched his, quite properly, with other students around, ostensibly just for the sake of identifying how different words produced different vibrations. But each had suspected what the other was thinking.

'Your voice has a beautiful quality,' he had whispered to her after one session, using hand gestures and careful enunciation so she could read his lips. She was startled, and wrote about it to her family. She had almost no memory of what her voice was like, and she knew she'd never hear it again. No one had ever thought to tell her it was beautiful.

In fact, when he'd been sent away from her home she'd been furious. For she was beyond measure in love with Aleck, and her mother hadn't been telling the truth when she'd pretended to read from the 'rejection' letter earlier in the summer.

'I think I am old enough now', Mabel wrote to her mother that year, 'to know if [Aleck] spoke about [his feelings] to you or Papa. I know I am not much of a woman yet, but... it comes to me more and more that I am a woman such as I did not know before' And then, emphatically: 'You need not write about my accepting or declining [his] offer.'

In that summer of 1875 Bell's love and his invention came together. Why not create a device with an *artificial* voice-box that mimicked a human one? That would be a chance to win Mabel's hand after all. There would be money and fame, respect from her parents, and - could they be so lucky? - a grand wedding bursting with flowers.

Finally, on Thanksgiving Day 1875 - Mabel's eighteenth birthday - she told Aleck that she loved him, and she kissed him, and she even agreed that she would marry him - so long as he was willing to make just one little change. It was to drop the final *k* from his name (and for the rest of his seventy years that was what he did).

[*Before long*] Mabel's father had become resigned to his daughter's match, and decided to help. He began paying for an assistant for Alec, a young machinist named Tom Watson, and together the two twenty-something hopefuls began by preparing a hand-sized sheet of stiff parchment. Hold it in front of your mouth, and as you poured out words, the parchment rippled back and forth in time with the sound vibrations from your throat - like the balloons that Alec's young charges had held, like the skin on Mabel's throat in those tremulous days of teaching months before.

*[Then over several pages I describe how he created a microphone and miniature loudspeaker, and learned to control and link them by electricity.]*

...With Bell's invention, even a whisper could in theory be carried, undimmed, through miles of wire. Encouraged by Mabel's anxious parents, Alec applied for a patent, and then an improvement on the patent, and soon the wedding they had both hoped for finally came. Alec gave Mabel pearls, a silver pendant in the shape of a telephone, and 1,497 shares of stock in the fledgling Bell Telephone company - which would be worth, if kept in the family, several billion dollars today. Less than a year later their first child was born; their marriage lasted till the end of their lives.

ALEXANDER GRAHAM BELL retired to Canada, where he became a pioneer of research on flying vehicles and high-speed hydrofoils; he was an early proponent of women's rights. There's a photo of him as a very old man with a white beard, standing on a pier in Nova Scotia, watching a test run of his most advanced hydrofoil, a shiny, streamlined aluminum blur, heading toward a speed record. His wife, MABEL HUBBARD BELL, can't be seen in the picture: she's piloting the hydrofoil.