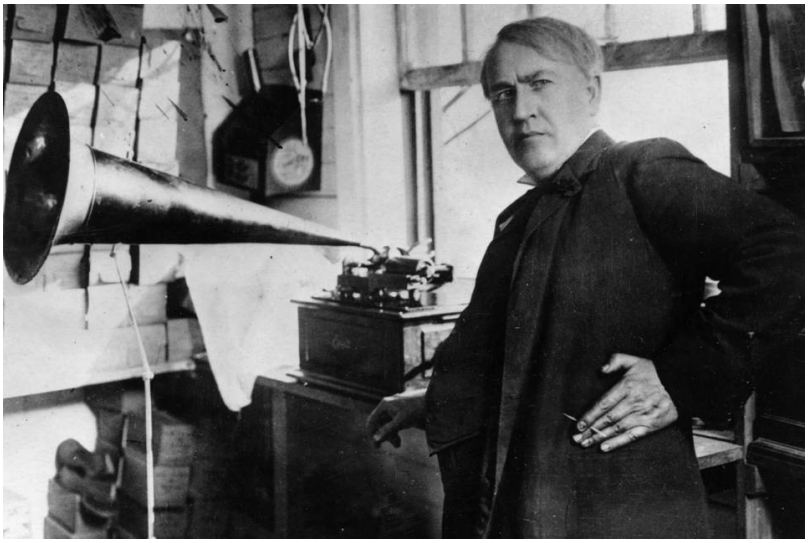
ESSAY

The Making of Thomas Edison's Miraculous Machine

In 1877, all of the inventor's past work on the sending and reception of sound coalesced into his greatest invention, the phonograph



Thomas Alva Edison (1847-1931) with an Edison Standard Phonograph, 1906. PHOTO: HULTON ARCHIVE/GETTY IMAGES

By Edmund Morris

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Thomas Alva Edison's self-proclaimed greatest invention, the phonograph, won him overnight fame. Journalists would marvel that such an acoustic revolution, adding a whole new dimension to human memory, could have been accomplished by a man half deaf in one ear and wholly deaf in the other.

In February 1877, the same month that saw Edison turn 30 and show his first streaks of silver hair, he and his fellow inventor Charles Batchelor began a new series of experiments on what they called, variously, the "telephonic telegraph," the "speaking telegraph" and the "talking telephone." This confusion of names would last as long as Americans took to adjust to the startling notion that an electrically transmitted message did not necessarily have to be transcribed.

It was beyond even Alexander Graham Bell's imagination that people might one day use the telephone just to chat. As far as Edison was concerned, Bell's invention was a device to speed up

the process of turning words into pulsations of current, then turning the pulsations back into words at the other end—words intended to be heard only by a receiving operator, who would then (as Edison had done thousands of times as a youth) copy out the message for delivery. Hence the telephone really was, for all its crackly noise, telegraphic in function. What Edison was after was a device that would accommodate the infinite gradations of the human voice—even nonvocal breaths, sighs, coughs and hesitations.

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That May, Edison was in the midst of sketching some devices for the capture of sibilants when Rep. Benjamin Butler of Massachusetts challenged him to invent a telephone recorder that would convert sound into text. Edison brooded for a day or two, then came up with the opposite idea.

He drew what looked like a xylophone floating in space. The xylophone bars turned out to be lettered keys, each ending in a tiny metal wheel serrated to make or break signals in the high frequencies. Edison apparently thought he could play the keys—once for each unit of the alphabet—in such legato combinations that *T* would blend into *H*, then into the vowel *I*, which would sharpen into a hiss as the last key was depressed. It was hardly the text recorder Butler had suggested, nor was it workable. Edison soon realized that letters had little to do with phonetics. Instead, he had dreamed up something truly radical: the notion of text transformed digitally into sound.

By mid-June, Edison had been able to construct a combination telephone transmitter-receiver that tested "far plainer and better than Bell's." The normally phlegmatic Batchelor was so pleased with it that he boasted to his brother, "We have just got our 'speaking telegraph' perfected." That turned out not to be the case, and the pace of round-the-clock experiments increased to the point that a trade journal for telegraph operators reported, "T.A. Edison is gray as a badger, and rapidly growing old."

Not until July 16 did Edison feel that he had a device worth patenting. The application he signed that day specified multiple timpani that "reproduced" vocal inflections and a sibilant-sensitive diaphragm. But a laboratory visitor (spying for Bell) found the instrument more powerful than clear, with the word *schism* sounding more like *kim*.

"We have had terrible hard work on the Speaking telegraph," Batchelor complained to his fellow inventor Ezra Gilliland. For the past five to six weeks, he added, Edison's team had been "frequently working 2 nights together until we all had to knock off from want of sleep."

Indeed, Edison's gray look may well have come from the ruboff of carbon dust, graphite and other sooty conductors that besmirched him as the summer progressed. After one of these

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adjournments, his wife Mary entered the spare bedroom of her house and found an apparent chimney sweep lying dead to the world "on my nice white counterpanes and pillow shams."

On July 18, Edison wrote in a technical note that there was "no doubt that I shall be able to store up and reproduce automatically at any future time the human voice perfectly." When exactly, that summer, did all of Edison's past work on the sending and reception of sound coalesce into the phonograph? The discovery was so sensational that legends began to accrete around it almost at once, and his own memories of the moment swam confusedly.

Perhaps it was when he heard the faint sound of his own voice reciting the alphabet, when he retraced some diagrammatic scratches he had made on a strip of paraffined paper. It might have been when he shouted "Halloo! Halloo!" into the mouthpiece and, pulling a strip of wax paper intended to record waves through a second time, heard as from a distant cliff, "Halloo! Halloo!" It may even have been the moment when, absent-mindedly caressing a needle as it vibrated, he felt a prick on his thumb—a sonic wave inscribing itself in his own flesh.

'I never was so taken aback in my life.'

—Thomas Edison

"Kruesi—make this," Edison recalled saying to John Kruesi, his Swiss-born master machinist, giving him a drawing of a mounted, foil-wrapped cylinder, with a handle on one side to turn it, and a vibrant mouthpiece projecting a stylus that just touched the surface of the wrap. "I told him I was going to record talking, and then have the machine talk back," Edison wrote. "He thought it absurd. However, it was finished, the foil was put on; I then shouted Mary had a little lamb, etc. I adjusted the reproducer, and the machine reproduced it perfectly....I never was so taken aback in my life."

What awed Edison beyond any other thought was that the moment did not have to be a moment; it could be a century, if the foil and the stylus were preserved; and then in 1977, if some unborn person turned this same handle, the voice of a man long dead would speak to him. No wonder that Kruesi, listening with incredulity to the thing he had made talking with Edison's voice, exclaimed, *"Mein Gott im Himmel!"* (My God in heaven).

All those who heard the miraculous machine in the ensuing months, from the president of the U.S. on down, reacted with equal disbelief. Since the dawn of humanity, religions had asserted that the human soul would live on after the body rotted away. The human voice was a thing almost as insubstantial as the soul, but it was a product of the body and therefore must die too—in fact, did die, evaporating like breath the moment each word, each phoneme was sounded. Even the notes

of inanimate things—the tree falling in the wood, thunder rumbling, ice cracking—sounded once only, except if they were duplicated in echoes that themselves rapidly faded.

But here now were echoes made hard, resounding as often as anyone wanted to hear them again.

—Mr. Morris, who died in May at the age of 78, was the author of books including "The Rise of Theodore Roosevelt, " "Dutch: A Memoir of Ronald Reagan" and "Edison," to be published by Random House on Oct. 22, from which this essay is adapted.