

THE WAR OF THE CURRENTS

One of America's most furious and important technological struggles, "the war of the currents," ended just eighty years ago. It started when alternating current marketed by George Westinghouse took the field against Thomas Edison's direct current.

Their contest lasted more than a decade—then, incredibly, erupted on death row and led to a switch in public opinion.

Willie Kemmler, a nondescript hatchet-killer, was no more than a pawn in the in-

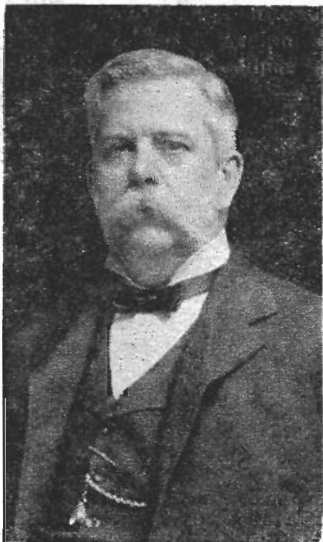
dustrial war. Still, his name appears in every comprehensive biography of Edison and of Westinghouse. For it was the life—or rather, the death—of Kemmler that turned the tide in favor of everyday use of alternating current.

Edison Got the Jump. Michael Faraday developed a crude but workable dynamo on October 17, 1831. Problems connected with commercial production and distribution of electricity were

so great that it took thirty years to perfect a practical dynamo for use in arc lighting.

Big-name European scientists devoted a great deal of time to improvement of the dynamo. But self-taught Thomas Edison, who never pretended to be a scientist, was the man who first put it to work on a large scale.

Edison startled the western world in 1879 by developing a constant-voltage dynamo with an efficiency in the range of 90%. His "Long-waisted Mary Ann," devel-



Whether to use AC or DC power in your home was decided over 80 years ago in a small room at the end of Auburn Prison's death row.

by Gary Webster



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oped in the machine shop at Menlo Park, had potential to turn enough steam power into electricity to light the world. At least, that's the exuberant claim the inventor made.

Edison put the first commercial central generating station into business on Monday, September 4, 1882. Six dynamos of approximately 125 hp were located at the plant on Pearl Street, New York City. At first only fifty-nine customers contracted to buy current, so just one dynamo was actually used.

Edison's DC generator used a commutator that functioned best at a low constant voltage—110 to 220. Above 220 volts the commutator tended to heat quickly.

"The potential demand for electric current is practically limitless," the inventor declared a few weeks after his Pearl Street station began operation. "In the end, production and sale of power will prove more important than all of my inventions."

Backing that judgment, he put everything he had into the Edison Electric Illuminating Company. Business grew slowly at first. By 1884 there were 508 consumers—and the number of incandescent lamps fed by the system had grown from 400 to 10,164.

Edison had a bear by the tail, and he knew it. "I'm going to be a business man," he confided to a friend in 1883. "I'm going to take a long vacation in the matter of inventions and devote my time and energy to work as a contractor for electric lighting plants."

Westinghouse Enters Field. George Westinghouse, just one year older than Edison, hit the big time with his steam-power brake device for railroad use. From 1869 to the mid 1880's he devoted most of his enormous energy to railroads and auxiliary equipment for them.

In the spring of 1885 he became interested in methods of generating and transmitting electric power. By this time Edison was firmly entrenched, determined to hold his monopoly, and rather contemptuous of competing alternating current systems that were in the infancy of their development.

French electrician Lucien Gaulard and English engineer John Dixon Gibbs perfected a device that they called a transformer.

With it, they claimed, alternating current could be generated and delivered at high voltages and corresponding efficiency. At the point of use, a transformer would step down current to the desired level.

Edison had an opportunity to buy U.S. rights to the new patent, but decided to stick with his direct current system. Westinghouse, a brash newcomer to the electrical field, paid \$50,000 for the Gaulard-Gibbs patent and set out to challenge Edison.

He made several improvements in the European design, pushed forward with development of essential accessories needed in an alternating current system. Two of them, the meter and the AC motor, made him a serious challenger.

By 1886 the newly organized Westinghouse Electric Company was manufacturing transformers in quantity. A test program was arranged in Great Barrington, Mass. Using a power line that carried 500 volts, Westinghouse and his men employed transformers to reduce voltage to about 100 volts at point of use. Several stores in the village were lighted satisfactorily.

Transmission at high voltage meant that the Westinghouse system was not limited by distance. He proved that by establishing a system in Buffalo and putting it into service on the night before Thanksgiving, 1886.

Public Became Involved. Westinghouse and his backers had not completed their first New York installation before the general public became involved. Ex-governor Cornell wrote an urgent letter to New York's mayor in 1888. "High-tension circuits must be absolutely prohibited within the city limits," he insisted.

Cornell simply reflected views expressed in lurid newspaper stories, many of which are now known to be of doubtful authenticity. Headlines screamed such tidings as:

WIRE CLAIMS ANOTHER VICTIM HORRIBLE DEATH OF A LINEMAN HIGH-TENSION SLAUGHTER ANOTHER CORPSE IN THE WIRES

At least one repairman was killed while mending an insulator at the top of a pole and a boy peddler dies from contact with a wire that hung too low. Some New York papers set up special departments to collect and distribute gifts to "adults crippled, children orphaned in consequence of public indifference to the arch destroyer running

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from telegraph pole to telegraph pole.”

Edison wrote an article on *The Dangers of Electric Lightning* for the influential *North American Review*. He virtually converted his big West Orange laboratory into a propaganda factory where stray dogs and cats purchased for 25¢ each were killed in the presence of reporters and dignitaries.

A New Use for Electricity. Propaganda plus demonstrations plus occasional fatal accidents convinced the masses that the new alternating current actually was deadly.

Ordinary folk paid no attention to the Westinghouse emphasis upon use of transformers, by which current was customarily reduced to 50 volts before it entered a shop or residence. They only knew that alternating current will kill.

In this climate, it took just one vivid incident to suggest a new use for electricity.

Several members of the New York state legislature were among witnesses to a particularly gruesome hanging. Since the rope was not adjusted properly, the condemned woman slowly strangled before their eyes.

Why not do away with ropes? Why not bring “instant and painless death” by means

of the dreadful alternating current?

This proposal made so much sense that the legislature of 1886 created by statute a commission of three investigators. Headed by Elbridge T. Gerry, they reported in favor of adopting capital punishment by electricity—and were careful to specify that alternating current be used.

Westinghouse took out advertisements protesting that direct current can be lethal, too. He pointed to the example of Benjamin Franklin, who had killed a number of small animals with direct current of low voltage.

Widely revered, more firmly established, and perhaps more aggressive in his propaganda campaign, Edison won easily. On June 4, 1888, Governor David B. Hill signed a bill stipulating that in New York condemned felons would, after January 1, 1890, be executed by means of “alternating currents of electricity applied to the body.”

Contracts were drawn up for electrical death apparatus at Sing Sing, Auburn, Buffalo, and Clinton prisons. Significantly, it was the one-time Edison employee Harold P. Brown who got the jobs.

At Clinton he used a dynamo capable of supplying alternating current for 650 incandescent lamps of sixteen candle power each.

Three commissioners appointed by the New York State Prison Superintendent

made elaborate tests at each prison. To be sure that apparatus was lethal and painless, at Auburn they tested current on a calf and a horse. "Death was instantaneous," they reported.

One member of the commission, Dr. Alphonso D. Rockwell, devised but did not patent a special wooden chair fitted with electrodes. Hailed as "a marvel of humane progress," the new electric chair and its deadly alternating current would "forever end shame and indignities of barbarous dispatchment of those condemned by society."

Equipment was ready; the only thing needed was an occupant for the chair.

Declared guilty of having killed his commonlaw wife, timing of Willie Kemmler's trial was such that he seemed to be the logical condidate upon which to test the new and humane method of execution.

Long-drawn Legal Contest. Sentenced in Buffalo early in June, 1889, Kemmler was sent to death row in Auburn Prison.

While his case was being appealed, a number of prominent persons began challenging the Electrical Death Law. Kemmler, who had no money, suddenly announced that he was being represented by a big-name and high-fee law firm headed by the nationally famous W. Burke Cochran.

Legal maneuvers, public protests, paid advertisements, and secret lobbying failed.

Electrocuted by means of alternating current shortly after dawn on August 6, 1890, Kemmler's death was seen by two dozen notables. Reporters were barred, so mingled with thousands of curious outside the prison.

Instead of producing a quick and tidy death, the electric chair virtually cooked its victim during several minutes when current was applied and then re-applied.

Strange Denouement. More than any other single factor, the slow and tortured death of Willie Kemmler convinced the man on the street that Thomas Edison was wrong. Alternating current couldn't possibly be so lethal as the great inventor had said.

A surge of popular support for Westinghouse came in the aftermath of one of the most highly publicized executions in American history. Efficiency and low cost of the alternating current system gave it ever-increasing advantages over the direct current system.

Edison eventually capitulated and joined forces with Westinghouse. They pooled their patents and resources to expand alternating current and make it standard in most U.S. operations. Twenty years afterward Edison made one of his rare confessions: "I was wrong," he told George Stanley. "If I had followed your father's advice and given alternating current a fair trial, this country never would have been subjected to the war of the currents." ■