
ENGLISH LEARNING
FOR CURIOUS MINDS

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# Episode #258
# The War of The Currents
# 29th Apr, 2022

[00:00:00] Hello, hello hello, and welcome to English Learning for Curious Minds, by Leonardo English.

[00:00:12] The show where you can listen to fascinating stories, and learn weird and wonderful things about the world at the same time as improving your English.

[00:00:22] I'm Alastair Budge, and today we are going to be talking about the War of the Currents, an **epic**[1] battle to **standardise**[2] the electricity system in 19th century America.

[00:00:35] Now, you might not have woken up this morning and thought "I want to know about electrical currents", but **stick with me**[3], this story is anything but boring.

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[1] extraordinary or very impressive, grande

[2] cause to follow some standard rules or use

[3] stay with me, continue reading

[00:00:46] We'll encounter brilliant geniuses, **vicious**[4] rivalries, huge fortunes, the creation of the electric chair and why you didn't want to be a **stray**[5] dog in 19th century America.

[00:01:01] OK then, let's plug ourselves in to the story of the War of the Currents.

[00:01:08] Before we get started with the story, I'd like to quickly go over DC and AC, as these are two terms that you'll be hearing a lot, and are **vital**[6] for an understanding of the story.

[00:01:23] DC stands for direct current. It's a **unidirectional**[7], one directional flow of electrical charge.

[00:01:33] AC, on the other hand, stands for alternating current. AC changes directional multiple times every second.

[00:01:44] Today, AC is what you get out of your power sockets at home, whereas DC is generally used for batteries and **sensitive**[8] electronics.

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[4] intense, fierce

[5] having no home, wandering

[6] necessary, very important

[7] one directional

[8] easily damaged

 

[00:01:56] To transform AC to DC, for example for smartphones and laptops, you need a transformer. You may not have noticed this before, but if you have a laptop, you might see that the wire goes through a box - in there is the transformer.

[00:02:15] Now, we don't need to have a detailed knowledge about the science behind all of this, the important thing to remember is that AC and DC are **fundamentally**[9] different ways of transporting electricity.

[00:02:32] With that clarification out of the way, we can get on with our story, which starts in 1870s America.

[00:02:40] This period was known as the Gilded, or Golden Age - a period of economic **boom**[10] and industrial and technological growth that took place after the end of the American Civil War in 1865.

[00:02:57] While the Gilded Age was a period of **prosperity**[11], growing fortunes, **leaps**[12] in technology and opportunity, it was also **tainted**[13] by political corruption and the

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[9] completely, in essence

[10] a sudden increase or growth

[11] success and wealth

[12] large jumps or advances

[13] affected in a bad way, spoiled

**accumulation**[14] of huge amounts of wealth by a handful of industrialists, politicians and bankers **at the expense**[15] of the working classes.

[00:03:19] The War of the Currents was not just a battle to electrify America, it also **pitted**[16] some of the century's most excellent minds against one another and **exposed**[17] the darker side of the Gilded Age - **avoidable**[18] deaths, **smear campaigns**[19] and political corruption.

[00:03:39] So, let's take a look at how the War of the Currents got started and find out more about the **key**[20] figures involved.

[00:03:49] Now, before electricity, life was obviously very different. Perhaps one of the most visible differences, or you could say invisible differences, was how people would light the world.

[00:04:04] The options available to provide light were candles, oil and gas. Essentially, burning something to create light.

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[14] collection, gathering

[15] in a way that harmed

[16] put them in competition

[17] made it known, revealed

[18] possible to be avoided, unnecessary

[19] plans to harm the reputation or fame of someone by telling lies

[20] very important

[00:04:14] After the discovery of electricity in the early 1800s, **the race was on**[21] to find a way to **channel**[22] this new, amazing technology.

[00:04:25] The first popular electric light was invented by an Englishman called Humphry Davy, a man who was from Cornwall, the county of Southwest England, which you may remember from our episode on **smugglers**[23].

[00:04:40] Davy wasn't a **smuggler**[24], but he did invent a form of lighting called "**arc**[25] lighting", which was very different from the light bulbs we think of today.

[00:04:51] **Arc** lighting uses a special bulb in which two carbon **electrodes** are placed close together.

[00:04:59] When the bulb is supplied with electricity, the current passes through the air between the two **electrodes**[26] creating an electric **arc** which **gives off**[27] a very bright light.

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[21] the competition had started

[22] direct, transfer

[23] people who illegally transferred goods in the country

[24] someone who illegally transferred goods in the country

[25] a curved line, something having the shape of part of a circle

[26] pieces through which an electric current enters or leaves an object

[27] sends out, emits

[00:05:12] The problem was that **arc** lighting required a very high **voltage**[28], over 3,000 volts, to work properly, making it very dangerous to work with.

[00:05:24] For reference, today's standard supply **voltage** is between 220 and 240 volts for most of the world and 120 volts in the USA.

[00:05:36] **To top it off**[29], this **arc** lighting also required regular maintenance, it **buzzed**[30] constantly and it was a major **fire hazard**[31].

[00:05:47] Pretty scary stuff.

[00:05:49] As you can imagine, **arc** lighting was **unsuitable**[32] for indoor use and was mainly used for street lighting and factory **yards**[33].

[00:06:01] Clearly, **arc** lighting was not going to replace indoor gas lights, oil lamps or candles anytime soon.

[00:06:10] The race to invent and manufacture an electrical light bulb for indoor use had been ongoing for over 50 years.

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[28] a measure of how strong an electrical current is, expressed in volts

[29] to make it even worse

[30] made a low sound

[31] something that could easily cause a fire

[32] not right or appropriate for this purpose

[33] areas of land used for a particular business

 

[00:06:18] While **breakthroughs**[34] had been made, it wasn't until 1789 that a 31-year-old inventor by the name of Thomas Edison found a practical solution, with his **incandescent**[35] light bulb.

[00:06:32] Edison will appear a lot in this story, but if you're interested in learning more about his life, our last member-only episode, number 257, goes into that in great detail.

[00:06:46] If you haven't listened to that one, Edison was already a well-known inventor and a rich man by this time. He had already invented an almost magical-seeming device that could record and playback sound called the phonograph, but then he **set his sights on**[36] something bigger.

[00:07:05] The big, hairy, almost **holy**[37] goal of lighting every house in America.

[00:07:12] He started with the actual light itself, and invented and **patented**[38] an electric light bulb that was **suitable**[39] for indoor use - the **incandescent** light bulb.

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[34] important developments

[35] producing light as a result of heat

[36] decided to achieve, set his goal on

[37] regarded as deserving special respect

[38] received an official licence that allowed him to use his invention exclusively for a period of time

[39] right or appropriate

[00:07:24] **Incandescent**, by the way, means something that **emits**[40], or **gives out**[41], light when it is heated.

[00:07:31] Edison's light bulb was by no means the first **incandescent** light bulb but it was the most practical that had ever been made, as it was relatively inexpensive to produce and it had a long burn time of over 1,200 hours.

[00:07:49] It's important to note that Edison's light bulb **ran**[42] at a low **voltage** of 110 volts on a direct current supply, the direct current part is very important for our story.

[00:08:03] Now, a light bulb is great, but it's pretty useless unless you have electricity to power it.

[00:08:10] So, Edison set himself the task of building the **infrastructure**[43] to get electricity into people's houses, so that they could buy and then power his light bulbs.

[00:08:23] As his bulbs were made to run on DC current, he developed a DC supply system complete with electric meters to measure his clients' usage.

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[40] produces and sends out, releases

[41] produces and sends out, releases

[42] worked, functioned

[43] the basic organisational structure or systems

[00:08:35] Edison had a huge **incentive**[44] to **ensure**[45] that DC, not AC, was adopted as the standard current across the country.

[00:08:46] Just think about the **scale**[46] of things for one moment.

[00:08:50] Edison owned the **patents**[47] for the **incandescent** light bulb that was initially designed to run on DC power.

[00:08:57] He also sold his DC systems to cities to power these lights and he held all of the key **patents** for DC power distribution and he controlled all technical development.

[00:09:12] One word **springs to mind**[48]: a monopoly.

[00:09:15] Edison **stood to make**[49] billions upon billions as the country, and indeed the entire world, began to electrify its houses, workplaces and streets.

[00:09:28] And all of this money depended on his **patented** direct current system being **standardised**[50], being adopted as the standard current for electricity supply.

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[44] reason, motive

[45] make it certain to happen

[46] size, degree or scope

[47] official licences that allowed him to use his inventions exclusively for a period of time

[48] comes to mind

[49] had a high likelihood of making

[50] adopted or accepted as the standard way to do it

 

[00:09:39] Imagine if there was one individual who would profit from every part of the creation of **artificial**[51] light, and this gives you an idea of the **scale** of what Edison was **on the cusp of**[52] achieving.

[00:09:53] This point is important **to bear in mind**[53] as it will go some way to explaining the **dishonourable**[54] tactics that Edison would later use to **discredit**[55] his competitors.

[00:10:04] The reality was that DC, direct current, simply **wasn't up to the task**[56], it wasn't **suitable**.

[00:10:12] When transmitted over distances longer than one and half kilometres, **substantial**[57] amounts of energy were lost.

[00:10:20] And if you want to transmit power across the third largest country in the world, this is evidently a bit of a problem.

[00:10:28] For Edison's dream to come true, there would need to be power stations in every town on every street corner, and this simply wasn't a possibility.

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[51] made by people, not natural

[52] at the point when it was about to happen

[53] to have or keep in mind, to remember

[54] not fair and bringing shame

[55] harm their good reputation or fame

[56] wasn't right or appropriate for this purpose

[57] large

 

[00:10:40] Another problem with DC, with direct current, was that it was not easily converted to higher or lower **voltages**[58]. As DC ran at a constant rate, if another **voltage** supply was required, separate lines would need to be installed.

[00:10:59] While Edison never lost faith, at least publicly, in the **superiority**[59] of his DC power supply system, he did become aware of some of the limitations quite early on.

[00:11:12] These faults inspired Edison to offer a **substantial** financial reward to any of his employees who could improve upon the performance of his DC machinery.

[00:11:24] And it's here that we'll meet another character whose name you may well have heard of, and one who will be central to our story.

[00:11:33] He was a young Serbian genius who had just moved to America, the legendary inventor Nikola Tesla.

[00:11:42] By the way, our next member-only episode is going to be a deep dive on the life of Nikola Tesla, that's going to be episode number 259, so do give that one a listen if you'd like to know more about this **eccentric**[60] but brilliant man.

[00:11:58] Tesla had been fascinated with electricity since he was a child, and had long been working on a plan to improve the DC motors that he had studied at university.

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[58] measures of how strong an electrical current is, expressed in volts

[59] the fact that it was better

[60] strange or unusual

 

[00:12:10] He was a bit younger than Edison, 9 years younger to be precise, and had started working for Edison's company first in Paris, and then when he emigrated to America as a 28-year-old.

[00:12:24] Tesla, as an Edison employee at the time, shared his plans for an AC motor that was far superior to Edison's DC ones, and he was hopeful for the reward that Edison had promised.

[00:12:39] Unfortunately for Tesla, and you could say unfortunately for Edison, he wasn't given the reward, and was instead told that the prize money was a joke, and he didn't understand American humour.

[00:12:53] Understandably annoyed at being **turned down**[61] by Edison, Tesla **promptly**[62] left Edison's company and started up his own company.

[00:13:04] What Edison perhaps didn't realise, though, is that Tesla **was onto something**[63] with his ideas for an AC motor.

[00:13:12] Alternating current, or AC, didn't have the same problems as DC.

[00:13:18] AC could be transmitted over long distances then transformed with very little energy loss.

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[61] rejected, dismissed

[62] immediately

[63] had discovered or produced something important

[00:13:26] This meant fewer power plants would be needed, saving a huge amount of money.

[00:13:33] What's more, AC used thinner copper lines, saving even more money.

[00:13:39] AC, put shortly, was far more efficient and cheaper.

[00:13:44] It could, in theory, supply rural areas and small towns, all of the places where it was just impossible to supply DC and still make a profit.

[00:13:55] Plus AC could also be **stepped up or down**[64] to other **voltages** as needed without the need for separate supply lines.

[00:14:04] However, AC still needed some innovations and improvements to enable it to work as a functioning electrical supply and a direct competitor to DC.

[00:14:17] What's more, Tesla may have been a genius, but at the time he was a young, **unconnected**[65] immigrant without the funding or business knowledge to market and produce his AC motor.

[00:14:30] This is where we meet our third and final character, a certain George Westinghouse.

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[64] increased or decreased

[65] with no powerful friends to help him

[00:14:38] George Westinghouse was a Pittsburgh **industrialist**[66] and a **savvy**[67] businessman who had made his fortune in the railway industry but was now **trying his hand**[68] at the next big thing: electricity.

[00:14:52] He was quite a **discrete**[69] character, unlike his **soon-to-be**[70] rival Edison who enjoyed his time **in the limelight**[71], and his status as a celebrity inventor.

[00:15:03] Westinghouse was a little bit of a **latecomer**[72] to the electricity sector, but with his good business head, he soon realised the advantages of AC over DC for power supply.

[00:15:18] Plus, with some modifications, **incandescent** lighting, Edison's indoor lighting, could be made to **run off**[73] either AC or DC.

[00:15:29] In short, Westinghouse realised that he could build a truly competitive AC system rather than simply copying Edison's DC system.

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[66] someone in a high position in industry

[67] intelligent or skillful

[68] trying doing it for the first time

[69] independent, separate

[70] in a short time, before long

[71] at the centre of public attention

[72] a person who appeared late

[73] work or function with

 

[00:15:40] Doing so would have been barely competitive and would have still needed various **patents** to get around Edison's monopoly.

[00:15:49] What's more, as Edison was **struggling**[74] to build enough power plants and could only connect properties within a one-and-a-half kilometre radius from his plants, Westinghouse could easily supply all of Edison's unsupplied city customers, as well as those in small towns and rural areas.

[00:16:10] It was a big and bold idea.

[00:16:13] To make it come true, Westinghouse had the **cash**[75], investors and the business skills.

[00:16:19] But to create and develop the AC motors and generators necessary to get his project **off the drawing board**[76] and make it a reality, he needed Tesla's AC motor.

[00:16:32] Tesla and Westinghouse came together after Tesla left Edison's company, after he was refused the **bonus**[77].

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[74] trying with difficulty

[75] money (in the form of notes and coins)

[76] beyond the planning stage

[77] a sum of money as a reward for his good performance

 

[00:16:40] Westinghouse went on to **licence**[78] Tesla's **patents** for his AC system, **pitting**[79] him directly against Edison.

[00:16:50] In 1886 the Westinghouse Electrical Company had built the first commercial AC power system in America, in Buffalo, New York.

[00:17:00] By the end of 1887, just one year later, Westinghouse had 68 AC power stations compared to Edison's 121 DC stations.

[00:17:13] Remember, AC stations could supply many more customers over a greater area. To make matters worse for Edison, another electrical supply company, Thompson-Houston, had also **muscled in**[80] on the scene with 22 power stations supplying both AC and DC.

[00:17:35] Other smaller companies also got involved in supplying electricity, resulting in numerous legal battles with Edison over his **patents**.

[00:17:45] **Mired in**[81] legal battles and struggling to make any significant improvements to his DC distribution system, Edison was losing out on power and profits.

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[78] permit, authorise

[79] putting him in competition

[80] forced their way, got involved in

[81] involved in (a difficult situation)

[00:17:57] However, having built up his lighting company and light bulbs to be **mutually**[82] inclusive, he was **understandably**[83] **reluctant**[84] to **admit**[85] **defeat**[86] and switch to AC power.

[00:18:10] As the inventor of the light bulb that all of these other companies were **vying**[87] to supply with power, as well as being considered a **veritable**[88] "magician" by the public thanks to his inventions and research laboratory, Edison did not feel **compelled**[89] to **back down**[90], to **give in**[91].

[00:18:30] He firmly **stood his ground**[92], insisting that DC was better and safer than AC.

[00:18:37] But, he was wrong.

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[82] in a way that one depended on the other

[83] in a way that is easy to understand

[84] not willing

[85] accept that it was true

[86] the state of being defeated, loss

[87] competing

[88] true, genuine

[89] required, forced or obliged

[90] accept that he was wrong

[91] finally accept that he was wrong

[92] refused to change his opinion or belief

 

[00:18:40] And as AC continued to grow in popularity, and Edison sensed he might not be able to win the battle if he competed fairly, he started to **play dirty**[93], his tactics becoming increasingly **underhand**[94].

[00:18:56] His primary tactic was to make the public think that AC, the electricity system proposed by Westinghouse, was so dangerous that it would kill you.

[00:19:09] In 1886, he publicly declared that Westinghouse would kill someone within six months due to the high **voltages** used in his AC power lines.

[00:19:21] But not content with simply hoping that someone would eventually get **electrocuted**[95] and killed, he wanted a way to demonstrate publicly how dangerous AC electricity was.

[00:19:35] And what better way to do this than getting the US government to kill someone with Westinghouse's electricity?

[00:19:44] How Edison did this was both **cunning**[96], clever, and horrible at the same time.

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[93] act in a dishonest or unfair way

[94] secret and dishonest

[95] injured by electricity

[96] showing skill at achieving his goals by tricking or deceiving people

 

[00:19:50] He managed to persuade politicians that using electricity would be a more effective way of **conducting**[97] the death sentence than **hanging**[98].

[00:20:00] There was already some knowledge that electricity could kill, because people working with electrical wires would sometimes die in an instant after touching a live wire.

[00:20:13] After reports of a drunken man being killed by a live electricity generator, a New York dentist called Alfred P. Southwick became interested in the idea of using electricity to kill, even publicly **electrocuting**[99] hundreds of **stray dogs**[100] to prove his point.

[00:20:33] So politicians thought that electricity could be an alternative to **hanging**, and wanted to explore this idea.

[00:20:42] Naturally, they consulted, they asked, the electricity experts of the day, including Westinghouse and Edison.

[00:20:51] Westinghouse said that he wanted nothing to do with it, as he didn't agree with capital punishment.

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[97] organising and carrying out or performing

[98] killing someone by dropping them with a rope tied around their neck

[99] killing by electricity

[100] lost or homeless dogs

 

[00:20:58] Edison, on the other hand, recommended that Westinghouse's AC system was used and even **came up with**[101] the term "Westinghoused" to refer to a person who was intentionally or accidentally killed with electricity.

[00:21:14] The government **made up its mind**[102], and it was decided to test using electricity as opposed to **hanging** as a way to **conduct**[103] the death penalty.

[00:21:24] You probably know what I'm talking about: the electric chair.

[00:21:29] Westinghouse had refused to sell his AC generators to be used to kill, but Edison made sure that a Westinghouse AC generator was used when the first electric chair was being designed.

[00:21:43] Edison was secretly paying an electrical engineer called Brown, who would organise the purchase of Westinghouse's generators specifically for use with the electric chair.

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[101] introduced, thought up

[102] made its choice

[103] organise and carry out or perform

[00:21:56] **Horrified**[104] that his electrical machinery was going to be used to kill someone, Westinghouse even paid a substantial amount for the chosen **convict's**[105], the criminal's, **appeal**[106].

[00:22:09] This was all **to no avail**[107], it had no impact.

[00:22:14] William Kremmler, a man **convicted**[108] of killing his wife, became the first person **executed**[109] by the electric chair in 1890.

[00:22:24] Now, you probably know that even now an electric chair is considered to be a **horrific**[110] and **inhumane**[111] way to kill someone, but the first execution using it was even worse.

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[104] filled with horror, extremely shocked

[105] of the person who was found guilty, the criminal's

[106] application to a higher court in order to change the first decision and sentence

[107] without success

[108] found guilty of

[109] killed as punishment for his crime

[110] causing horror and shock

[111] causing suffering, cruel and without compassion

 

[00:22:37] I will **spare you**[112] the worst details, but **suffice it to say**[113] that it took ten minutes and Westinghouse later commented "They would have done better using an axe".

[00:22:50] While Edison was **adamant**[114] that AC was more dangerous due to the high **voltages** used, both types of current can cause severe injury and death.

[00:23:01] And although Westinghouse's AC system was forever associated with the electric chair in the public's mind, this didn't really stop its **ascent**[115], stop its **rise to the top**[116].

[00:23:15] As AC continued to spread, Edison's profits fell while his legal costs and the copper prices went up.

[00:23:24] Remember DC lines needed more copper than AC ones.

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[112] not tell you every detail about it because it is too unpleasant

[113] it is enough to say

[114] not willing to change his opinion

[115] way upward towards success

[116] way upward towards success

[00:23:29] Given the **increasingly**[117] **gloomy**[118] **outlook**[119], some of Edison's investors and engineers attempted to convince him to consider AC.

[00:23:40] However, their concerns **fell upon deaf ears**[120].

[00:23:44] Edison, not used to being wrong, was **adamant** that his DC system was **superior**[121] and he was determined to succeed even if it meant continuing to **play even dirtier**[122] than before.

[00:23:58] He put out adverts and newspaper articles, **blamed**[123] accidents where workmen were killed by electricity on Westinghouse, and did anything he could to **discredit** his rival's system.

[00:24:12] Despite all of the bad publicity and attacks, the **spread**[124] of AC couldn't be stopped. It was more efficient and cheaper.

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[117] more and more, growingly

[118] without hope

[119] likely future situation

[120] failed to be heard

[121] better

[122] act in a more dishonest or unfair way

[123] said that he was responsible for them

[124] expansion, advancement

 

[00:24:21] Westinghouse, and his more cost-efficient AC, won the contract to supply electricity to the 1893 World Fair in Chicago, which provided an impressive **showcase**[125] for Tesla and Westinghouse's AC supply system.

[00:24:38] This was one of the largest displays of electrical power ever created, with hundreds of lights **illuminating**[126], lighting up, the lake and the **purpose-built**[127] neoclassical buildings, while brightly coloured **searchlights**[128] **dazzled**[129] across the night sky.

[00:24:55] That very same year the Niagara Falls Power Company awarded Westinghouse the contract to generate power from the Niagara Falls with Tesla's AC induction motor.

[00:25:07] This achievement was largely considered to represent the end of the War of the Currents and confirmed AC's position as the dominant current in the electricity supply industry.

[00:25:20] However, DC didn't **die out**[130] completely.

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[125] occasion or place for presenting it to general attention

[126] lighting up

[127] built for that particular purpose

[128] powerful outdoor electric lights that can be turned in any direction

[129] were lit in an impressive and very bright way

[130] finally stop existing

 

[00:25:23] In fact, DC has been **gaining ground**[131] in recent years, being better **suited**[132] for use with batteries and other sensitive electronic appliances.

[00:25:34] Today, DC is used for electric vehicles, computers, **solar panels**[133] and LEDs, for example.

[00:25:42] Methods have also been developed to **enable**[134] us to more easily convert DC to higher and lower **voltages**.

[00:25:51] Thanks to advances in high **voltage** DC, companies are finding new ways to transmit DC over long distances with less energy loss.

[00:26:02] So, while AC may have been declared the winner of War of the Currents **at the turn of**[135] the last century, it looks like DC is **here to stay**[136] and perhaps it may go on to play an even more important role in the years to come.

[00:26:21] OK then, that is it for today's episode on the War of the Currents

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[131] becoming more popular

[132] appropriate, fitting

[133] devices that change energy from the sun into electricity

[134] make it possible for

[135] at the time when the particular century ended and the next began

[136] likely to last for a long time

[00:26:26] I hope it's been an interesting one, and you've learned a little bit about the history of lighting and electricity, as well as some of the people whose inventions have changed the world.

[00:26:37] As always, I would love to know what you thought of this episode.

[00:26:41] Do you think Westinghouse was **unfairly**[137] **targeted**[138] by Edison?

[00:26:46] Could you imagine living in a world without electricity?

[00:26:49] You can head right into our community forum, which is at community.leonardoenglish.com and get chatting away to other curious minds.

[00:26:58] You've been listening to English Learning for Curious Minds, by Leonardo English.

[00:27:03] I'm Alastair Budge, you stay safe, and I'll catch you in the next episode.

[END OF EPISODE]

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[137] in a way that was not fair or just

[138] selected as an object of criticism

## Key vocabulary

| Word | Definition |
|---|---|
| **Epic** | extraordinary or very impressive, grande |
| **Standardise** | cause to follow some standard rules or use |
| **Stick with me** | stay with me, continue reading |
| **Vicious** | intense, fierce |
| **Stray** | having no home, wandering |
| **Vital** | necessary, very important |
| **Unidirectional** | one directional |
| **Sensitive** | easily damaged |
| **Fundamentally** | completely, in essence |
| **Boom** | a sudden increase or growth |
| **Prosperity** | success and wealth |
| **Leaps** | large jumps or advances |

 

| | |
|---|---|
| **Tainted** | affected in a bad way, spoiled |
| **Accumulation** | collection, gathering |
| **At the expense** | in a way that harmed |
| **Pitted** | put them in competition |
| **Exposed** | made it known, revealed |
| **Avoidable** | possible to be avoided, unnecessary |
| **Smear campaigns** | plans to harm the reputation or fame of someone by telling lies |
| **Key** | very important |
| **The race was on** | the competition had started |
| **Channel** | direct, transfer |
| **Smugglers** | people who illegally transferred goods in the country |
| **Smuggler** | someone who illegally transferred goods in the country |
| **Arc** | a curved line, something having the shape of part of a circle |
| **Electrodes** | pieces through which an electric current enters or leaves an object |
| **Gives off** | sends out, emits |

 

| | |
|---|---|
| **Voltage** | a measure of how strong an electrical current is, expressed in volts |
| **To top it off** | to make it even worse |
| **Buzzed** | made a low sound |
| **Fire hazard** | something that could easily cause a fire |
| **Unsuitable** | not right or appropriate for this purpose |
| **Yards** | areas of land used for a particular business |
| **Breakthroughs** | important developments |
| **Incandescent** | producing light as a result of heat |
| **Set his sights on** | decided to achieve, set his goal on |
| **Holy** | regarded as deserving special respect |
| **Patented** | received an official licence that allowed him to use his invention exclusively for a period of time |
| **Suitable** | right or appropriate |
| **Emits** | produces and sends out, releases |
| **Gives out** | produces and sends out, releases |
| **Ran** | worked, functioned |

 

| | |
|---|---|
| **Infrastructure** | the basic organisational structure or systems |
| **Incentive** | reason, motive |
| **Ensure** | make it certain to happen |
| **Scale** | size, degree or scope |
| **Patents** | official licences that allowed him to use his inventions exclusively for a period of time |
| **Springs to mind** | comes to mind |
| **Stood to make** | had a high likelihood of making |
| **Standardised** | adopted or accepted as the standard way to do it |
| **Artificial** | made by people, not natural |
| **On the cusp of** | at the point when it was about to happen |
| **To bear in mind** | to have or keep in mind, to remember |
| **Dishonourable** | not fair and bringing shame |
| **Discredit** | harm their good reputation or fame |
| **Wasn’t up to the task** | wasn't right or appropriate for this purpose |
| **Substantial** | large |

 

| | |
|---|---|
| **Voltages** | measures of how strong an electrical current is, expressed in volts |
| **Superiority** | the fact that it was better |
| **Eccentric** | strange or unusual |
| **Turned down** | rejected, dismissed |
| **Promptly** | immediately |
| **Was onto something** | had discovered or produced something important |
| **Stepped up or down** | increased or decreased |
| **Unconnected** | with no powerful friends to help him |
| **Industrialist** | someone in a high position in industry |
| **Savvy** | intelligent or skillful |
| **Trying his hand** | trying doing it for the first time |
| **Discrete** | independent, separate |
| **Soon-to-be** | in a short time, before long |
| **In the limelight** | at the centre of public attention |
| **Latecomer** | a person who appeared late |

 

| | |
|---|---|
| **Run off** | work or function with |
| **Struggling** | trying with difficulty |
| **Cash** | money (in the form of notes and coins) |
| **Off the drawing board** | beyond the planning stage |
| **Bonus** | a sum of money as a reward for his good performance |
| **Licence** | permit, authorise |
| **Pitting** | putting him in competition |
| **Muscled in** | forced their way, got involved in |
| **Mired in** | involved in (a difficult situation) |
| **Mutually** | in a way that one depended on the other |
| **Understandably** | in a way that is easy to understand |
| **Reluctant** | not willing |
| **Admit** | accept that it was true |
| **Defeat** | the state of being defeated, loss |
| **Vying** | competing |

 

| | |
|---|---|
| **Veritable** | true, genuine |
| **Compelled** | required, forced or obliged |
| **Back down** | accept that he was wrong |
| **Give in** | finally accept that he was wrong |
| **Stood his ground** | refused to change his opinion or belief |
| **Play dirty** | act in a dishonest or unfair way |
| **Underhand** | secret and dishonest |
| **Electrocuted** | injured by electricity |
| **Cunning** | showing skill at achieving his goals by tricking or deceiving people |
| **Conducting** | organising and carrying out or performing |
| **Hanging** | killing someone by dropping them with a rope tied around their neck |
| **Electrocuting** | killing by electricity |
| **Stray dogs** | lost or homeless dogs |
| **Came up with** | introduced, thought up |
| **Made up its mind** | made its choice |

 

| | |
|---|---|
| **Conduct** | organise and carry out or perform |
| **Horrified** | filled with horror, extremely shocked |
| **Convict's** | of the person who was found guilty, the criminal's |
| **Appeal** | application to a higher court in order to change the first decision and sentence |
| **To no avail** | without success |
| **Convicted** | found guilty of |
| **Executed** | killed as punishment for his crime |
| **Horrific** | causing horror and shock |
| **Inhumane** | causing suffering, cruel and without compassion |
| **Spare you** | not tell you every detail about it because it is too unpleasant |
| **Suffice it to say** | it is enough to say |
| **Adamant** | not willing to change his opinion |
| **Ascent** | way upward towards success |
| **Rise to the top** | way upward towards success |
| **Increasingly** | more and more, growingly |

 

| | |
|---|---|
| **Gloomy** | without hope |
| **Outlook** | likely future situation |
| **Fell upon deaf ears** | failed to be heard |
| **Superior** | better |
| **Play even dirtier** | act in a more dishonest or unfair way |
| **Blamed** | said that he was responsible for them |
| **Spread** | expansion, advancement |
| **Showcase** | occasion or place for presenting it to general attention |
| **Illuminating** | lighting up |
| **Purpose-built** | built for that particular purpose |
| **Searchlights** | powerful outdoor electric lights that can be turned in any direction |
| **Dazzled** | were lit in an impressive and very bright way |
| **Die out** | finally stop existing |
| **Gaining ground** | becoming more popular |
| **Suited** | appropriate, fitting |

 

| | |
|---|---|
| **Solar panels** | devices that change energy from the sun into electricity |
| **Enable** | make it possible for |
| **At the turn of** | at the time when the particular century ended and the next began |
| **Here to stay** | likely to last for a long time |
| **Unfairly** | in a way that was not fair or just |
| **Targeted** | selected as an object of criticism |

*We'd love to get your feedback on this episode.*

*What did you like? What could we do better?*

*What did you struggle to understand?*

*Let us know in the forum community.leonardoenglish.com*

 