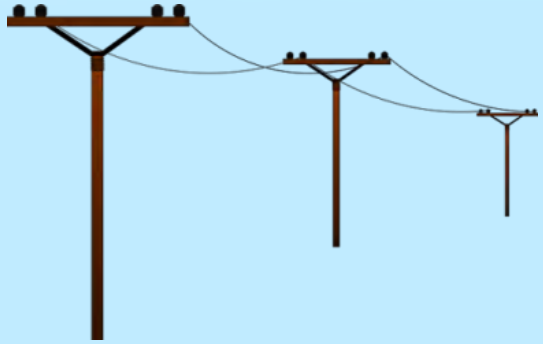
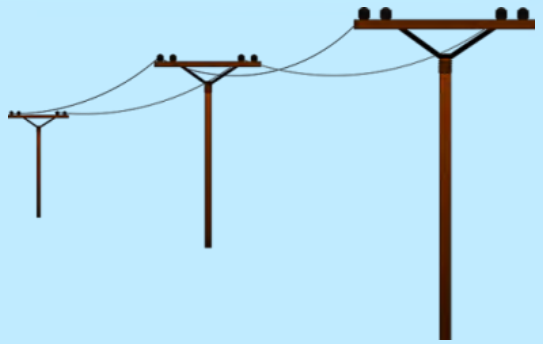


Tesla

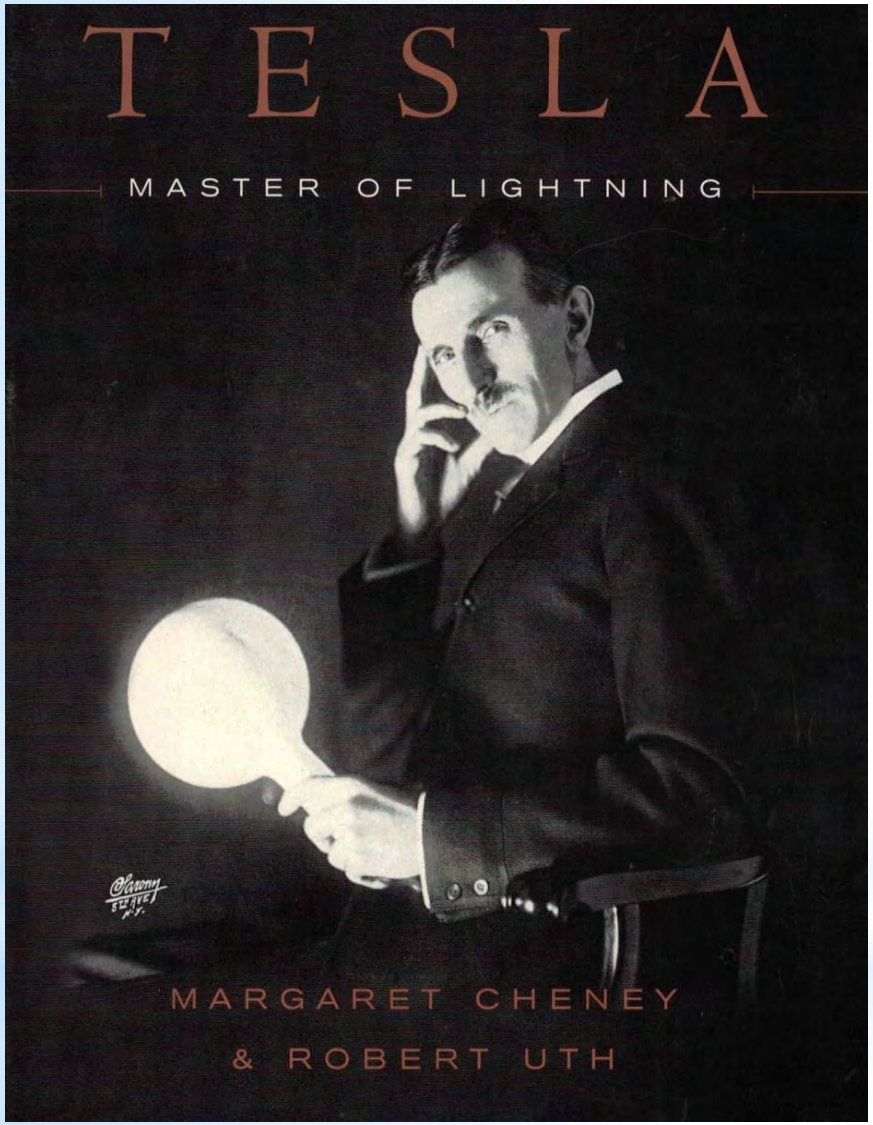


The Forgotten Genius

Part 1
Alternating Current (AC) Electric Power

Ange Rapa

January 11, 2022



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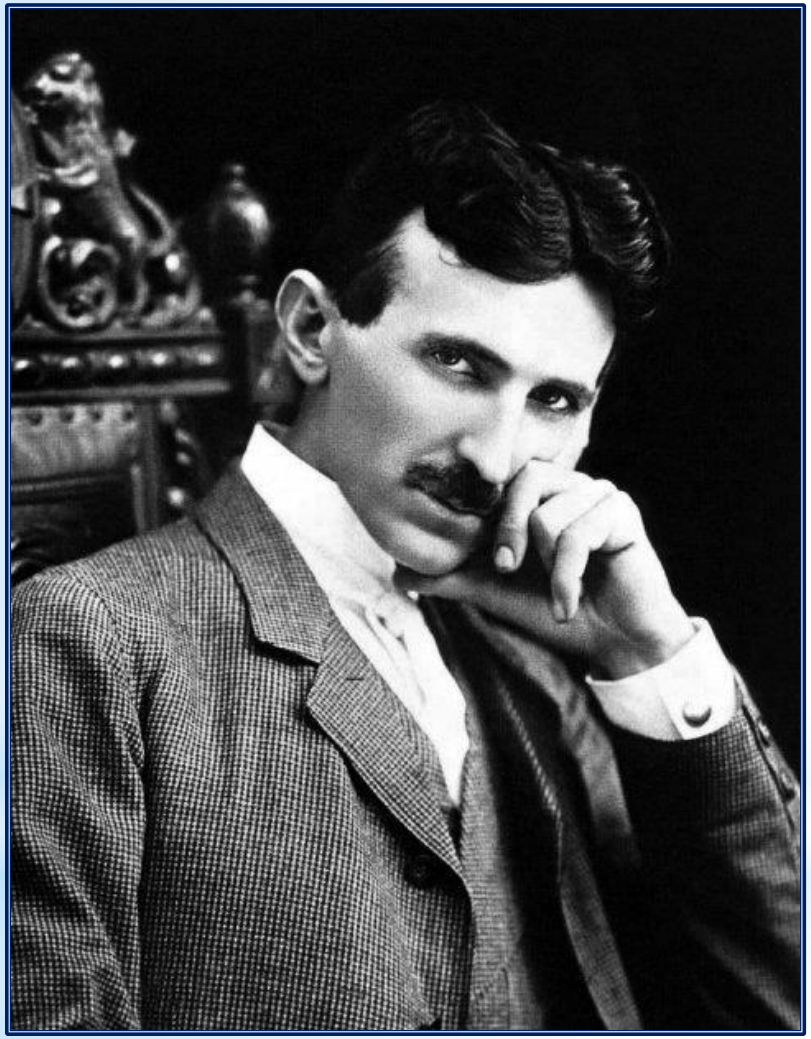
Margaret Cheney & Robert Uth

PBS Documentary Video
"TESLA – Master of Lightning"

The History Channel

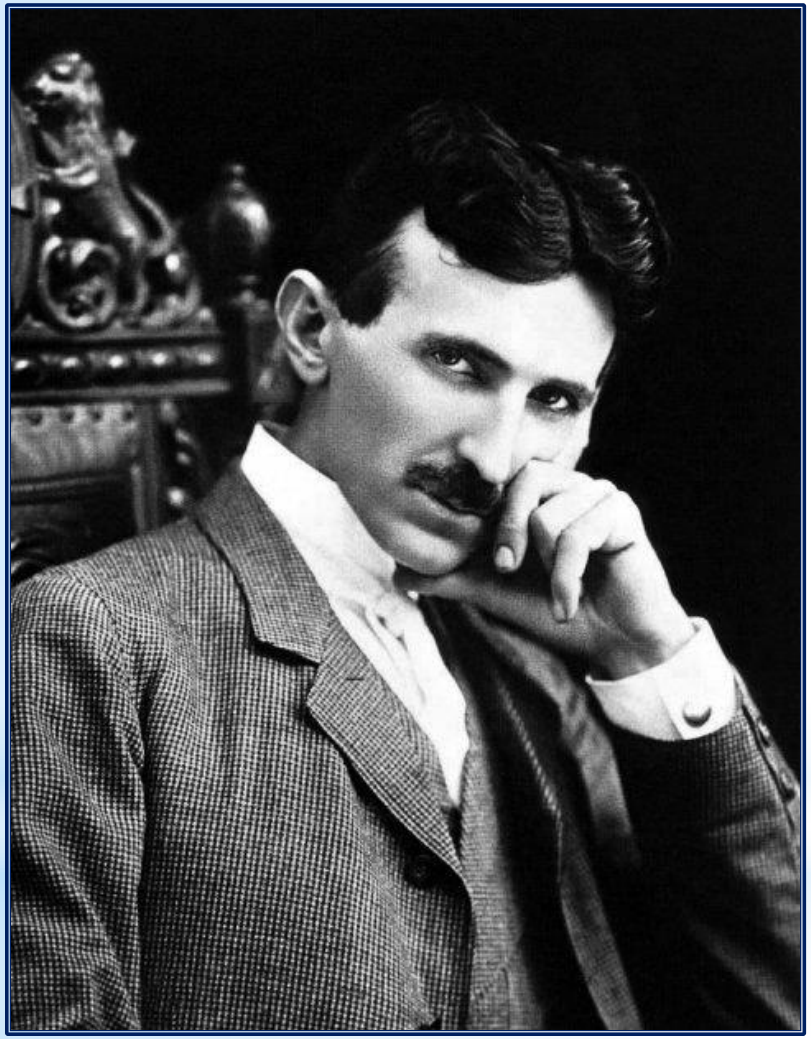
Tesla's Autobiography
"My Inventions" (1919)
www.tfcbooks.com/e-books/my_inventions.pdf

NIKOLA TESLA



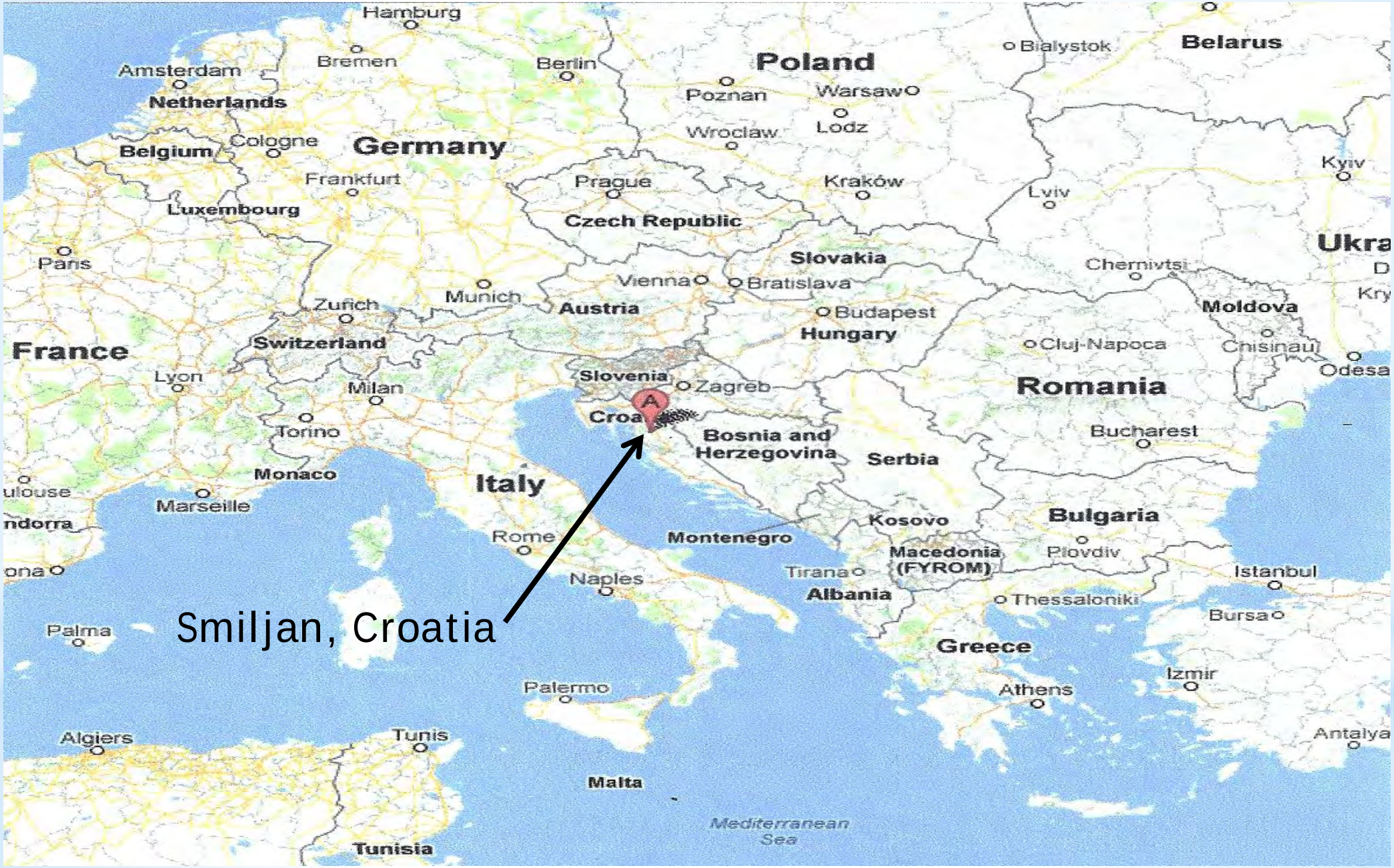
- Nikola Tesla is largely responsible for the technology used in today's world-wide electrical power and wireless communications systems.

NIKOLA TESLA



- Nikola Tesla is largely responsible for the technology used in today's world-wide electrical power and wireless communications systems.

- Tesla's innovations made him rich and famous, but he died alone, poor, and in virtual obscurity.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Cologne
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Kraków
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Bursa
Palma
Greece
Izmir
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Antalya
Malta
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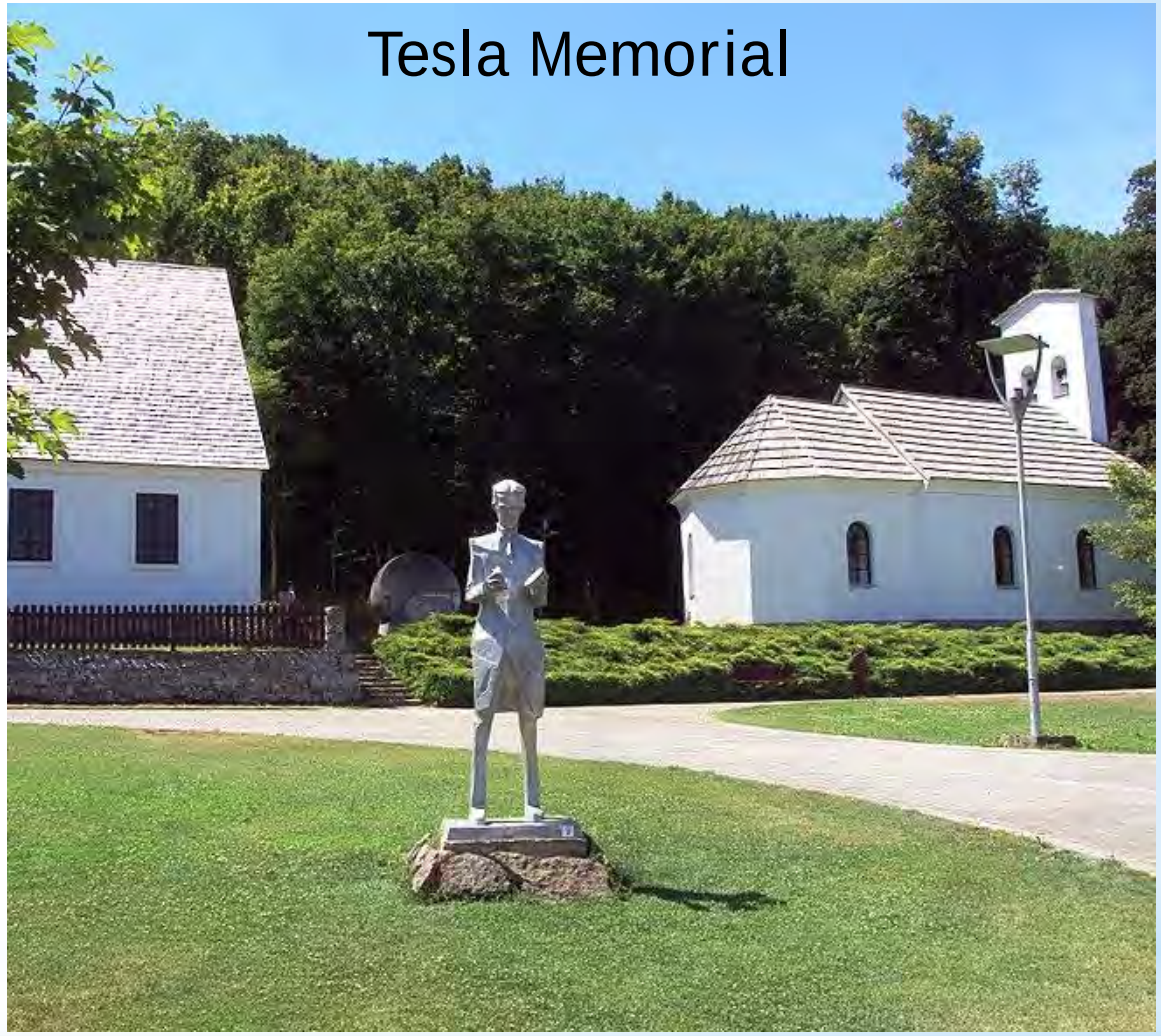
Sea
Tunisia
Smiljan, Croatia

Original Birthplace

Tesla Memorial



Tesla's Birthplace & Childhood Home

My Early Life

- **Youngest of 5 children, all intellectual**

Tesla at age 23 (1879)

- Youngest of 5 children, all intellectual
- **Mainly Self-taught**

Tesla at age 23 (1879)

- Youngest of 5 children, all intellectual
- Mainly Self-taught
- **Personality**

Tesla at age 23 (1879)

- Youngest of 5 children, all intellectual
- Mainly Self-taught
- Personality
- **Beliefs**

Tesla at age 23 (1879)

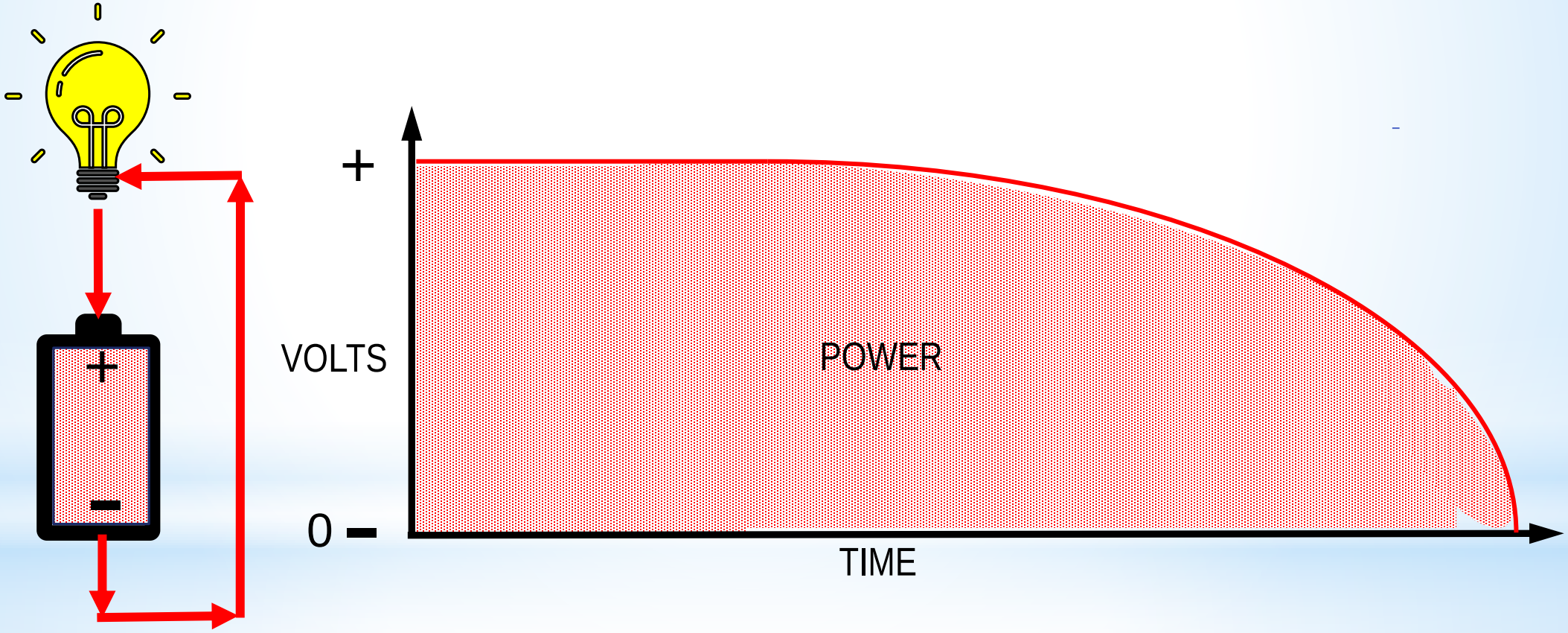
- Youngest of 5 children, all intellectual
- Mainly Self-taught
- Personality
- Beliefs
- **Visualization Abilities**

Tesla at age 23 (1879)

The New Land

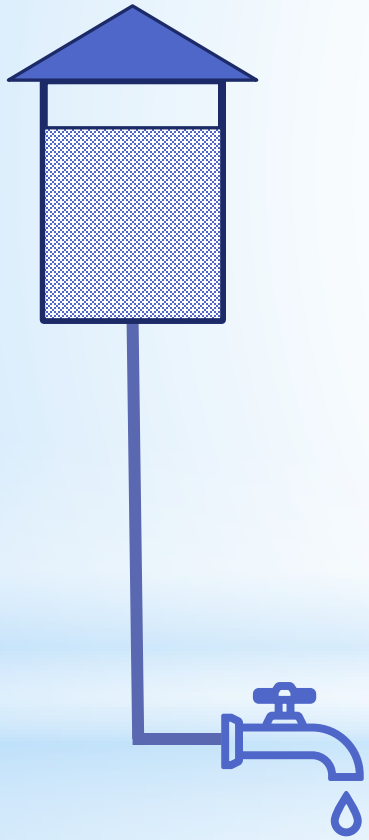
DC power from storage battery

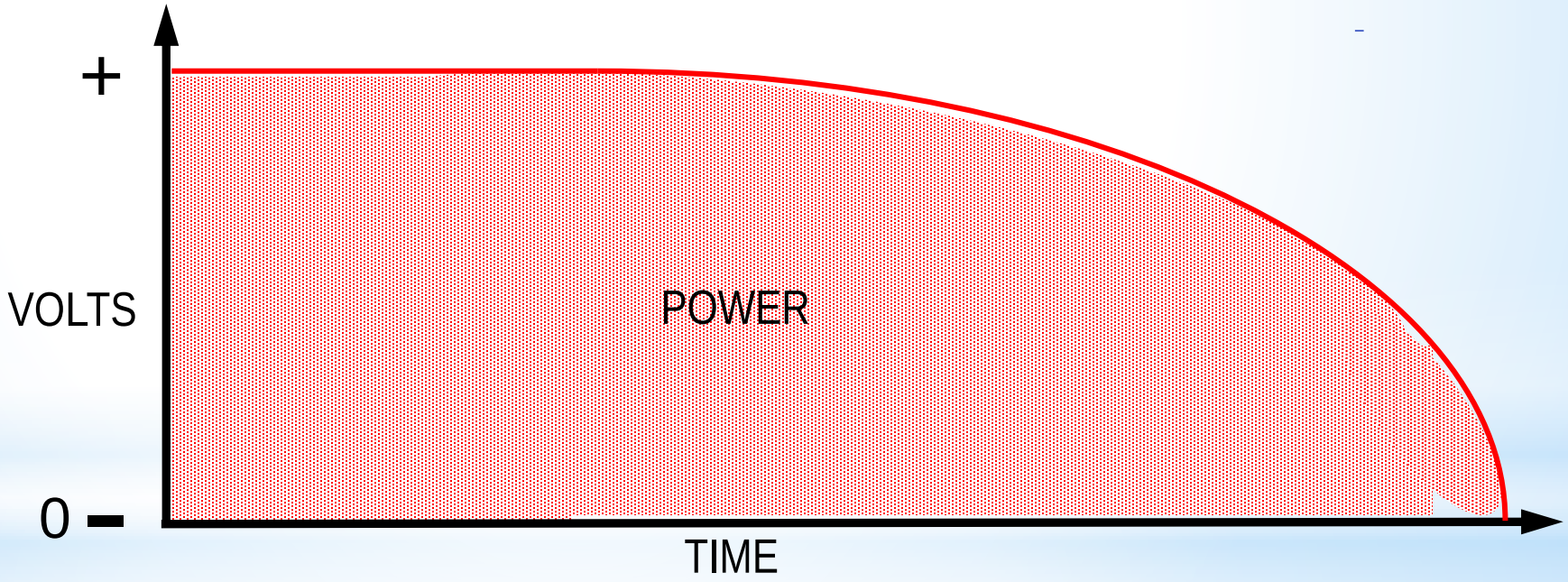
pure uninterrupted power - flow in one direction



DC power from storage battery

pure uninterrupted power - flow in one direction

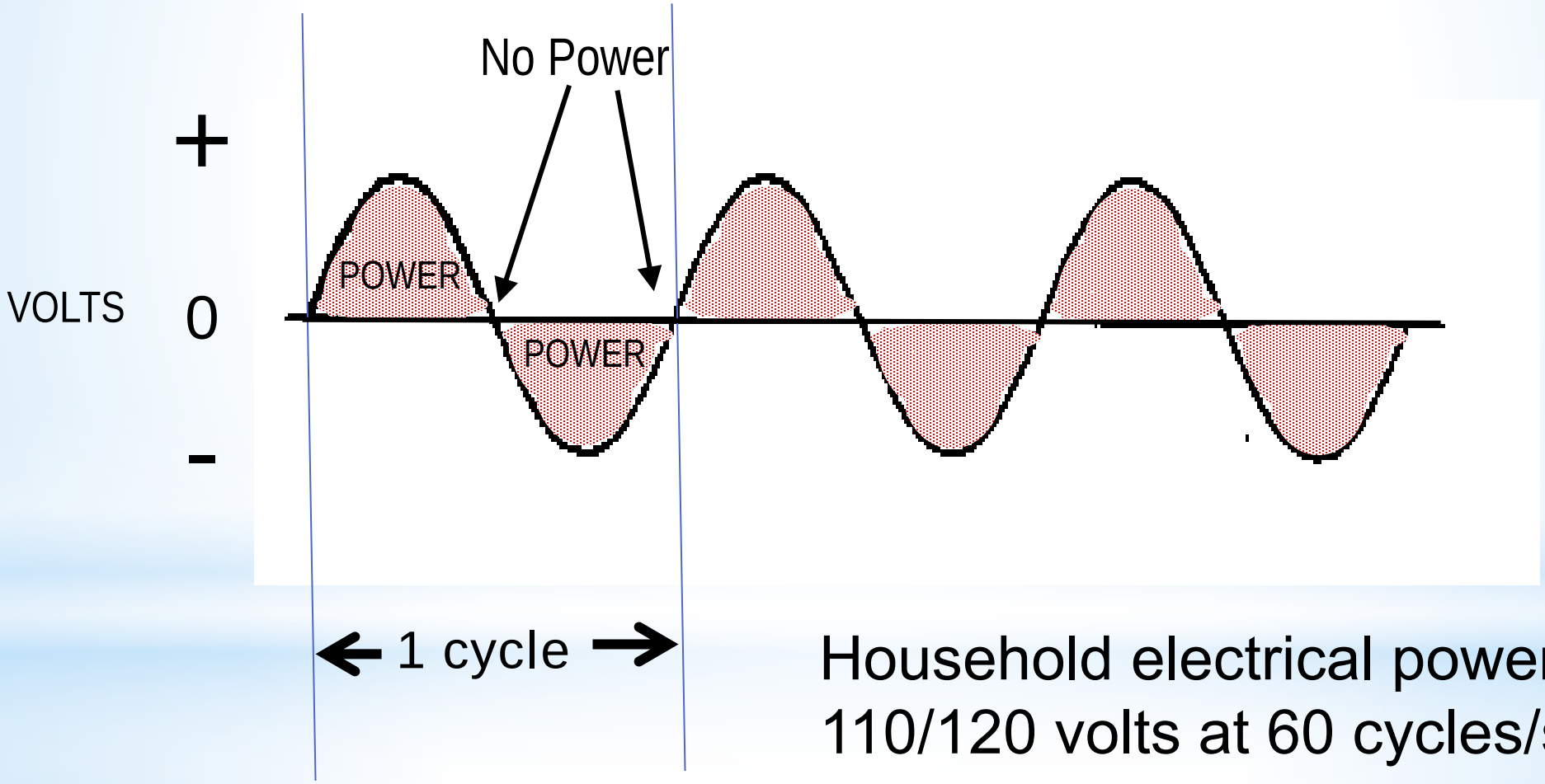




Water Tank Analogy

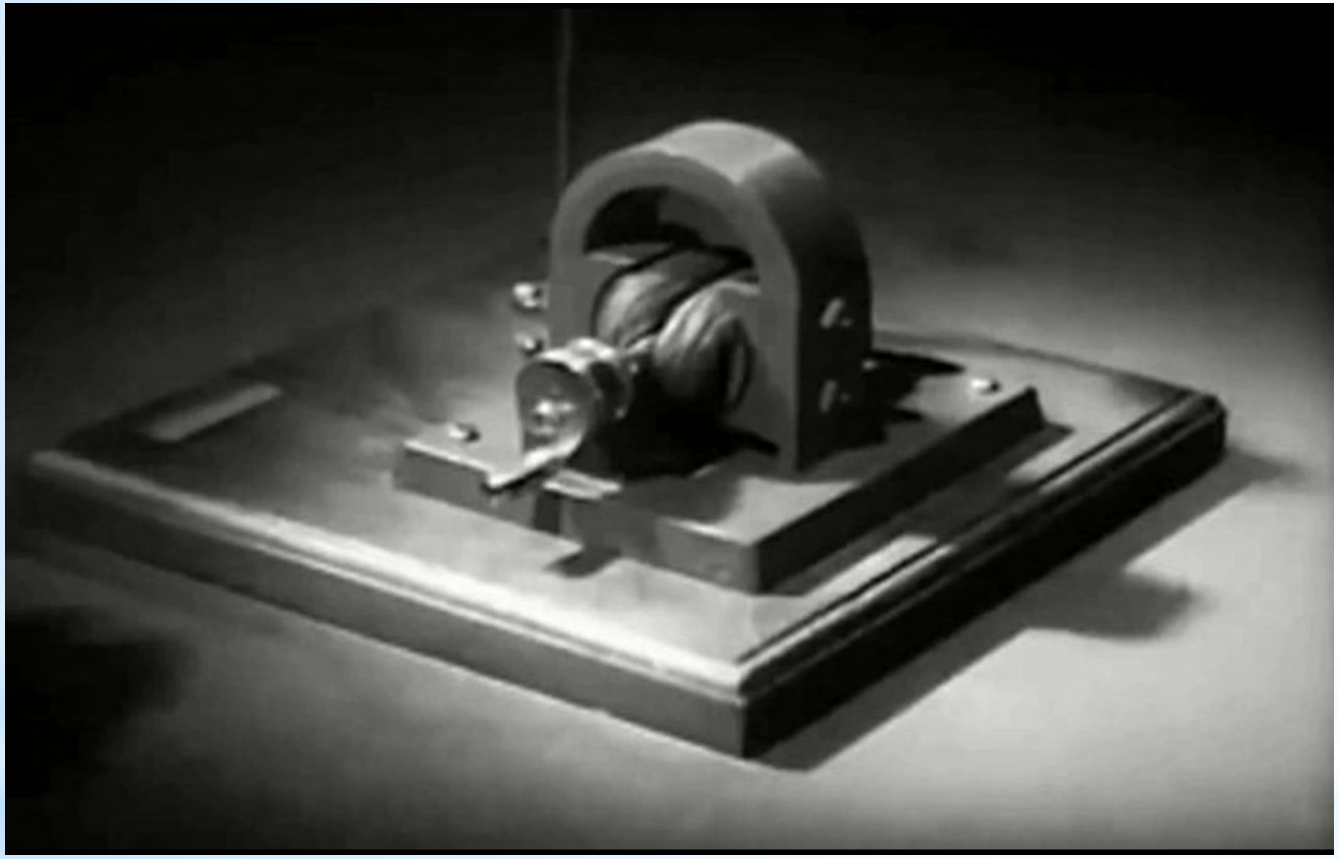
AC (generated)

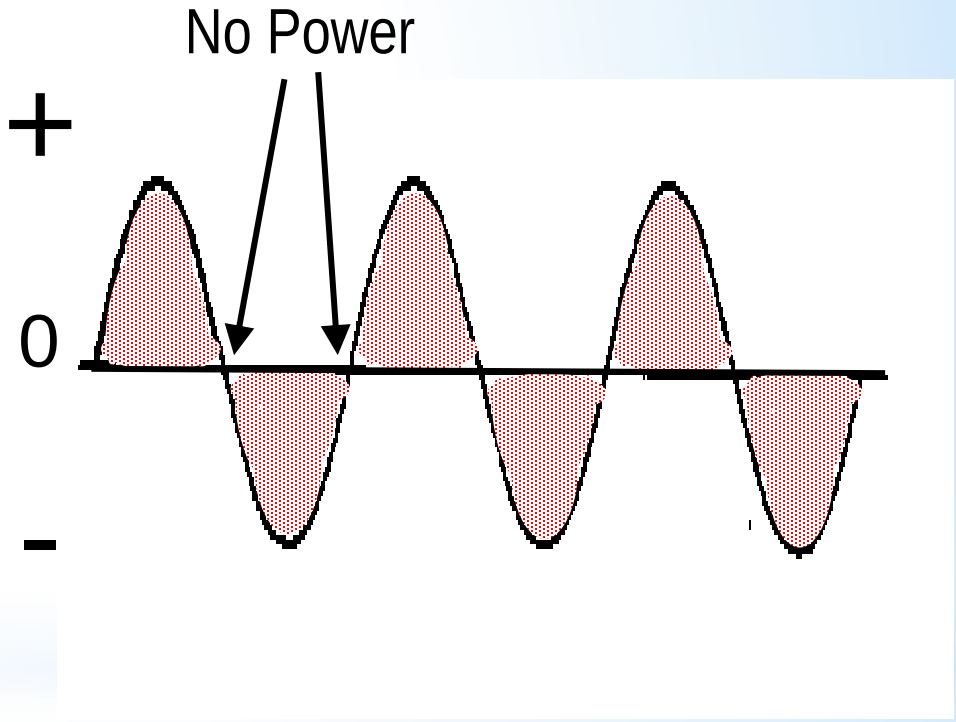
oscillating power flowing in two directions



Household electrical power:
110/120 volts at 60 cycles/sec. (Hz)

AC Power Generation

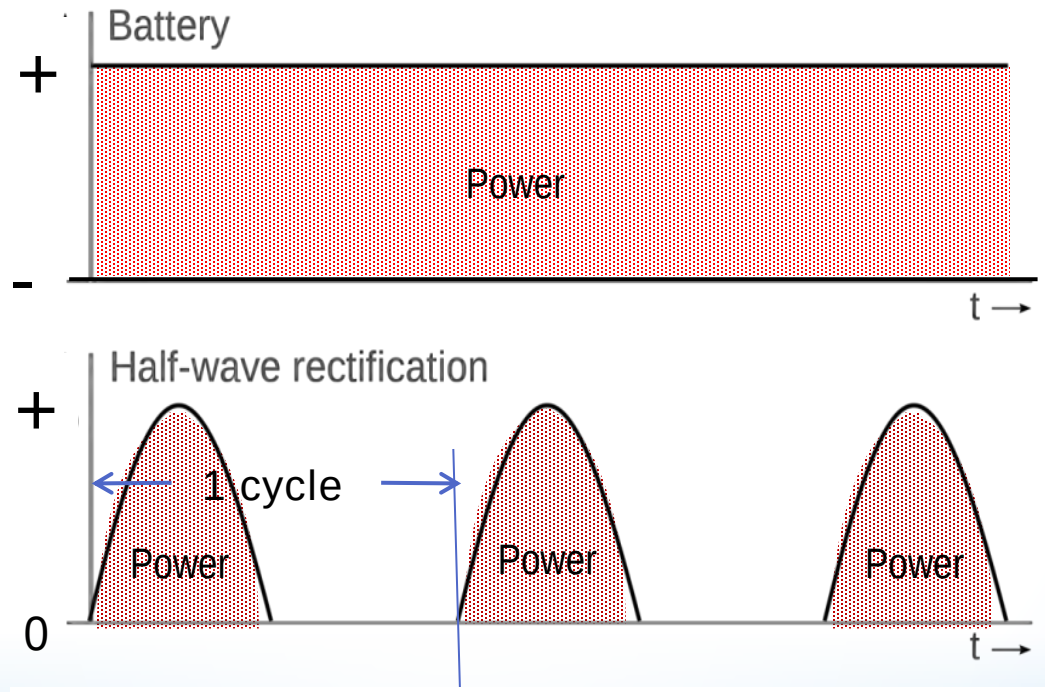




Converting AC to DC (rectification)

Battery

DC Generator
(Dynamo)



Converting AC to DC (rectification)

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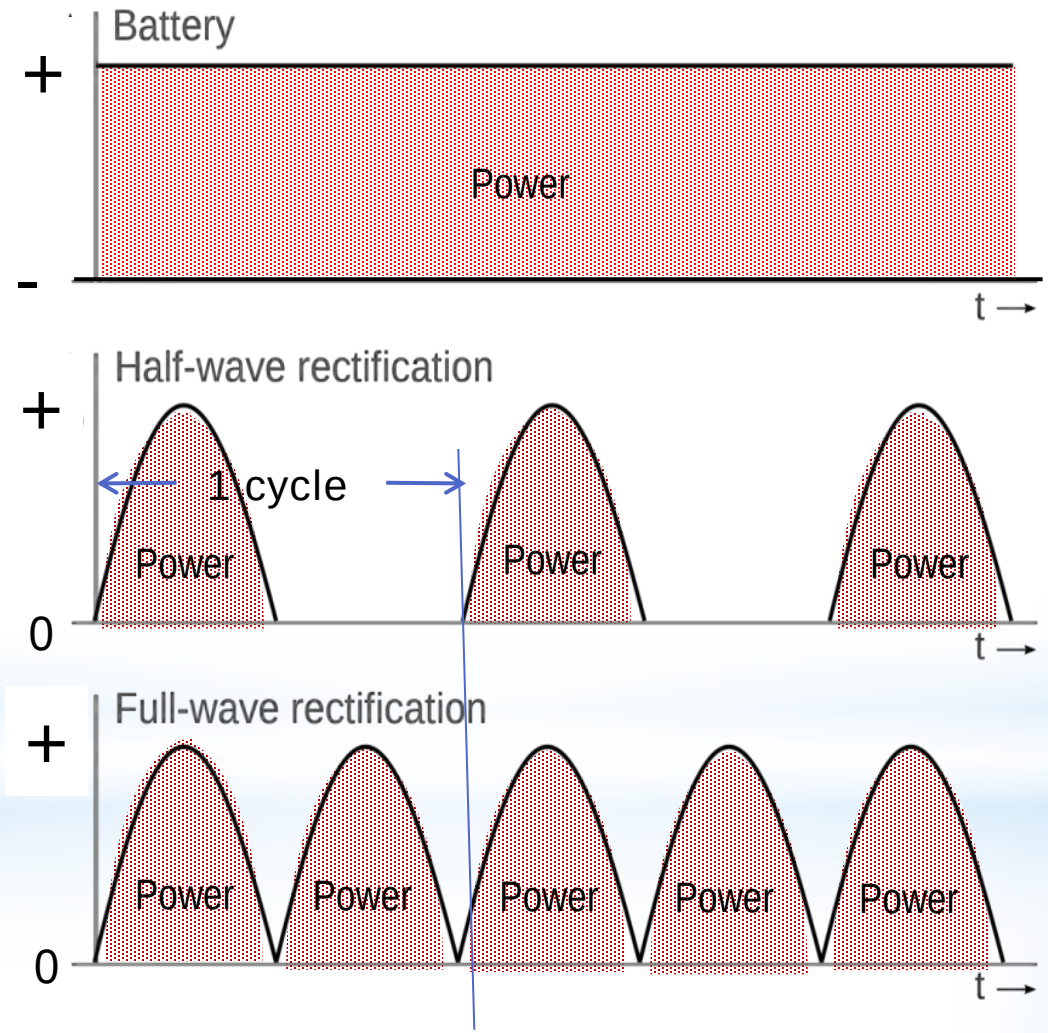
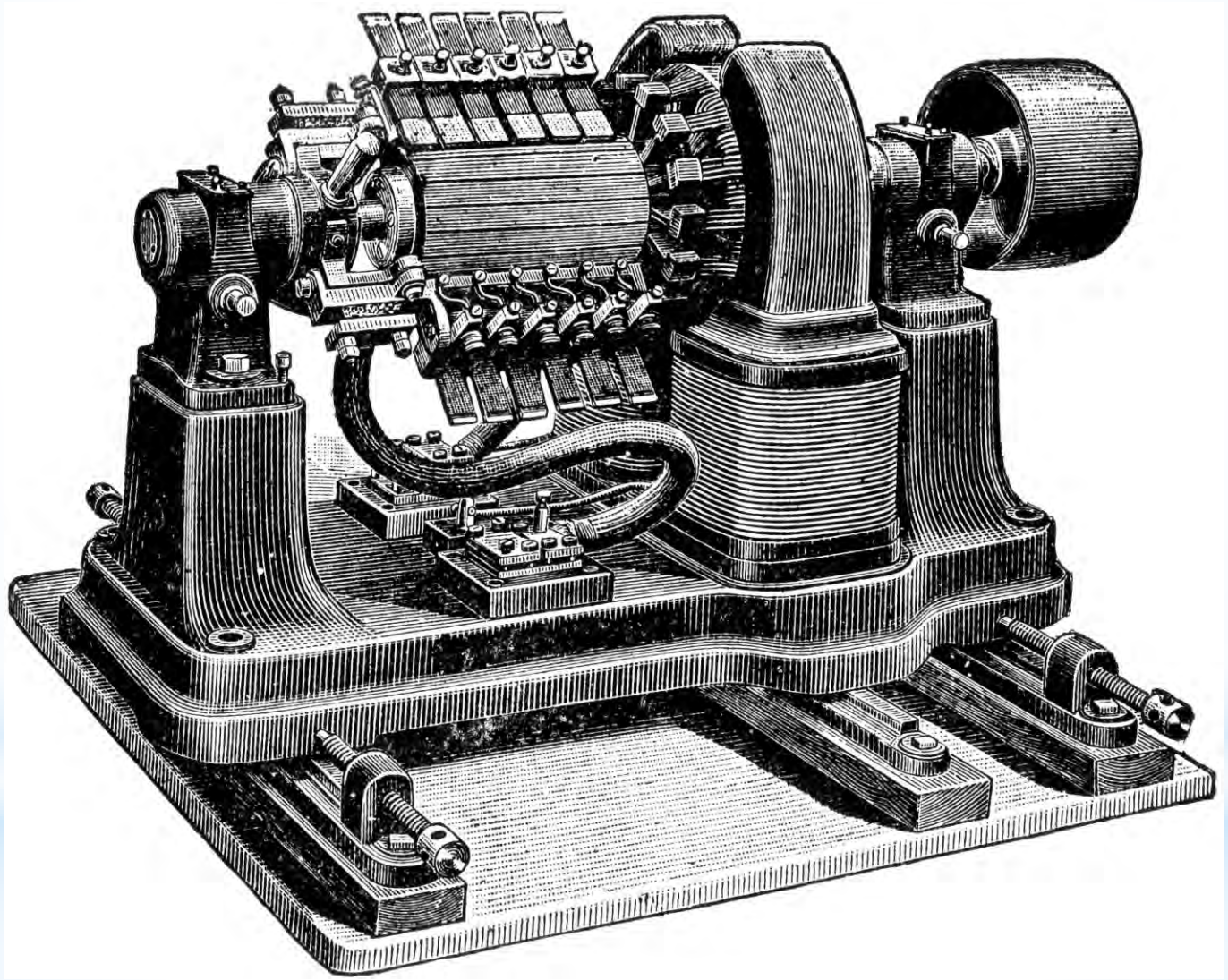
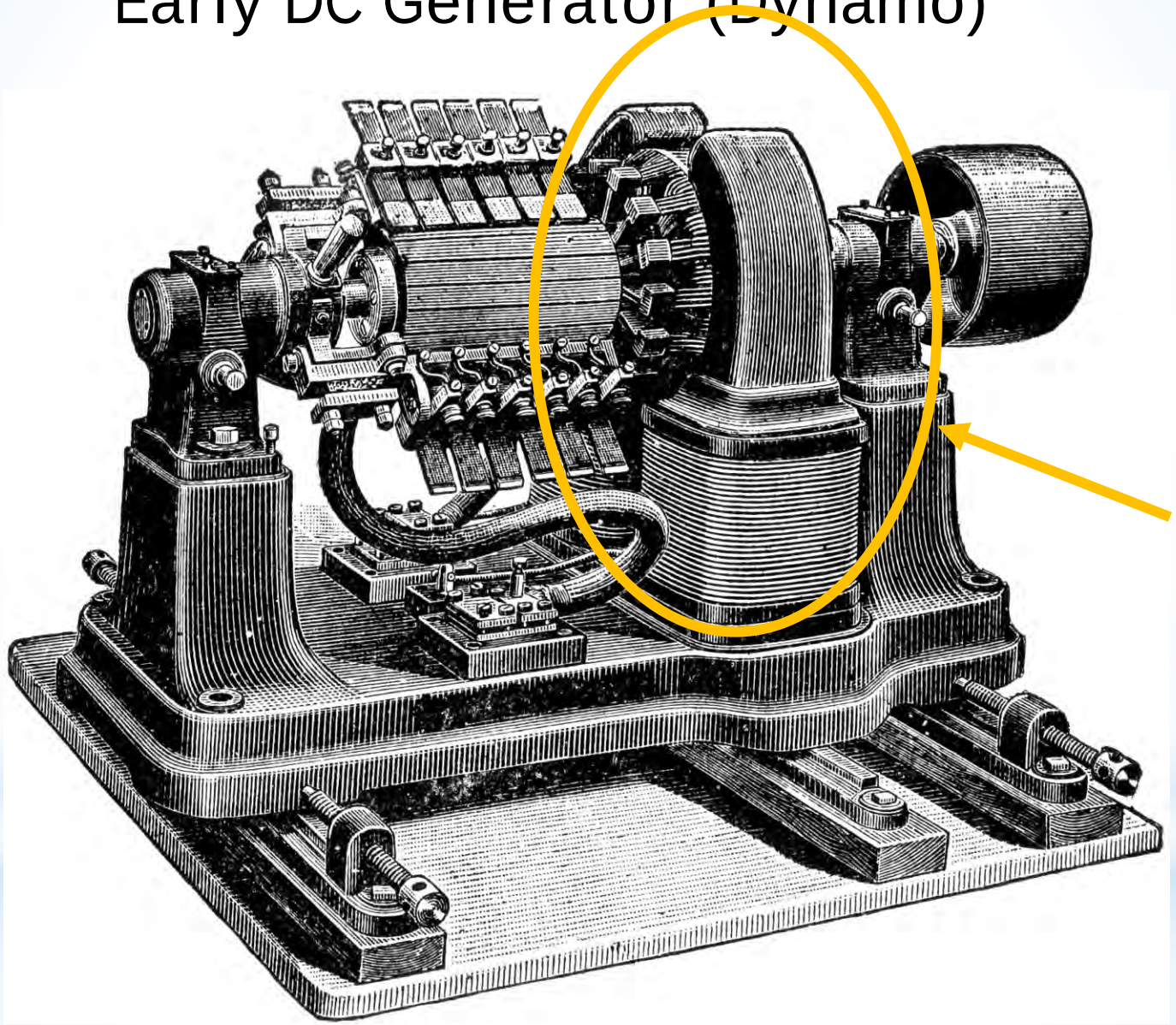


Early DC Generator (Dynamo)



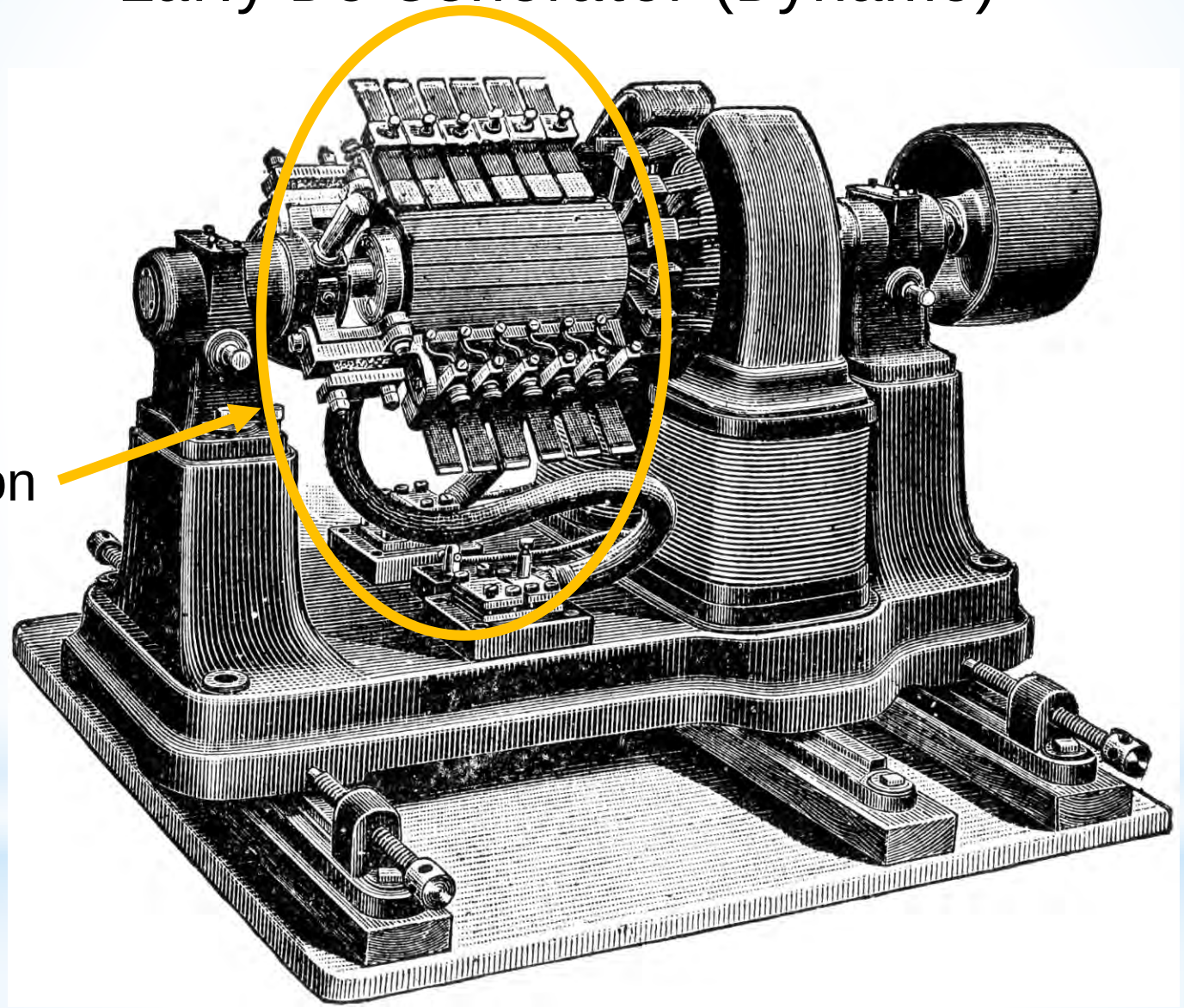
Early DC Generator (Dynamo)



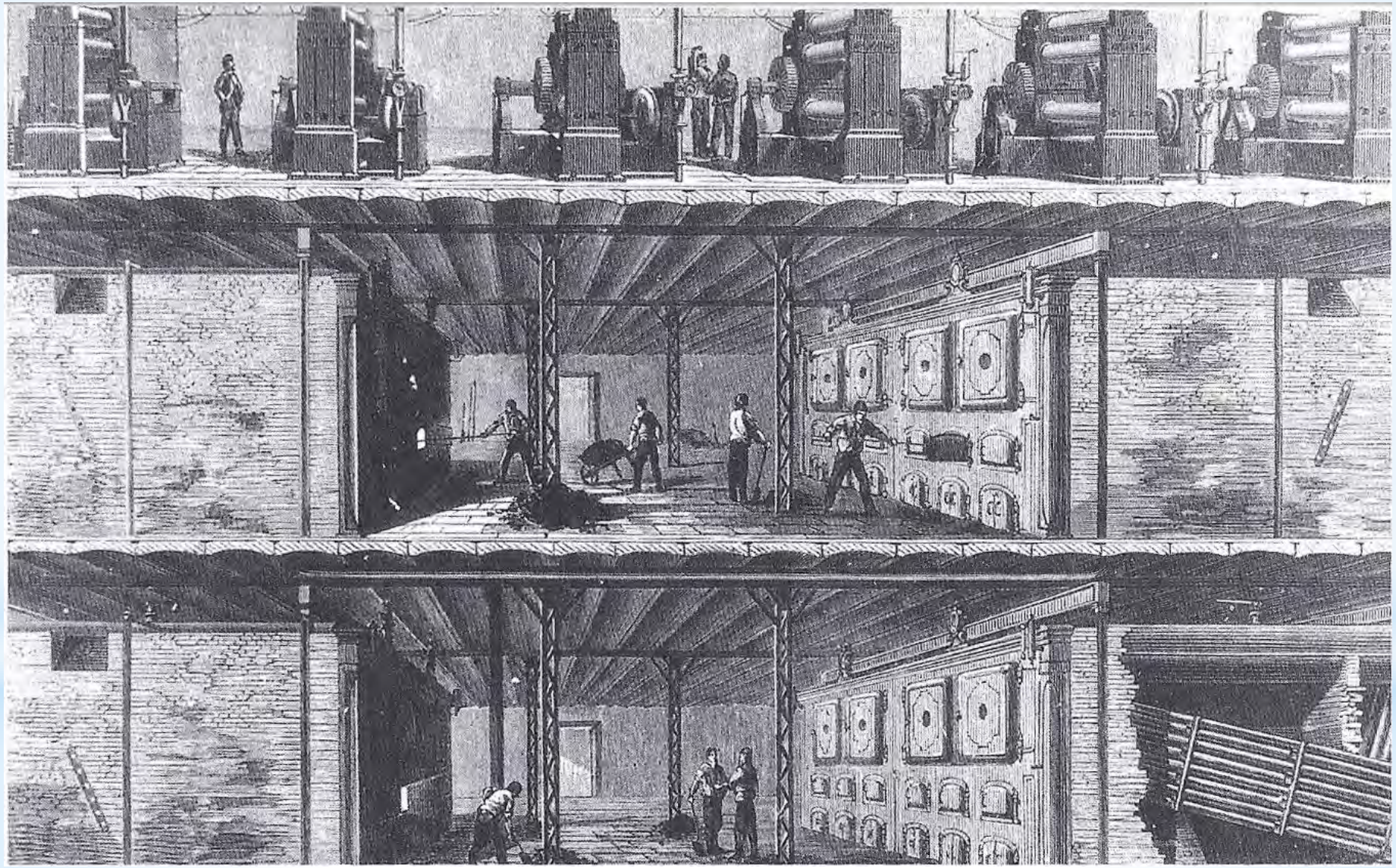
generator section

Early DC Generator (Dynamo)

commutator section

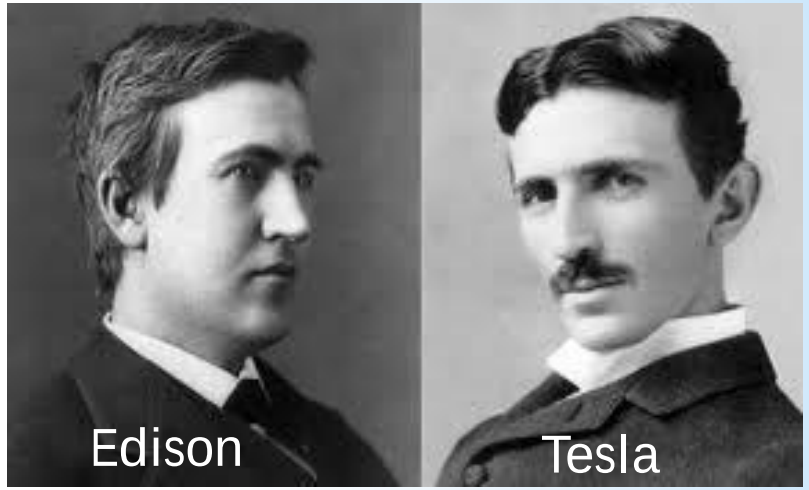


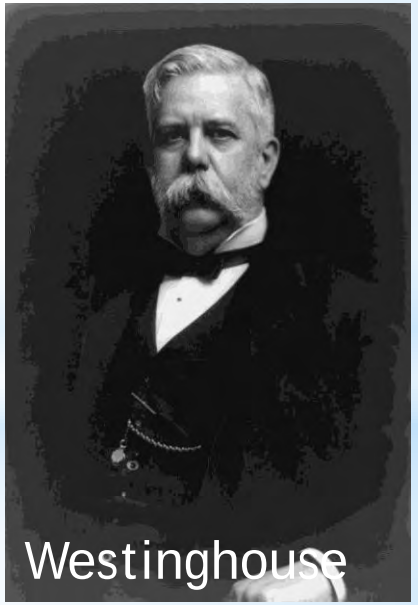
Edison's Pearl Street Power Station, 1883



Review of Key Events:

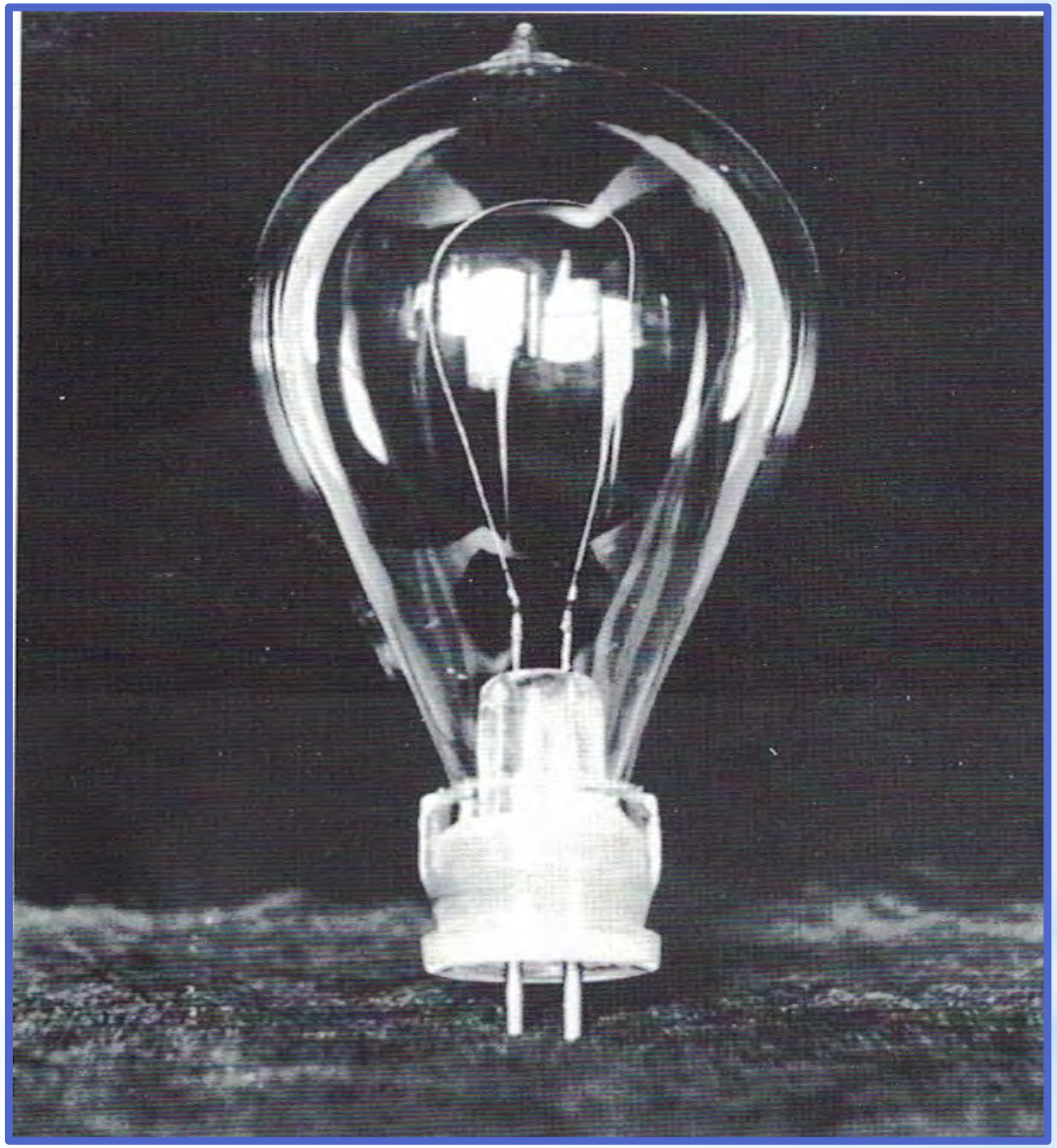
- 1831 – Faraday discovers power generation
- 1878 – Edison markets incandescent lighting (DC)
- 1884 – Tesla comes to NYC to work for Edison but quits within a year
- 1885-87 – Tesla develops AC motor and patents complete AC power system.
- 1888 – Westinghouse buys Tesla's AC patents and hires him as a consultant.





War of the Currents

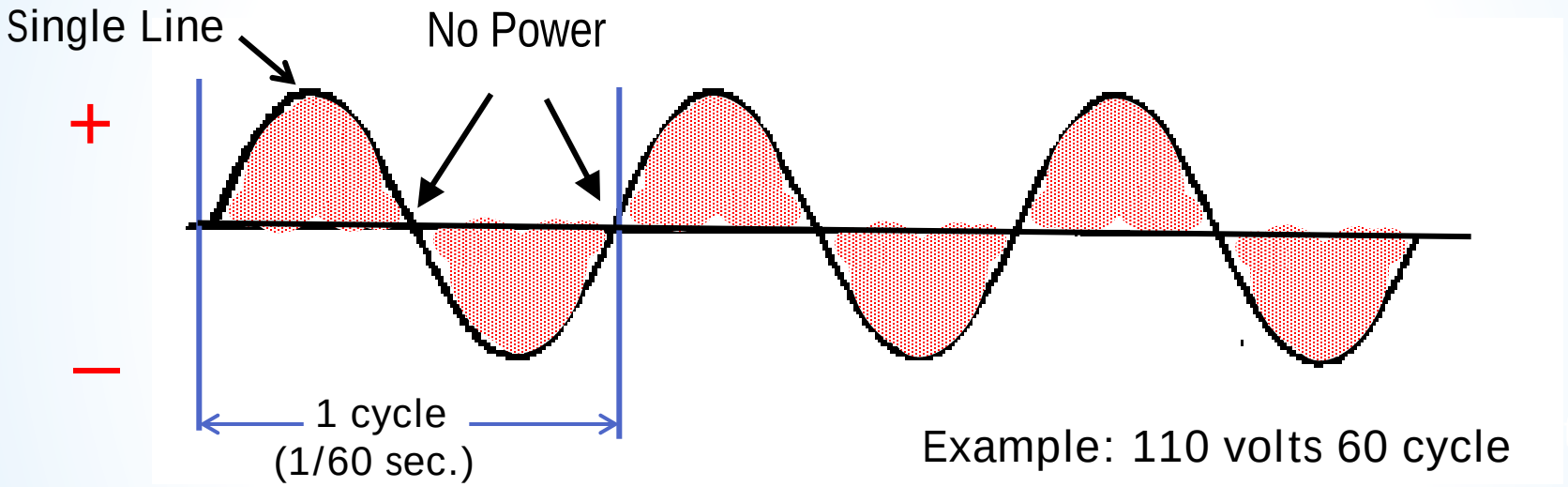
Edison one-piece Lamp



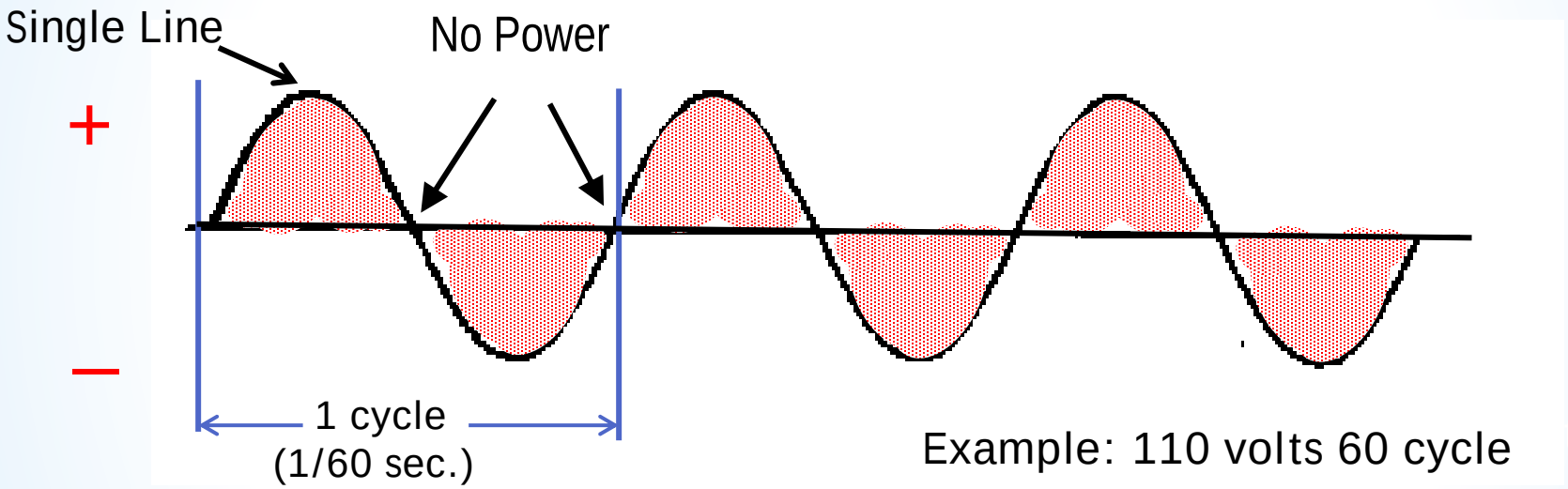
Westinghouse two-piece Stopper Lamp

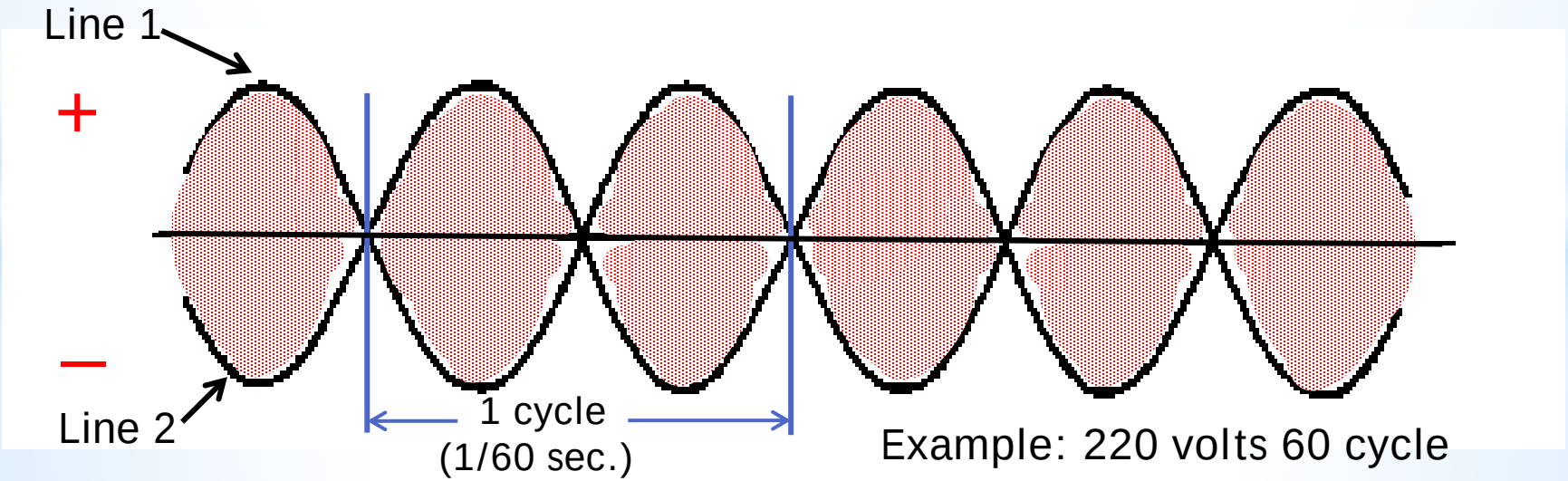
Tesla Polyphase System

AC Power (single phase - residential)

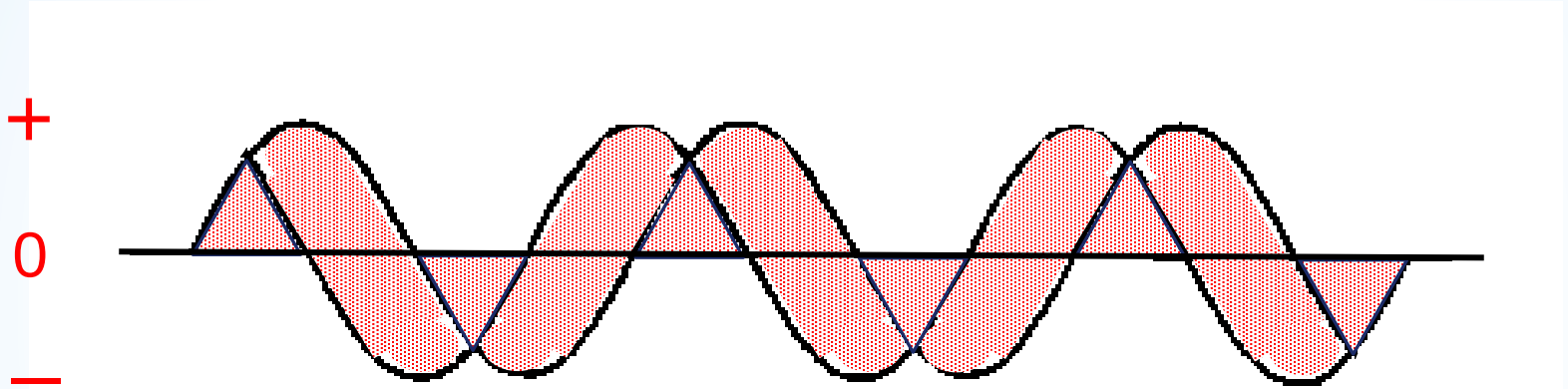


AC Power (single phase - residential)





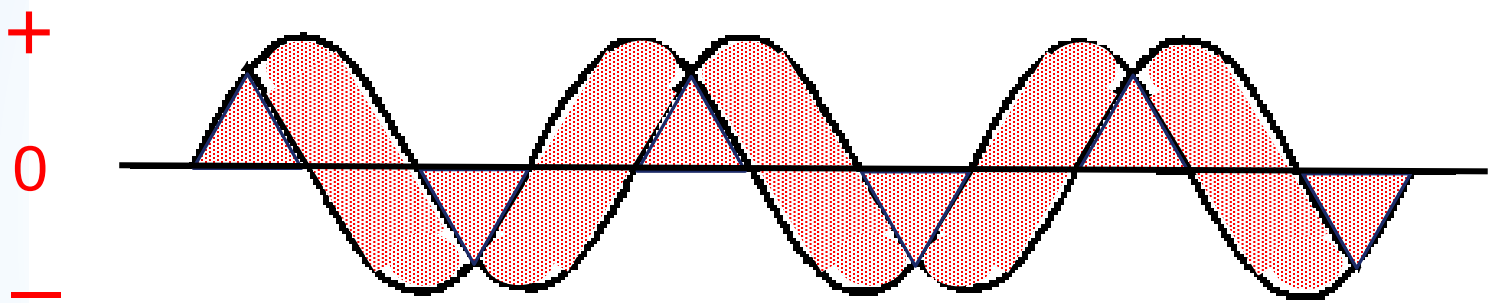
Polyphase AC (industrial power)



2- phase

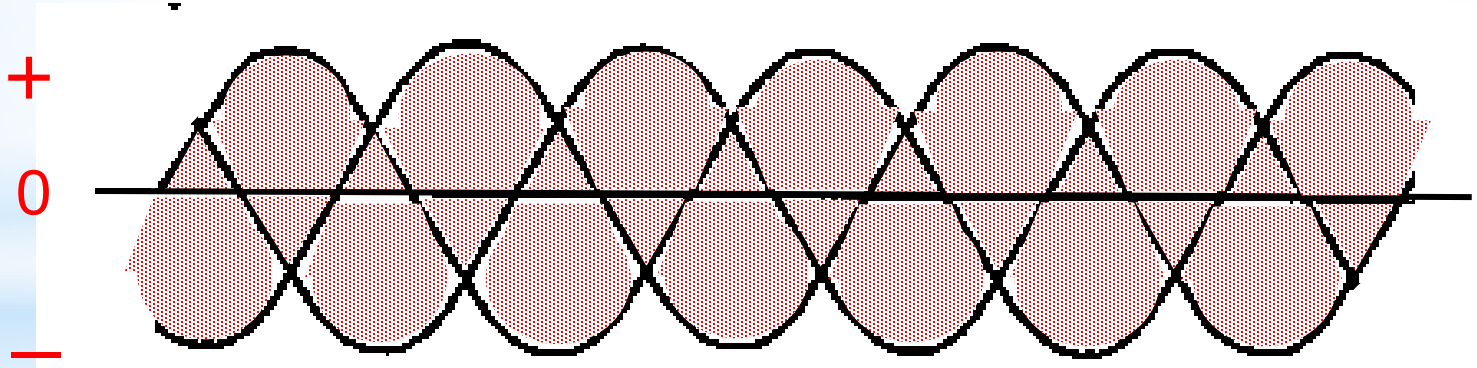
(2 Currents - **90º out of phase)**

Polyphase AC (industrial power)



2- phase

(2 Currents - **90º out of phase)**

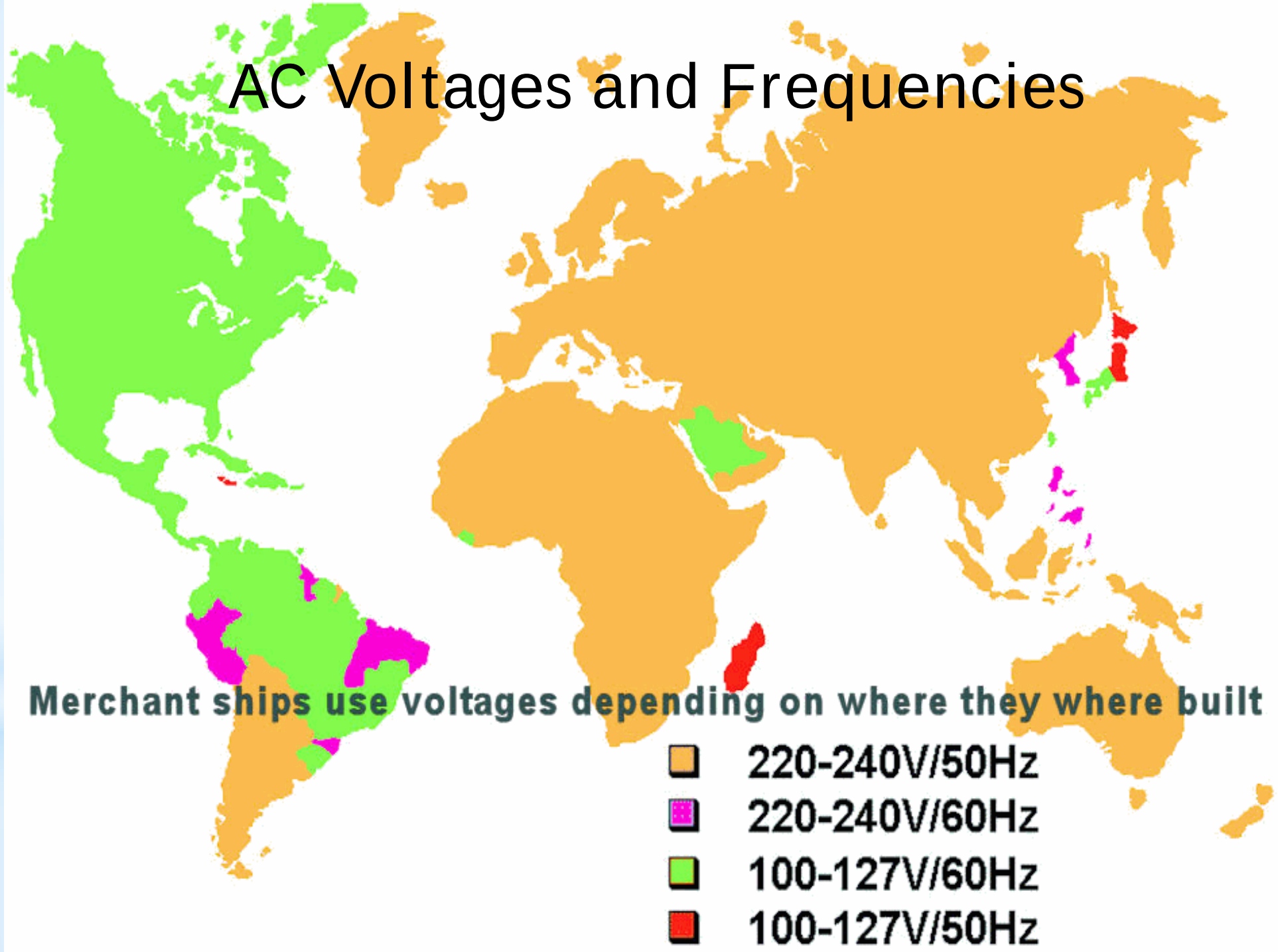


3- phase

(3 Currents - **120º out of phase)**


Niagara

AC Voltages and Frequencies



Niagara Power Station - 1900

AC Power Timeline

1884 - Tesla goes to New York to work for Edison

1887 - **Tesla's AC system patented**

1888 - Westinghouse buys patents (DC vs AC war)

1892 - Westinghouse wins Chicago Expo contract

1893 - Chicago Expo opens - Lord Kelvin is convinced

1893 - Westinghouse wins Niagara Falls Contract

1896 - Niagara power online to Buffalo

1900 - Niagara power reaches NYC

Next Class: Thurs. January 13th – "High Frequency"