



**University of
Dayton**

Inspirational Women In STEM

ENM 583- Leadership & Engagement for Diversity in Engineering

Advisor - Dr. Sharon Bommer

Presenters - Leah Frost, Alexander Hoffman, and Meredith Wall



Inspirational Women Stories: Elizabeth Blackwell

Meredith Wall

ENM 583 – Leadership & Engagement for Diversity in Engineering



Background

- ❖ Born: February 3, 1821, Bristol, United Kingdom
- ❖ Died: May 31, 1910, Hastings United Kingdom
- ❖ At age 11, her family moved to Jersey City, New Jersey, and then to Cincinnati, Ohio two years later
- ❖ Inspired to pursue medicine when her dying friend wished she had a female physician
- ❖ Family fought for women's rights and to abolish slavery

Interesting Facts

- ❖ Originally wanted to be a surgeon, but became blind in her left eye due to an infection

Notable Contributions

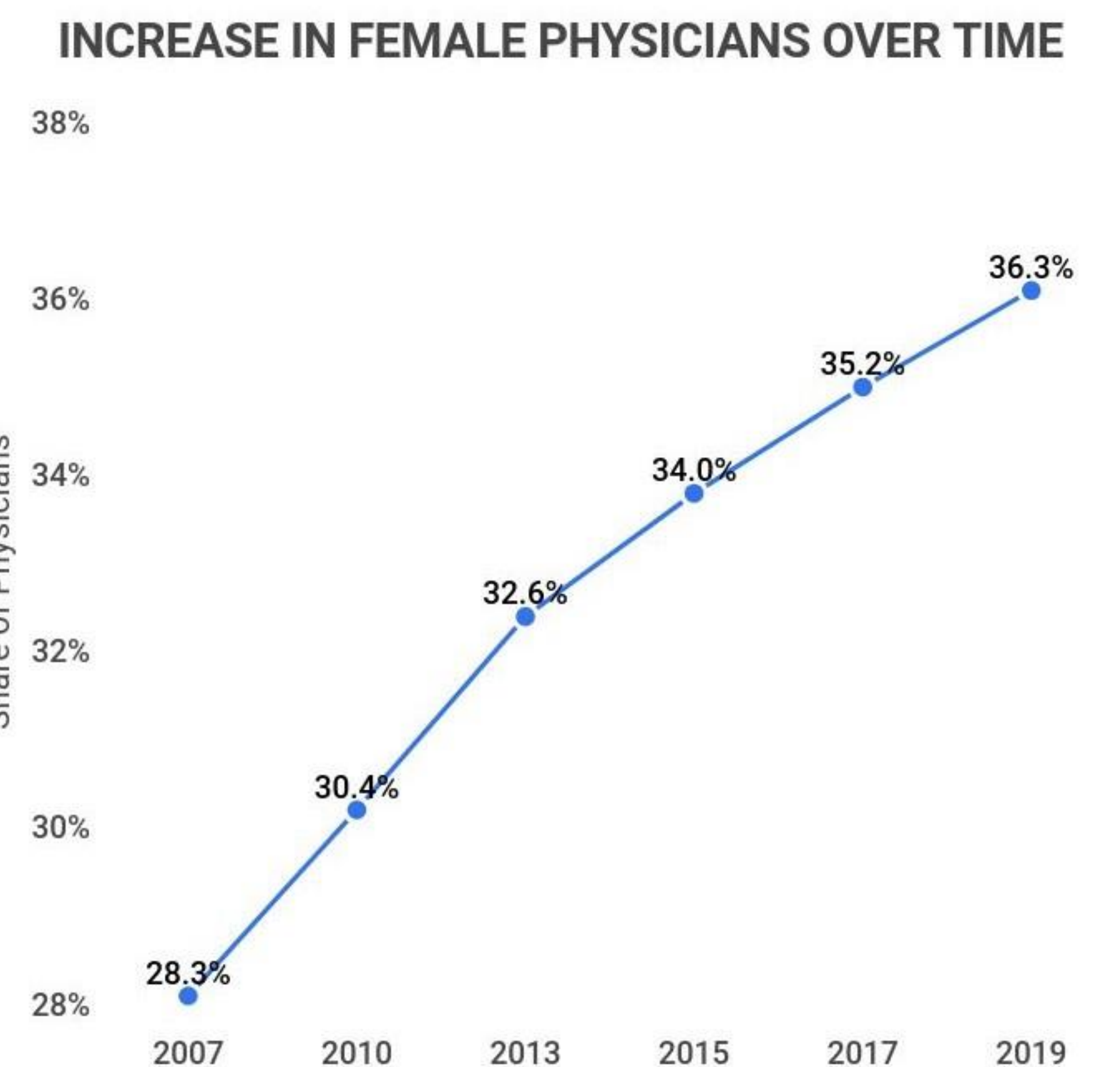
- ❖ First woman to receive a medical degree from an American university, thus pioneering the movement for women in healthcare
- ❖ Wrote books about women in medicine: *Medicine as a Profession For Women* (1860) and *Address on the Medical Education of Women* (1864)
- ❖ Organized the Woman's Central Association of Relief and U.S. Sanitary Commission
- ❖ Opened a medical school for women in 1857

Career Path

- ❖ 1849: Graduated medical school first in her class from Geneva Medical College
- ❖ 1849 – 1852: Worked in clinics in Paris and London
- ❖ 1853: Opened a small dispensary in New York
- ❖ 1857: Opened New York Infirmary for Women and Children
- ❖ 1859: First woman to have her name on British Medical registry
- ❖ 1868: Opened Women's Medical College at the Infirmary
- ❖ 1871: Organized National Health Society in England
- ❖ 1875: Professor of gynecology at London School of Medicine

Statistical Data on Women in Medicine

- ❖ About 40% of physicians in the US are female. This has increased from 5% in 1970
- ❖ In 2020, women made up 53.7% of medical students



Works Cited

Encyclopedia Britannica, inc. (2023, January 30). *Elizabeth Blackwell*. Encyclopedia Britannica. Retrieved February 9, 2023, from <https://www.britannica.com/biography/Elizabeth-Blackwell>

Michals, D. (n.d.). *Elizabeth Blackwell*. Biography: Elizabeth Blackwell. Retrieved February 9, 2023, from <https://www.womenshistory.org/education-resources/biographies/elizabeth-blackwell>

National Institutes of Health. (2015, June 3). *Changing the face of Medicine | Elizabeth Blackwell*. U.S. National Library of Medicine. Retrieved February 9, 2023, from https://cfmedicine.nlm.nih.gov/physicians/biography_35.html#:~:text=ACHIEVEMENT-,Dr.,physician%20had%20been%20a%20woman



Inspirational Women Stories: Chien-Shiung Wu

Alex Hoffman

ENM 583 – Leadership & Engagement for Diversity in Engineering



Background^[4]

- Born in 1912 near Shanghai, China
- 1934 Degree in Physics from National Central University in Nanking
- 1936 traveled to US for graduate studies
- 1940 Received PhD in Physics from UC-Berkley
- Married in 1942 and had one child
- 1981 Retired from Columbia University

Career Path^[4]

- National Central University
- UC-Berkley-Received PhD
- Smith College-Associate Professor
- Princeton-Associate Professor
- Columbia University-Full Professor

Notable Scientific Contributions^[3]

PhD Thesis topics (1940)

- Bremsstrahlung-Radiation of a decelerating particle as part of beta decay
- Radioactive Xenon isotope-Production of radioactive isotope of xenon from uranium fission

Manhattan Project (1944-1945)

- Developed radiation detection equipment
- Helped solve significant problem with world's first practical reactor based on her thesis topic
- Involved with uranium enrichment process

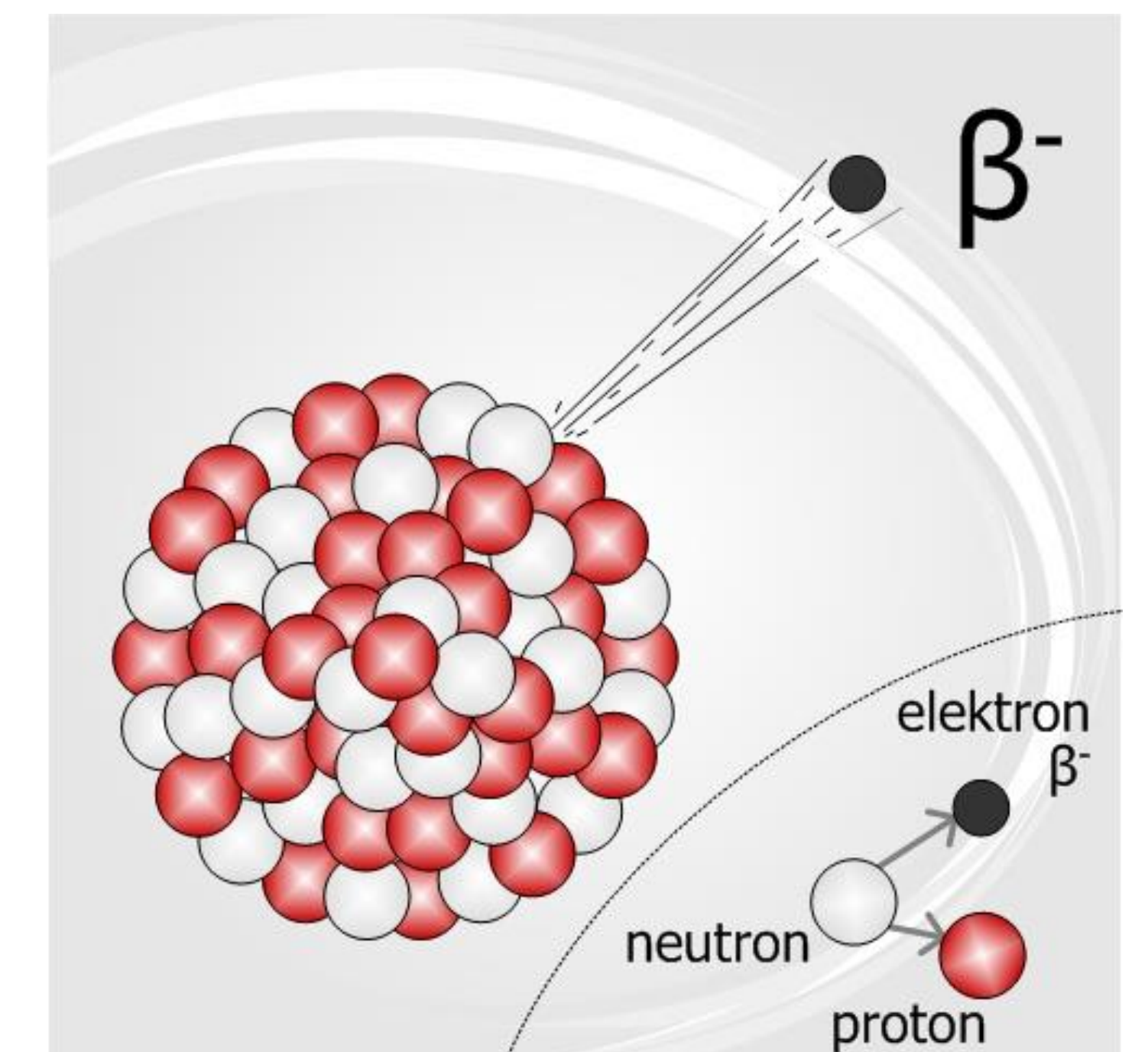
Beta Decay Experiment (1949)

Experimentally verified beta particle decay theory

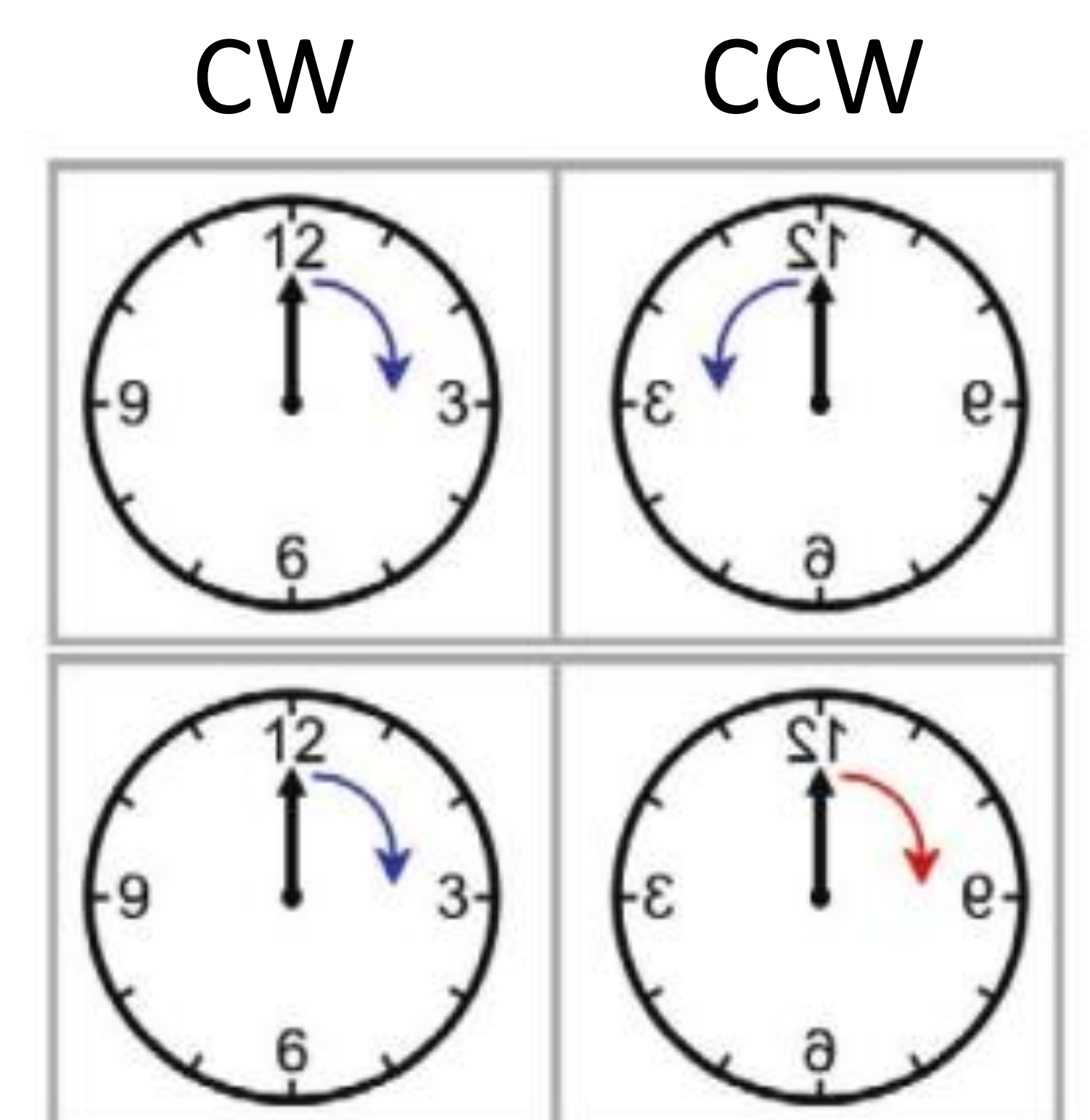
Parity Experiment (1956)

Experimentally proved that parity conservation was violated (real world and mirrored world {CW vs CCW} are not completely symmetric at an atomic particle level)

Beta Decay



Parity
Experiment
Analogy





Inspirational Women Stories: Chien-Shiung Wu

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Interesting Facts^[4]

- Nicknamed the “first lady of physics” & the “Chinese Madam Curie”
- Wu’s father believed in Chinese modernization and educating women and started a school for girls
- Wu was politically active during her student days while studying in China
- Wu was planning to attend the University of Michigan but decided on UC-Berkley instead based on U of M’s inequitable treatment of women
- Returned to China in 1973 but many of her family members had perished in the Cultural Revolution
- Controversially, Wu did not receive 1957 Nobel Prize for the Parity Experiment
- Won the inaugural Wolf Prize in Physics in 1978

Statistical Data on Women in Physics^[1]

Female representation in physics
has increased but is still low

Lower female representation
than most other STEM subjects

Disproportionate representation
of female Full Professors
compared to PhDs awarded

Physics Bachelors degrees awarded Women-21% Men-79%

PhDs awarded to women
Biological Science-53%
Mathematics-38%
Astronomy-31%
Engineering-22%
Physics-18%

Female physics faculty members
Full Professor-10%
Associate Professor-18%
Assistant Professor-23%
Instructor/Adjunct-23%

Works Cited

1. Porter, A. M., & Ivie, R. (2019). (rep.). *Women in Physics and Astronomy, 2019*. College Park, MD: Statistical Research Center.
2. By Smithsonian Institution - Flickr: Chien-shiung Wu (1912-1997), No restrictions, <https://commons.wikimedia.org/w/index.php?curid=18759827>
3. Indumathi, D. (2020). Chien-Shiung Wu: The First lady of physics. *Resonance*, 25(3), 333–352. <https://doi.org/10.1007/s12045-020-0949-3>
4. Yomtov, N. (2018). *Chien-Shiung Wu: Nuclear physicist*. Essential Library, an imprint of Abdo Publishing.



Figure 1. Olive Dennis Portrait

Inspirational Women Stories: Olive Dennis (1885-1957)

Leah Frost

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Figure 2. Dennis on Buffet Car

Background

- Childhood tinkerer
 - Built model train at 10
- Brother was civil engineer
- Bachelors Goucher College
- Columbia University- M.S. Mathematics
- Cornell University- M.S. Civil Eng
- Became first service engineer of the country

Career Path

- High School math teacher for 10 years
- Hired as service engineer for B&O Railroad as draftsman
- Promoted to service engineer (30 years)

Interesting Facts

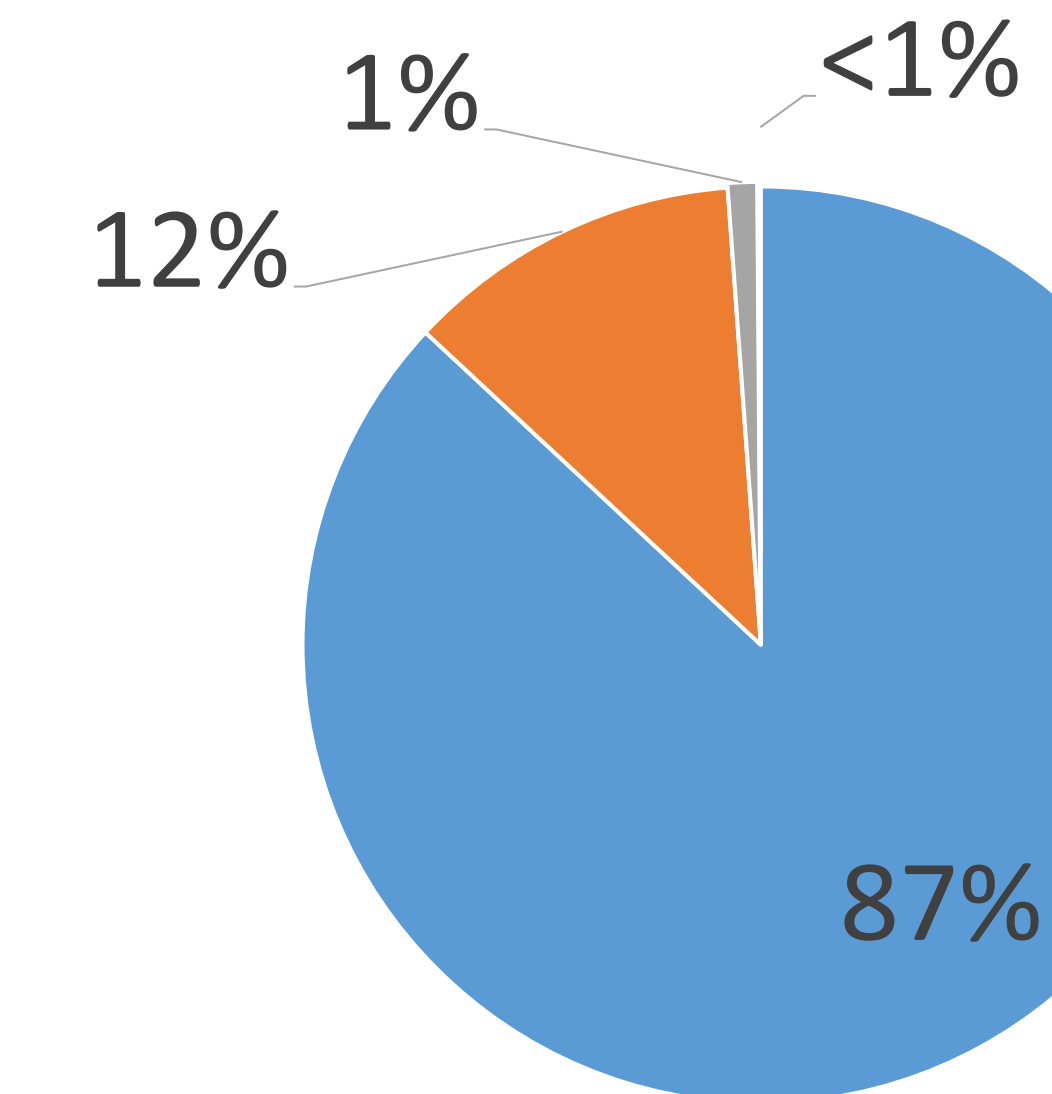
- 2nd women grad from Cornell with a master's degree in civil engineering.
- Traveled between a 50,000 miles per year on train for her career for research and testing.

Statistical Data on Women in Railway Engineering

- During WWII, ~84,000 women worked in railway but only 972 represented technical positions.
- In 2014, out of 55,000 locomotive engineers, 1.4% were women.
- In 2017, women represented 0.6% of rail executive positions.
- The first female locomotive engineer was Bonnie Leake, hired in 1974 .

Jobs Held By Women in Rail

(1920's)



■ Clerical ■ Cleaners ■ Track Work ■ Train Service

Notable Contributions

- Became first female of American Railway Engineering Association
- Patented “Dennis Ventilator”- individual window ventilator (1928)
- Studied refrigerator cars to develop first A/C enabled train (1930)

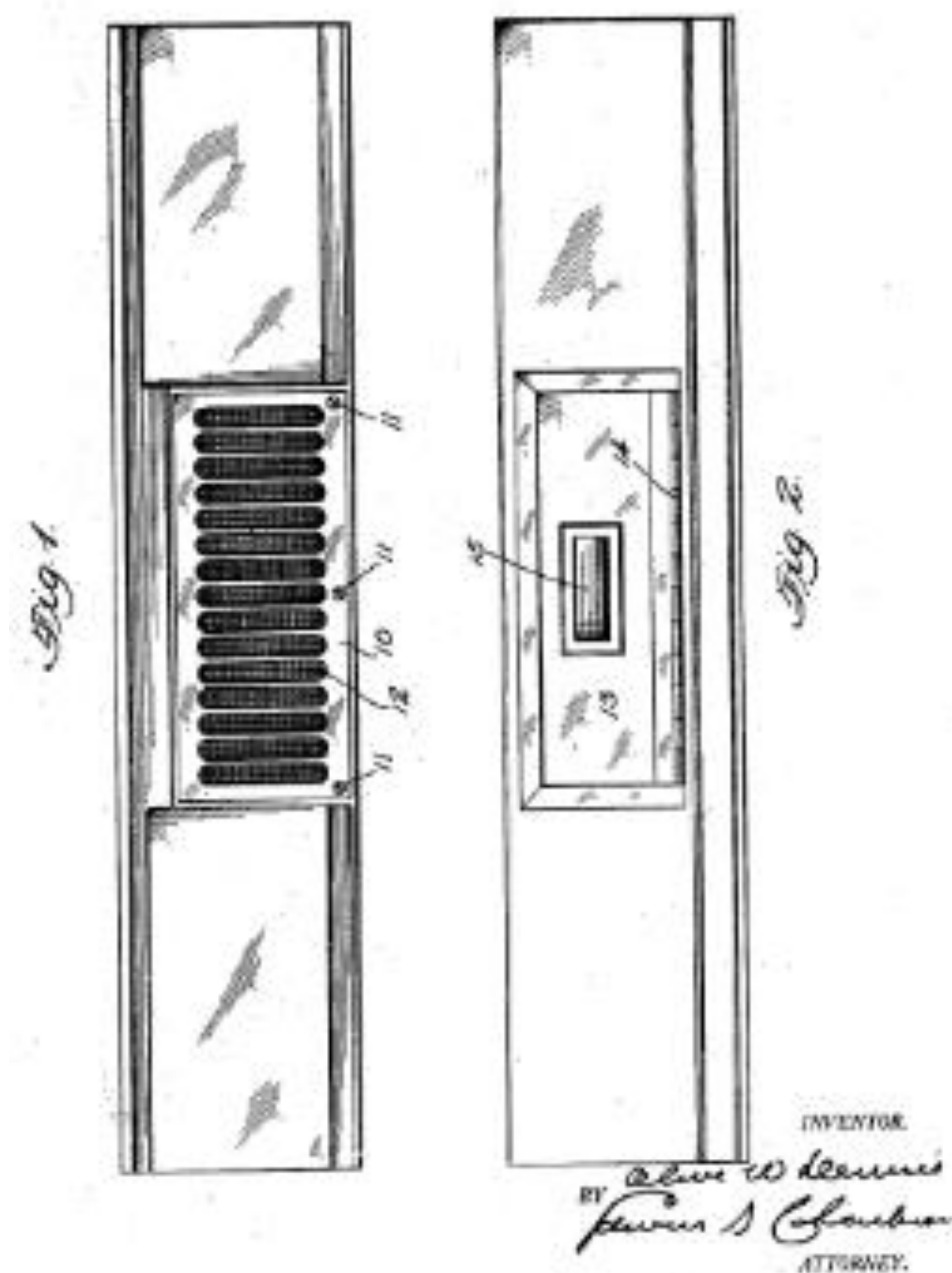


Figure 3. Patent US1693108 “Dennis Ventilator”

Interesting Quotes

- "No matter how successful a business may seem to be, it can gain even greater success if it gives consideration to the woman's viewpoint."
- "I do not claim credit for doing definite things on the railroad," she says. "I only make suggestions."

Works Cited

1. Dennis, Olive Wetzel. (1941). *Current Biography (Bio Ref Bank)*.
2. Dennis, O. (1928). *Ventilator* (US Patent No. 1693108). United States Patent Office.
3. Giaino, C. (2018, April 12). *The 'lady engineer' who took the pain out of the train*. Atlas Obscura. Retrieved February 6, 2023, from <https://www.atlasobscura.com/articles/olive-dennis-train-comfort-engineer>
4. Mundy, R. A., & Rust, D. L. (2018). (rep.). *Women in Railroad Operational Roles*. The Midwest Transportation Center and The U.S. Department of Transportation. Retrieved February 6, 2023, from https://intrans.iastate.edu/app/uploads/2018/12/women_in_railroad_operational_roles_w_cvr.pdf.
5. Global Railway Review. (2019, August 21). *How to promote gender equality in the rail sector*. Retrieved February 6, 2023, from <https://www.globalrailwayreview.com/article/34274/gender-equality-rail/>