

The development by Weston of the first reliable, stable, portable measuring instruments was a seminal contribution to the burgeoning field and use of electricity in the late 19th century. It is very fitting that an IEEE milestone be dedicated to this “event”. Like many entrepreneurs, however the meter company was Edward Weston’s “fourth start-up”. During his illustrious career, many other important contributions to the field and use of Electricity were made. The question that I struggle with is whether a milestone to the meter or a citation to the man is more appropriate. I am hoping that some people will offer their opinions on the matter. I am proceeding with the milestone but am offering the following list of some of his other contributions to be considered with regard to the type of citation that should be pursued.

Briefly, during the course of his Career Weston received over 300 (**Check no.**) patents. In addition to electric meters, he developed sensors of all kinds including the drag speedometer and the photometer. He made major contributions in the fields of Electrical Machine efficiency, Lighting (both arc and incandescent), Electroplating, Electro-refining, electrolytic copper (same thing?), arc furnaces, and established an international standard for the volt, the Weston cell, whose image is enshrined in the seal of the Electro Chemical Society. The most important of these that I’ve come across are listed below

1. Electrical Machines

- a. Improvements to Dynamos: His inventions raised efficiencies from 40-50% up to 80 to 90% making them commercially viable for use in the electroplating industry replacing batteries.
 - i. Armature made from layers of metal with insulator in between to minimize Eddy current losses. Patented 1876 (Every motor or generator used today has laminated cores based on this work)
 - ii. Minimize resistance of windings to minimize resistive losses. Prior to this, it was this assumed (as with batteries) that the windings should be adjusted to provide impedance matched to the load. Patented 1875
 - iii. Invented multi-polar machine – first multi-polar fields patent in July 1876
- b. First Dynamo company in the United States (sold to electroplating industry where he pioneered their use)
- c. First use of an electrically driven motor in a factory in America. This involved a dynamo generating electricity which transmitted the electricity to another location in the plan where it drove a DC motor. This was then installed in a nearby plant and used by the Clark Thread works.

But I should be permitted to point out that the first practical application of electrical power transmission for factory purposes in this country was first utilized in Weston’s factory; the success of this installation induced the Clark Thread Works, also located in Newark, to adopt for some special work this method of power transmission which has now become so universal.

2. Electrical Lighting Contributions

- a. public exhibition of Arc Lighting in the city of Newark.NJ, **the first in the U.S.A in 1877.** (ref Mulhern Letter,)

- b. Lit Brooklyn Bridge with arc lights
 - c. Made many patented improvements in Arc lighting systems and arc lights.
 - d. Increased lifetime of filaments in Edison bulb by factor of 100. Patents licensed by Edison and all manufacturers of incandescent bulbs for approximately for 25 years until replaced by Tungsten. Essential to commercial use of the bulbs
 - i. Process for strengthening weak spots by heating in an organic vapor
 - ii. Process to make films of and to cut uniform filaments of nitrocellulose
 - e. Used a soft metal core for arc light carbons (1878).
 - f. Copper plated the ends of arc light carbons (1878).
 - g. Founded Company that became US Electrical.
3. Electroplating
- a. Improved cathodes for electroplating
 - b. First nickel grain electrodes for plating
 - c. Identified the ability to use simple salts for plating by keeping bath acidic – faster, finer grain, smoother, purer coatings revolutionizing the plating chemistry
 - d. Applied the dynamo to electroplating (1872).
4. Electro-refining Pioneering work in electro-refining of copper, silver and gold. Work was needed to produce sufficient quantities of copper wire for electrical industry.
- a) Dr. Leo Baekland’s speech at the Perkins award medal ceremony stated:
 - His (Westons) careful laboratory observations, harnessed by his keen intellect, established true principles on which economic, industrial, electrolytic-copper refining could be carried out.
 - b) Professor James Douglas, the country’s foremost metallurgical authority at the this time said
 - I suppose that I may claim the merit of making in this country the first electrolytic copper by the ton, but the merit is really due to Weston, who, in this and innumerable other instances has concealed his interested work for his favorite science and pursuits under a thick veil of modesty and generosity.
5. The saturated cadmium cell in 1893.^[3] When the Weston cell became the International Standard for EMF in 1911, and remained the standard for decades. Weston waived his patent rights
6. First Used an electric arc furnace industrially in the United States (claimed by some –still checking references) (1875)
7. First solar energy patent based on his invention of Constantan and Manganin (Key alloys for thermocouples even today. Note: The demonstration of negative thermal coefficient of resistivity in one of these required a new definition of metal. Prior to this, physicists had defined metals as only having positive coefficients.

His awards and honors include:

- 1) Inclusion in national inventors hall of fame as well as NJ state Inventors Hall of fame.
- 2) 1915 **Perkin Medal** for electroplating chemistry. The Perkin Medal is an award given annually by the American section of the Society of Chemical Industry to a scientist residing in America for an

"innovation in applied chemistry resulting in outstanding commercial development." It is considered the highest honor given in the US industrial chemical industry.

- a. Awarded for: Achievements in electrodeposition of metals, electrolytic refining of copper, construction of electric generators and motors, arc and incandescent illumination, electric measuring instruments, and the Weston standard cell
2. Lamme Medal "For his achievements in the development of electrical apparatus, especially in connection with precision measuring instruments.
3. Elliott Cresson medal, the highest award given by the Franklin Institute, in 1910 for "Distinguished work in electrical discovery", as well as the Franklin Medal for "Distinguished services to mankind in the field of electricity".
4. American Electro-Chemistry Society's medal.