



## The Crystal Valve Arrester and Electric Supply Services Company Story

In the first half of the 20<sup>th</sup> century The Electric Supply Services Co. (ESSCo) was a thriving manufacturing enterprise serving the electrical, railroad, and porcelain industry. The product that is of interest to me of course is the Crystal Valve Arrester that was used on distribution medium voltage systems. By the end of the 20<sup>th</sup> century, they were only known to collectors of antiques.

Whatever happened to ESSCo is the question at hand. Was it bought out and its name lost in the history of another company? Did it fail as a business; did it change its name? Read on to learn some of the story.

The main offices and factory of ESSCO were located on the corner of North 17<sup>th</sup> and West Cambria St. in Philadelphia Pa. USA. Only 3 short miles from downtown Philly. My research so far has not revealed the founders or officers of the business. The only person I have been able to associate with this company was John Robert McFarlin a prolific design engineer who patented several arrester associated products for ESSCo from as early as 1918 and as late as 1950. More on John Robert McFarlin later. We know from a superb brochure published by ESSCo in 1935 titled "43 Years" that they proudly produced distribution arresters from 1892 until 1935. Other data suggest they produced arresters into the 1940s (perhaps even into the 50s). The last model of arrester they manufactured was called the Crystal Valve Arrester. It took its name from the fact that the Silicon Carbide (SiC) material used in the arrester was a crystalline in form, and the SiC acted as an electrical valve in its application. The term valve is sometimes used today to describe the action of non-linear elements in arresters.



# ArresterHistory

ArresterWorks.com



Today the name Crystal Valve is only known to collectors of antiques. With the last arrester being produced between 60 and 70 years ago, they would be a rare find on a system today. ESSCo was involved in much more than surge arresters, but from their 1935 brochure it is obvious they were serious in their involvement in the distribution arrester business. They produced AC and DC arresters, they also produced railroad equipment such as electrical and telephone boxes. It appears that they also

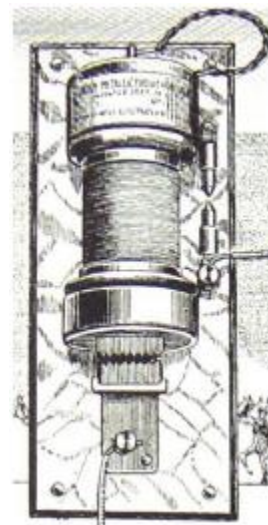
manufactured batteries. One of the more prominent products they produced was Franklin Porcelain which seems to be the product that has lasted the longest and is most well known.

From their brochure, they started producing power system arresters when power systems were born, in the early 1890's. It is obvious that the writer of the brochure was well versed in arrester technology. The purpose of the brochure was stated to help users of arresters understand arresters better. It is also obvious that they were showing off their technical prowess on the subject of lightning protection. By the end of the brochure it is an all out advertisement with encouragement to go out and buy more arresters. Especially the Crystal Valve arrester since it is the best.

Their first arresters were for systems up to 3500 volts and it was simply a gap in series with a coil and a second gap in parallel with the coil. They components were mounted on porcelain or wood. This was a very typical arrester design of those days, and patented heavily by GE and Westinghouse. The brochure takes the reader up through the years with comments about each new arrester design.

In 1902, 1906 and 1909 the designs used similar components with improved characteristics. By 1906 they had arrester ratings up to 20,000 volts and were able to handle more fault current during a discharge event.

In 1916 ESSCo introduced a new arrester using the more modern expulsion type arrester design. In addition to the series gap and resistor, this "Keystone Expulsion Type Arrester" used an expulsion tube that blasted gas out the end during the follow current portion of the lightning discharge event. This blast of gas was in such a way that it helped terminate the discharge event. This Keystone Expulsion arrester was also completely self contained and did not need regular inspection. Just a note on the term keystone that appear throughout the brochure. Pennsylvania is the Keystone State, and the keystone has been the state symbol for many years. It is interesting to see the patriotism and ownership of the keystone symbol in this company.



1902



The author of the brochure also mentions that by 1916 it had become or was becoming popular to mount lightning arresters directly on every transformer for improved protection. This is still the accepted application method for arresters and transformers in lightning prone areas of the world.

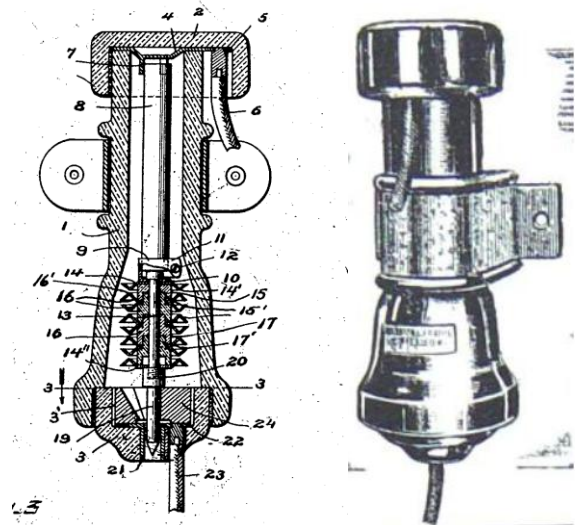
An engineer by the name of John Robert McFarlin appears

on the scene ca. 1917 with his first patent application that issued in 1918 (1,278,683) and was assigned to the ESSCo a Philadelphia corporation. This patent was for the design of the Keystone Expulsion Type Arrester. He was the sole patent producer for the company with at least 18 patents related to arresters up until 1950. In the 30's he and an engineer from the Carborundum Co in Niagara Falls NY developed improved silicon carbide formulations that lowered discharge voltage of arresters. It would seem that Mr. McFarlin was the primary engineer for the Electric Supply Services Co. through the years.

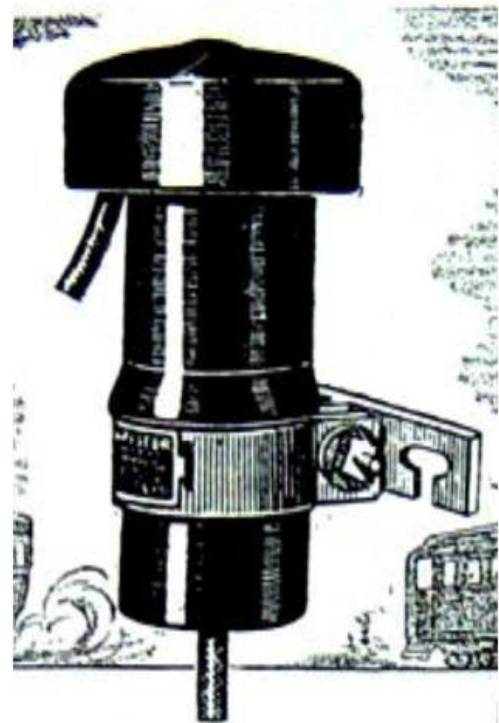
By 1926 a new type of arrester was introduced by ESSCo that utilized the newly discovered capabilities of the highly refractory crystals of the carbon group. The Crystal Valve Arrester line was born. John Robert McFarlin again was the inventor.

The brochure "43 Years" takes the reader through the history of ESSCo up until 1935 where it ends with a strong sales pitch to buy the Crystal Valve arrester because it represents such high quality. There is a promise that this brochure was just the beginning of several that would help arrester users better understand the products they were using.

From the US patent database, John Robert McFarlin was active in the arrester business from 1916 to 1944. He filed his last patent in 1944 but it was not issued until 1951.



**1916 Keystone Expulsion Type Arrester**



**1926 Crystal Valve Arrester**

# ArresterHistory

ArresterWorks.com

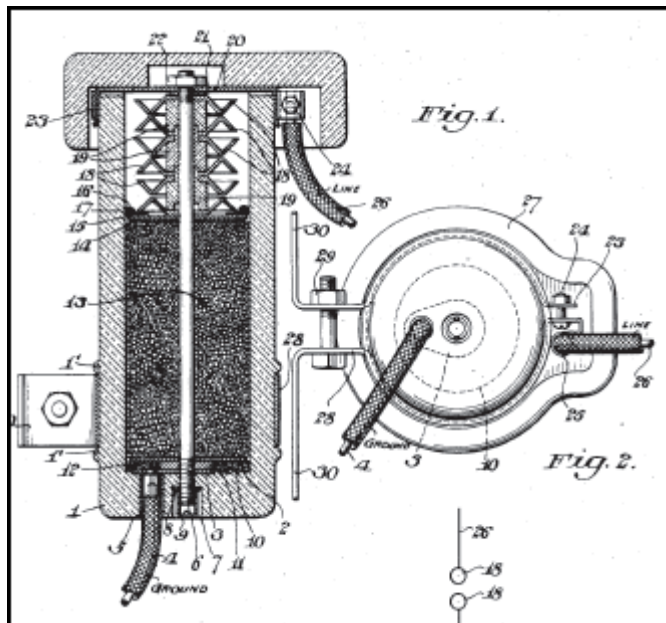


One has to wonder what became of both John Robert McFarlin and ESSCo. I have been unable to turn up any other information on them after the 1951 patent issuance.

From the long list of patents and many years of service, I believe, that John Robert McFarlin was also the author of "43 Years". With more than 30 years in the arrester business and with 18 patents covering two generations of arrester designs John Roberts had a had a very notable career in the surge arrester industry.

Other John Robert McFarlin patents were:

- 1918 1,276,783 Expulsion Arrester (Keystone Expulsion Type Arrester)
- 1918 1,277,095 Expulsion Arrester
- 1928 1,687,254 Multi-Gap Arrester (Filed Jan 1922)
- 1929 1,723,290 Latching Mechanism for electrical switch
- 1930 1,763,667 Crystal Valve Arrester (filed 1926)
- 1931 1,788,437 Lightning arrester and method of making same (Filed 1924)
- 1932 1,873,450 Lightning arrester and method of making same (Filed 1926)
- 1932 1,873,499 Pre Expulsion Arrester Design Patent (Filed in 1923 prior to crystal valve technology)
- 1933 1,911,380 Arrester Bracket (Filed 1929)
- 1933 1,923,943 Lightning Arrester (Filed 1931)
- 1933 1,935,810 Crystal Valve Type SiC Arrester
- 1935 2,012,689 Device for and Method of Protecting Arresters and the like from Moisture
- 1939 2,150,167 Improved SiC Formulation with Otis Hutchins (Niagara Falls)
- 1940 2,192,773 SiC Arrester with gaps (filed 1935)
- 1942 2,311,852 Arrester Top and Bottom Terminals (filed 1935)
- 1948 2,453,719 Externally gapped arrester called an excessive voltage discharge device. (Filed 1942)
- 1950 2,504,438 Circuit Interrupter (Disconnecter for an arrester) (filed 1942)
- 1951 2,559,024 Arrester Disconnecter (Filed 1944)



1930 Crystal Valve Arrester Patent

## End Notes

I am disappointed that I cannot uncover any more information on John Robert McFarlin or the Electric Supply Services Co; however my plan is to continue the quest. If any one knows more about this subject, please let me know.

Jonathan Woodworth  
April 30, 2008