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**Early History of Electrical Engineering in Korea:
Edison and First Electric Lighting in the Kingdom of Korea**

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1. Reception of Knowledge on the Electricity in 19C Korea

Among the Western science and technology introduced since the opening of ports in 1876, electrical matters was recognized as a symbol of “enlightenment” and “self-strengthening” of the nation to the King Gojong (re.1864-1907) and his reform-minded coterie. Electrical knowledge was known to Korean society directly or indirectly through Japan and China. There were several ways of introduction and reception of the new knowledge on the electricity:

1) Through the books; Theory of Electricity in the *New Encyclopedia* (translated into Chinese in 1854 in Shanghai) written by Benjamin Hobson (1810-1873) (Fig. 1), *Introduction to Science and Technology* written by William Martin (1827-1916) which was translated into Chinese in 1866, and *The Chinese Scientific Magazine* published from 1872 in Beijing and later 1876 in Shanghai.



Fig. 1

2) Special Envoy and Courtier’s (or Gentlemen’s) Observation Mission dispatched to Japan in 1880s for inspecting a wide range of Meiji Japan’s modernized schools, institutions, and industrial facilities. Several members of the mission might have a chance to see the electric lighting in the street of Yokosuka and Tokyo and they were very interested in the electricity and telegraph. At the same time a group of students and artisans were sent to study modern weapon’s manufacturing and military applications of the basic science and technology at the schools and factories in Tianjin, China. Among the students, Woon Sang and Joon Ahn studied electricity and electrical communication. After coming back from China, they devoted to the establishment of first telecommunication facilities in 1885.

3) Also the first modern newspaper *Hansong Soonbo* (*Ten-day Report Seoul*) (Fig. 2 Left)

introduced and propagated new knowledge on the electro-technology through their special columns (Fig. 2, Right).

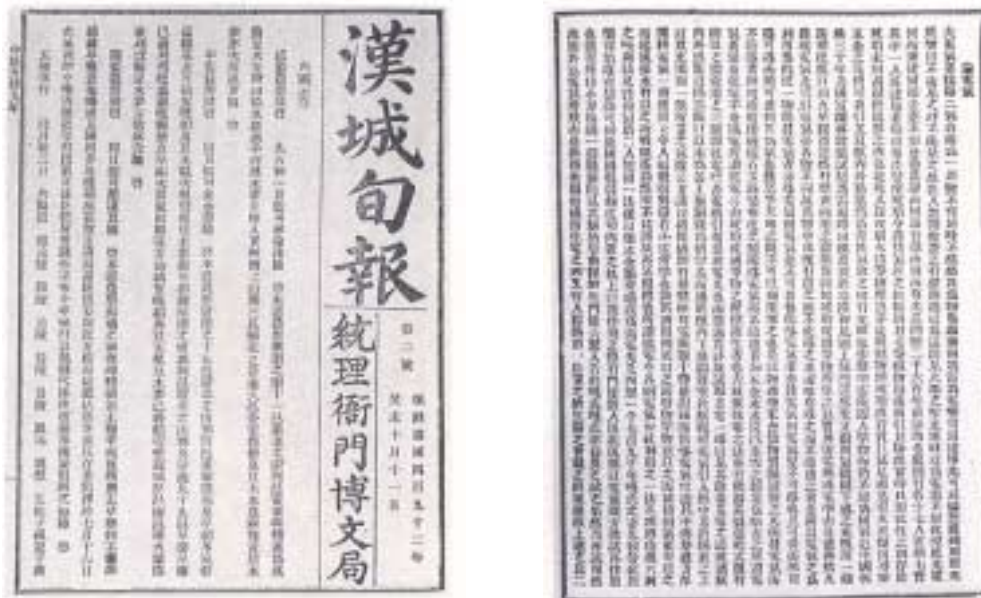


Fig. 2

After the conclusion of the “Corean-American Treaty of Peace, Amity, Commerce and Navigation” signed at Jemulpo (now Incheon) on May 22, 1882, Lucius H. Foote was assigned as the first American Minister to Korea and opened American legation in Seoul on May 1883. According to Foote’s recommendations on dispatching the special mission to America responding to the exchange of mission between two countries, an eight-man (later three men including Percival Lowell added for interpretation) Diplomatic Special Mission was dispatched to the United States in the Summer of 1883 leading by Chief Envoy Yong-ik Min and Deputy Envoy Yong-sik Hong. General aim of the mission was to obtain the American advisers, teachers, and loans in addition to cementing Korean-American ties and friendship (Fig. 3).



Fig. 3

The mission arrived in New York on September 18, 1883 via San Francisco, met President Chester A. Arthur in a New York hotel for submitting King's letter and diplomatic credentials, and embarked on inspection tour of modern facilities in major cities of New England including Boston and Lowell. It was the beginning of interactions in science and technology between Korea and America. They visited the two industrial fairs then in progress in Boston: the Foreign Exhibition and the American Exposition (Fig. 4). Korea had a few objects of porcelain and china and it was the first Korean participation in an international fair. Kil-Jun You (1856-1914), another attaché of the mission, strongly expressed his desire to introduce electrical equipments and facilities to Korea and remained in the U.S. when the others left the country for Korea. He enrolled as a student at the Governor Dummer Academy in Massachusetts- the first Korean to study in the U.S. Later several members of the mission including Mr.You became champions of reform and leaders of the Enlightenment movement in Korea.

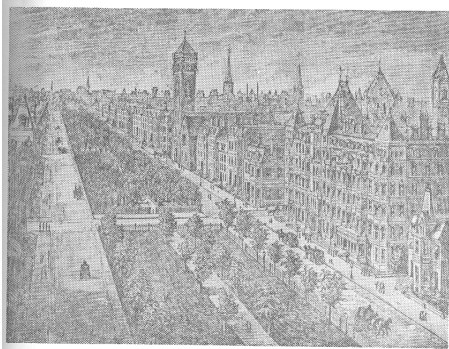


Fig. 4. L: Commonwealth Avenue around 1883. R: Catalogue of foreign exhibition
2. Edison and the Electric Lighting of Kyongbok Palace

It was just one year after Thomas Edison's Pearl Street Central Power Station began first commercial electric lighting service from September 4, 1882. The mission saw the incandescent lighting and generating facilities in the Hotel Vendome in Boston where they stayed and also in equitable building and Navy Ship Trent. The mission's visit to the Boston area may well be regarded as the first significant event in the history of scientific and technological interactions between Korea and the U.S. During their stay in New York, many enterprisers and traders who were interested in the trade with Korea visited the mission. Among them Everett Frazer who was trading with Japan and China earlier visited the mission and guided several manufacturing companies and textile factories. Thanks to his hospitality, Chief Envoy Min asked Korean government assigning him to be Honorary Korean Consul in New York on January 14, 1884 because there was no formal diplomatic consulate yet in Washington. After Frazer contributed so much on the introduction and operation of the electric lighting equipments and facilities to Korea, he sent the following message of telegram (Fig. 5 Left) to Minister Foote (Fig. 5 Right) on April 16, 1884 and asked him applying exclusive right on the electric lighting and telegraph project to Korean government:

Edison requests exclusive concession Electric Light Telephone Corea

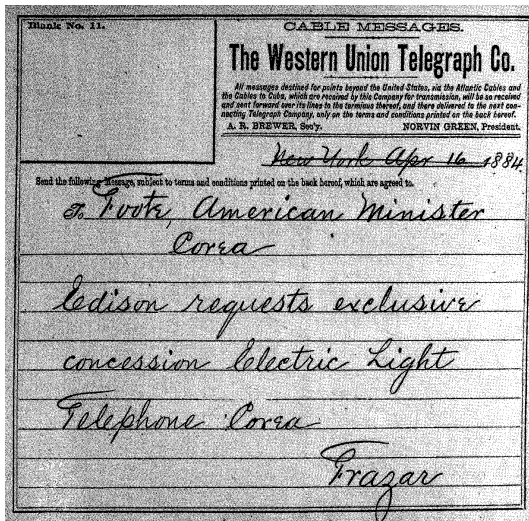


Fig. 5

After return to Korea, the mission reported to the king about the introducing the electric power plant and installations promoting the reform and enlightenment, and finally the king ordered electric lighting facilities for *Kyongbok Palace* to Edison Lamp Company on September 4, 1884. Upon receiving the order from Korea, Edison assigned Frazer to the General Agent in his electric lighting project in Korea on June 4, 1885 (Fig. 6).

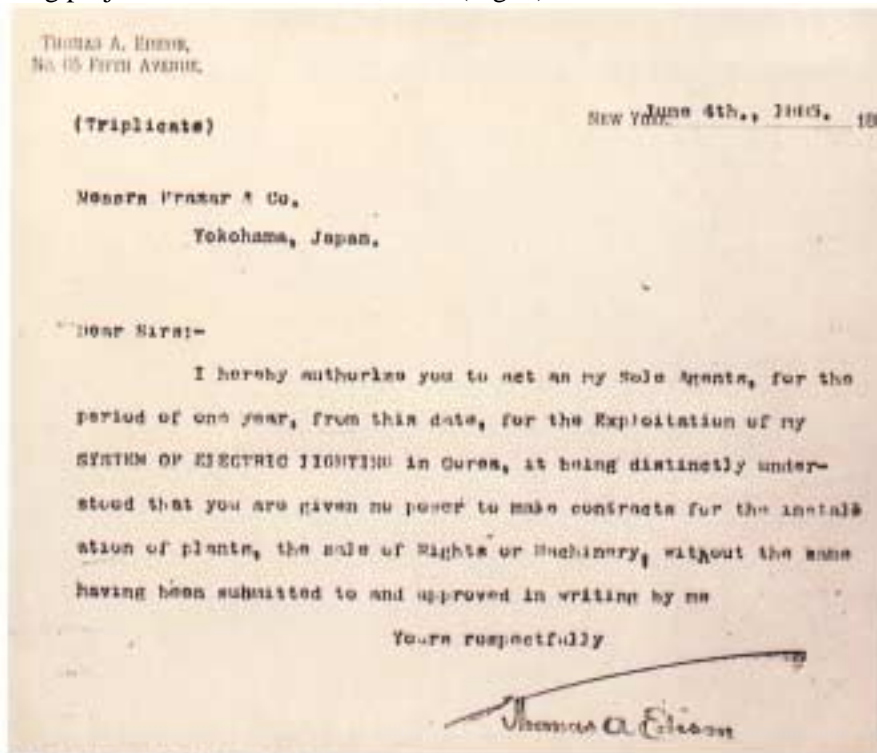


Fig. 6

Morse, Townsend & Co. and Frazer became in charge of trading Edison's facilities to Korea. In spite of the ill-starred Coup of December 4, 1884 which delayed the progress of the lighting project, most of the equipments and installations were arrived at Inchon on December of 1886 with newly recruited electrical engineer William McKay (at that time Korean called an electrical engineer as *Electric Lighting Teacher*) from U.S. As soon as he arrived in Seoul on December 1886, McKay started to build the generating facilities housing the power plant facilities (they

called it *Electric Machinery House* and later changed to *Electric Lighting House*) near *Hyangwon Pond* and *Chuihyang Bridge* (Fig.7 Right) in the *Kyongbok Palace* (Fig.7 Left) in convenience of supplying water for generation and an appropriate place for local distributions.



Fig. 7

According to Horace Allen's *Report on Electrical Matters in Korea* on October 26, 1893, whole generators capable of lighting 750 light-bulb of 16 candle-power which we can presume the generators used were three 7 kilowatts (kW) Edison dynamo coupled with an engine operated by coal-fired boiler. Total price of the installations was \$ 24,525 (current \$ was Mexican dollar used within port areas) except transportation fee between Nagasaki and Inchon. There is no formal record on the date of first light, according to Allen (Fig. 10, Left-down-leftmost) Paper of November 13, 1906: *The first electric light was installed in 1886 because of the habit of conducting palace business at night...*

By referring contemporary newspapers and several resources we can infer the date was March 6, 1887 (Fig. 8).



Fig. 8. Diary of Royal Affairs (Left) and *Tokyo Daily News* (Right)

It was 2 years and six months after the ordering the facilities to Edison and 7 years and five months after the invention of practical incandescent lamp by Edison. After the successful lighting, electrical engineer McKay was killed by accident of manipulating his pistol by his assistant on March 8, 1887 and the operation was stopped until September 1, 1887 waiting for calling to express McKay's condolences and waiting for inviting two new electric lighting teachers; Febigar and Forsyth from England.

3. Second Lighting Power House for the Lighting of Changdok Palace

Electric lighting systems of the *Kyongbok Palace* was advanced by two years than the Mikado Palace of Tokyo and Forbidden City of Beijing. The facility was most advanced one in the Orient and it was a model plant of Edison's future business of lighting the Japanese and Chinese palaces. According to the letter of Francis Upton sent to Edison on April 18, 1887, they shall lose \$2,000 on Korean project and death of McKay will make hard in selling facilities to Korea as well as Japan and China. Edison supplied his first class facilities to Korea and Japan for future business in China (Fig. 9, Right, Edison National Historic Site).

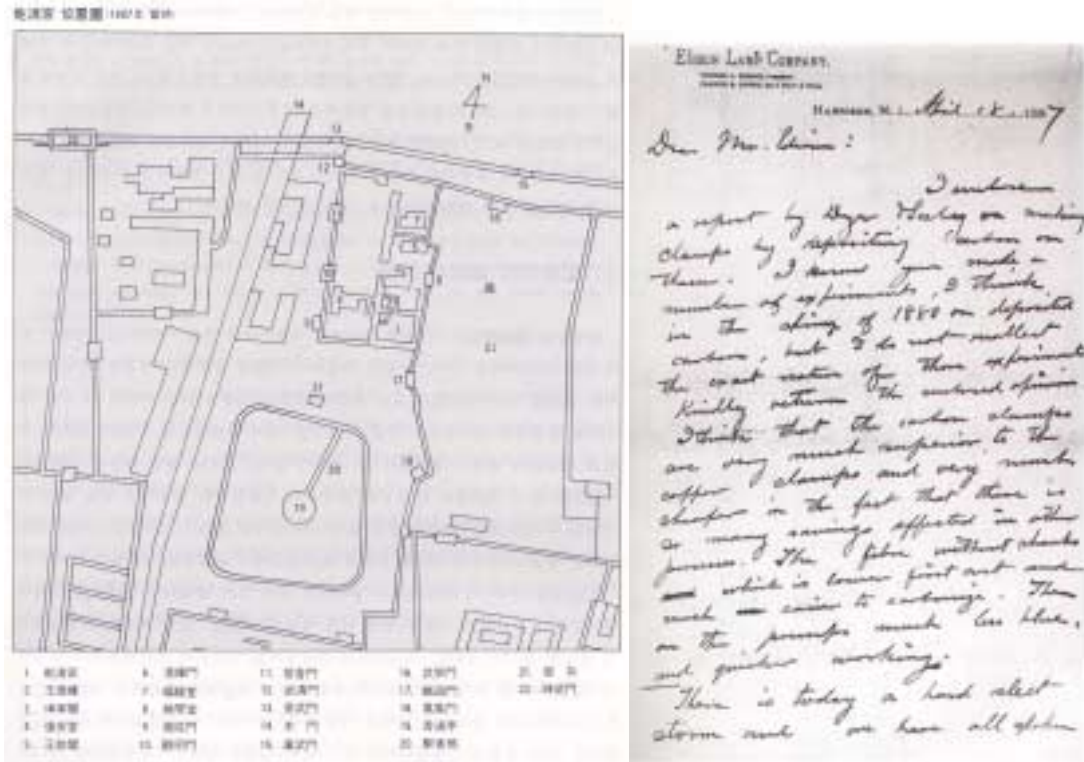


Fig. 9

Edison might think place like royal palace was best show place to promote telephone and electric light. We can see the example in Alexander Bell's telephone business in Victorian Court earlier. In Korean side, the King Gojong believed the new Western technology such as electricity, telephone, streetcar, gold mining, and railroad will make the nation wealthy and strong, and tried to install modern facilities in the capital city of Seoul. King Gojong believed his reform projects were able to initiate with American assistance including the Royal Academy in 1886 and gave his concrete credentials to American Minister Foote. In 1891 Korean government decided to change obsolete old facilities of *Kyongbok Palace* and construct second powerhouse to electrify the *Changdok Palace* by the king's order (Fig.10).

In this time Workshop Office of the Department of Interior initiated the electric lighting facility contraction through the minister to America Chae-yon Yi and American Trading Company. Charles W. Powers who was electrical engineer in *Kyongbok Palace* was in charge of selecting equipment makers and dealers, and he was involved in most of construction and installing projects. New Lighting Power House was completed on May 30, 1894 on the eastern area of *Kyongbok Palace* (Fig. 9, Left) and total cost was reached to \$47,000. Powers said to Allen it was an advanced and economic system with simplicity and long durance. Summary of the facilities was as follows;

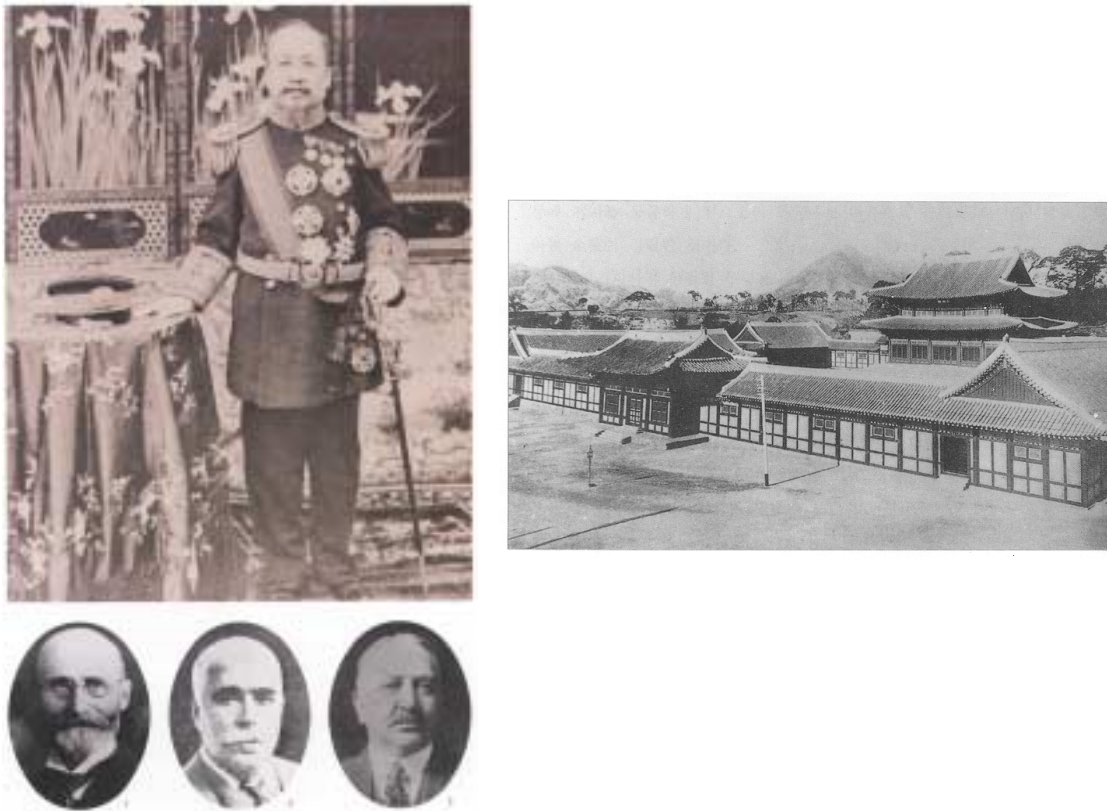


Fig. 10

- 1) Boiler: Three 80 horsepower tubular type could be operated series and/or parallel fashion. Chimney: height 90 feet and 3 feet diameter steel assembly type. Maker: Thos. C. Bassnor in Baltimore, Maryland
- 2) Engine: Two Straight Lines type high-speed horizontal engine could be connected with generator though two driving pulley. Maker: Syracuse Engine Works of Syracuse, New York.
- 3) Generator: Four 125volts DC generator could supply 250 Amperes capable of lit 500 light bulb of 16 candle power. The generator could be connected series and/or parallel fashion. Maker: United States Electric Lighting Company in New York.
- 4) Distribution Panel: 8 feet high, 10 feet wide distribution panel made by Westinghouse Manufacturing and Electric Company in Pittsburgh, Pennsylvania.

After the successful lighting, engineer Powers quit his job until July 20, 1894 salaried 200 dollars with some premiums.

Opening of new powerhouse was relayed to the establishment of first electricity firm Seoul Electric Company invested solely by King Gojong to promote modern industries in 1898 (Fig. 10, Left above). The company was commissioned providing streetcar service and electric lighting in Seoul and made contraction of the construction of streetcar with Collbran and Bostwick Company on February 15, 1898 (Fig. 10, Left down).

(Figures and Photos except 4 are referenced from < *One-Hundred Years of Electro-Technology in Korea*>, published by Korean Electric Power Co., 1989, and figure 4 are referenced from the *Journal of the Korean History of Science Society*, Vol.4, No.1, pp.21-25, 1982)

References

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2. Chong Wha Pyun, "The Visit of the Korean Mission to Boston in 1883 and the Beginning of Scientific and Technological Interactions between Korea and the United States (Korean with English Abstract and Summaries)." Han'kuk Kwhaks-sa Hakhoe-Ji (The Korean History of Science Society), Vol.4, No. 1, pp. 3-25,1982.
3. Yun-hee Kim, "Establishment of the Seoul Electric Company, 1897-1905 (Korean with English Abstract).", *op. cit.*, Vol.19, No.2, pp. 87-121, 1997.
4. Sang-Hui Park, ed. *Fifty Years of the Korean Institute of Electrical Engineers*, Korean Institute of Electrical Engineers (KIEE), 1997.

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Visual presentation materials

1. Scene from contemporary painting (Hyewon Shin, Yun-bok) and modern Seoul.
2. Title of the <*New Encyclopedia*> published in 1854, Shanghai:
Pages of Electricity Theory in the <*New encyclopedia*>
3. Hansong Soonbo(*Ten-Day Report Seoul*) No.2 and page on discussion on the Electricity
4. Korean Diplomatic Special Mission arrived in New York to meet President Arthur Chester. (September 18, 1883)
5. Common wealth Avenue, Boston around 1883.
Hotel Vendome where the mission stayed in Boston.
Catalogue of American Exhibition and foreign Exposition in 1883, the mission made tour.
6. Textile factory in Lowell around 1880.
7. Lucius H. Foote, first American Minister in Seoul, 1883
8. Telegram of Everett Frazar to Foote asking exclusive electric light and telephone projects in Korea, April 16, 1884.
9. Letter of Commission of Thomas Edison assigning Frazar as his Korean Agent, June 4, 1885.
10. Visa Application form of William McKay to the Department of State, September 18, 1886.
11. Edison Dynamo (displayed at Edison Electric Co., New York): same type

- installed in *Kyongbok Palace* in 1886.
12. Official Record of Palace: gate keepers record showing two electrical engineers left the *Kyongbok Palace* around midnight on March 6, 1887. This is a good evidence inferring date of first electric lighting in Korea.
 13. *Hyangwon Pond* in front of the King's Residence *GonchongKung* where the first electric powerhouse and facilities was installed. Arc light and pole shown in front.
 14. *Ocholu*, King' residence where the first electric light were lit.
 15. Map of the *Kyongbok Palace* showing first power house were situated near area 17,18 and 21 and also Second Power House were situated eastern area of the palace.
 16. Contemporary painting celebrating "One-Hundred Years of First Electric Lighting in *Kyongbok Palace* in 1887".
 17. Part of the letter to Thomas Edison written by Francis Upton, general manger of the Edison Lamp Company in Harrison, New Jersey on April 18, 1887. In this letter Upton worried about \$2,000 lose in Korean Project because of death of McKay and delay of Edison's business in Mikado Palace and Beijing Palace.
(Edison National Historic Site, West Orange, N.J.)
 18. *Changdok Palace* where the second electric lighting in 1894
 19. Streetcar runs by Seoul Electric Company in 1896.
 20. King Gojong (re.1864-1907) and Three Americans who devoted early electrifying Korea, U: King Gojng his uniform, L: Dr. Horace G. Allen, C: H. Collbran, R: H.R. Bostwick