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Francois Van Rysselberghe - long-distance telephone pioneer

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Introduction: his early life

Fig. 1: François Van Rysselberghe (1846-1893)

Figure 1: François Van Rysselberghe (1846-1893)

François Van Rysselberghe (1846-1893) was born in Ghent, Belgium as the oldest son of a humble carpenter. Besides François, there were four other sons, which were remarkable in their area of interest:

Julien Van Rysselberghe (1852-1931) was an engineer "des ponts et des chaussées" (government official responsible for bridges and roads) and became in 1891 professor at the science faculty of the Ghent university.

Charles (1850-1920) and Octave Van Rysselberghe (1855-1929) were known as famous architects.

Theo Van Rysselberghe (1862-1926) was at the end of the 19th century a famous painter (he became expert in pointillism in the 1890s). One of his numerous paintings is the children of his older brother François Van Rysselberghe (see Figure 2), which can be seen at the Museum of Fine Arts in his hometown of Ghent, Belgium.

Early achievements

As a young boy Van Rysselberghe attended the college Saint-Barbe, in Ghent, Bel-gium, from which school he was graduated with honours in 1863, at the age of 17. He was the son of a humble carpenter. Although he was a brilliant student, he could not afford to go to the university, so he became a self-made engineer and scientist. He became teacher at the Ostend school of Navigation while he was still a teenager. In 1866 he passed an exam and was nominated professor of nautical astronomy and mathematics at the same school. He was the very best of all candidates. While teaching as a professor in Ostend, he prepared for the exam of "candidate in physical sciences and mathematics" at the university (without attending any courses), and succeeded in 1869.

In the 1870s he became meteorologist at the Royal Observatory of Brussels, and designed several automatic meteorological instruments, such as the "téléméthéorographe". This instrument was capable of doing meteorological measurements at the Belgian coast in Ostend and send the data to the Royal Observatory in Brussels over telegraph lines . A major achievement in the 1870s! At the Paris Electrical Exposition in 1881 he registered with this device at the Hall of Industries the meteorological conditions prevailing at Brussels, at a distance of 340 kilometers. The information was sent in real time over a telegraph line, which was astonishing for his international colleagues.

He came up with an idea of continuously collecting meteorological data from 43

Fig. 2: The children of Van Rysselberghe

sources in Europe and generating "on line" weather maps, but this project stayed in the conception phase.

During his work as a meteorologist he did some experiments in the beginning of 1882 on the telegraph link between the Royal Observatory in Brussels and the measuring station in Ostend. As telephony came up, he thought it would be interesting to have a long distance telephone connection, and he tried to carry telephone signals over the telegraph network, and so we come to the following section of this document.

Telephony around 1880

Telephony was invented by several people, but commercialised after the inventions of Alexander Graham Bell in 1876.

In the beginning of the 1880s, telegraphy networks had already existed in Europe for decades, and were used and controlled by European governments as their communication network. It was installed nationwide, with international links to their neighbouring countries. At that point in time telephony was considered a novelty and not important. It was mostly used for local communication only.

From this perspective a separate telephony network was unnecessary – there was only a limited use of long distance connections. The first telephone lines were, for convenience, usually strung right alongside existing telegraph lines. But the strong electrical pulses in the telegraph wires induced currents in the phone lines and interfered with the transmission. "Induction" or "crosstalk" as we should call it today. But the noise was very annoying for the telephone user, a regular voice conversation was almost impossible.

Mixing telephony with telegraphy

Van Rysselberghe came up with the idea of running both signals (telephony and telegraphy) on the same line. He turned the problem into one of signal retrieval.

He invented circuits to separate telephone and telegraph signals on the same wire. Using a coil of wire, an inductor was formed that could filter the lower Morse frequency from the much higher voice frequency. The inductor blocked the higher voice frequency but allowed the low Morse frequency to pass. Similarly but opposite to the effect of the inductor, a condenser (capacitor) was installed that passed the higher voice frequency but blocked the low Morse frequency. The two separated frequencies were diverted the

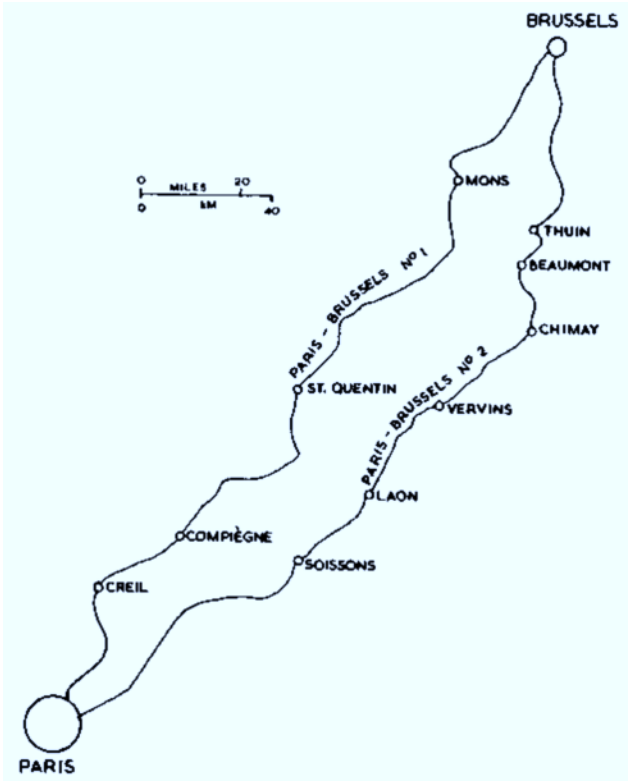

Fig. 3: Brussels-Paris route

respective instruments, either the Morse instrument or the telephone instrument. So now he had means for carrying telephone signals over really long distances over telegraph networks.

Figure 3 shows the test setup of the Van Rysselberghe system between Brussels and Paris (1882)

In 1882 François was appointed professor at the well-known Ghent university and gave courses about electrical applications.

At the same time he conceived the idea of transmitting 12, 18, and up to 24 signals over the same wires. What we call multiplexing today.

After his tests within the Royal Observatory in January 1882 some more tests were done on the Belgian telegraph network, and a few months later a test on a link to Paris gave good results. Also a test over a submarine cable to Dover was also successful.

Business association with Charles Mourlon

Charles Mourlon (1851-1932) was a business man of Brussels mainly active in electro-technical applications. From 1880 until 1889 he worked together with François Van Rysselberghe to commercialize his invention of using the same wires for telegraphy and telephony. Together they sold licences and apparatus for what was called "the Van Rysselberghe system" all over the world.

This invention, patented in 1882 in Belgium and the UK, caused the rapid expansion of the Mourlon works in Brussels. Later on patents were obtained worldwide.

Fig.6 shows commercial phones from Ader, adapted for long distance by Van Rysselberghe used by the Belgian telegraph services.

All adaptions could be done in the telegraph circuitry. On longer distances an enhanced microphone in the telephone, giving a higher level of transmission, and a battery with a low resistance were recommended. Adapted Van Rysselberghe phones were sold when necessary. [See Note 2 about Ader]

International installations

The real importance of van-Rysselberghe's system of simultaneous telephony and telegraphy was that it enabled a long-distance telephone service to be provided at a time when the demand for such service was not really established. It was not therefore thought economic to provide the separate and isolated telephone routes that would otherwise have been needed.

Fig. 5: Charles Mourlon

The Belgian network

Fig. 7 shows the Belgian Long Distance telephone network, superimposed on the telegraph network (1885).

After the successful experiments the Belgian government reconsidered his program to foresee 600 km of new telephone lines, which would cost 3 million Belgian Francs. Finally they choose the cheaper plan of fitting existing telegraph lines with the Van Rysselberghe system of simultaneous telephony and telegraphy at a cost of 150,000 Belgian Francs, only 5 percent of the original cost!

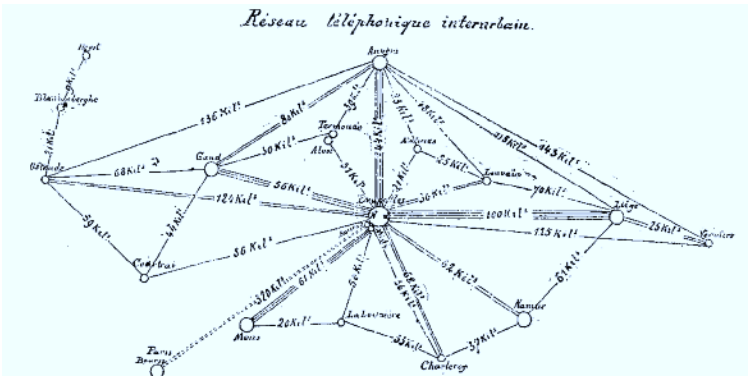

Fig. 7: Belgian Long-distance network (see text)

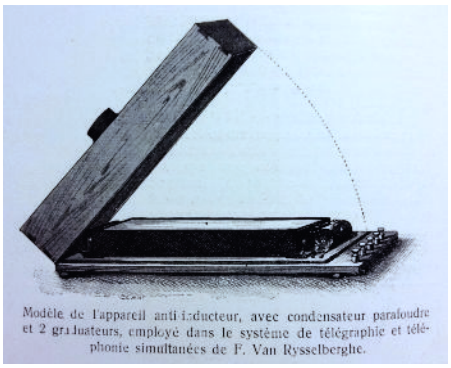

Fig. 4: Unit with 2 anti-induction cir-

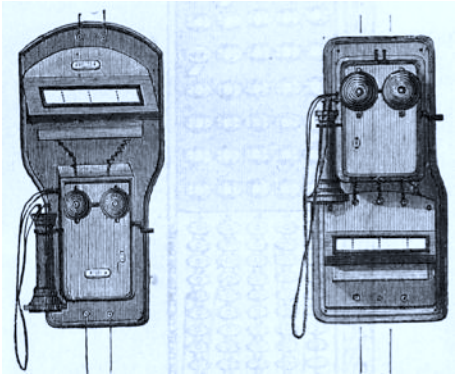

Fig. 6: Adapted phones from Ader

Continued on P 15

Notes

[1] Telegrafverket/Televerket, was a Swedish State authority acting as a state-owned corporation (public enterprise), responsible for telecommunications in Sweden between 1853-1993. Originally it was named Kongl. Elektriska Telegraf-Verket (literally: Royal Electric Telegraph Agency), which was founded in 1853. Its name changed to Kongl. Telegrafverket in 1871, Kungl. Telegrafverket in 1903, the prefix Kungl. (English: Royal) was dropped in 1946 and the name was further modernised to Televerket in 1953. Televerket continued on with its telecommunications monopoly until corporatisation in 1992-1993 when it was renamed Telia, now part of Telia Company. Televerket network, branded Rikstelefon, was supplied with telephones produced by Ericsson.

[2] The word "Allmänna" ("General") gave rise to misunderstandings on several occasions, particularly in French and Spanish-speaking countries where it was confused with Allemagne (Fr) and Alemania (Sp), both meaning "Germany", so that the Company's name was thought to be of German origin. At the suggestion of the board, the LME General Meeting of 7 June 1926 resolved to delete the word "Allmänna" from the first of the Company's articles of association and after this the name of the Company became Telefonaktiebolaget LM Ericsson, abreviated Telefon AB LM Ericsson.

[3] Aktiebolaget means 'limited company', abbreviated AB. (bolag = company)

[4] Early company name changes:
1876 LM Ericsson & Co
1896 AB LM Ericsson & Co (Aktiebolaget LM Ericsson & Company)
1920 Allmänna Telefon AB LM Ericsson
1926 Telefonaktiebolaget LM Ericsson (in short: LM Ericsson Ltd.)

[5] Logos – a selection of Ericsson logos appeared in Part 1 in THJ 105, Winter 2018/19

References

Useful Internet links

[1] http://www.telephonecollecting.org/
[2] Bobs%20phones/Pages/Skeletal/Skeletal.htm
[3] https://www.ericsson.com/en/about-us
[4] www.ericsson.com/history-explorer
[5] https://en.wikipedia.org/wiki/Ericsson
[6] www.telegraphy.eu

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[7] LM Ericsson 100 years - Volume I - THE PIONEERING YEARS - STRUGGLE FOR CONCESSIONS CRISIS; Artur Attman, & Jan Kuuse & Ulf Olsson – 1977
[8] LM Ericsson 100 years - Volume II - RESCUE, RECONSTRUCTION, WORLDWIDE ENTERPRISE; Artur Attman & Ulf Olsson –
[9] LM Ericsson 100 years - Volume III - EVOLUTION OF THE TECHNOLOGY; Christian Jacobæus & collaborators – 1977
[10] TELEGRAFI och TELEFONI - Ivan Bodstedt och Ivan Heiner – 1917
[11] PRISLISTA – AB L.M. Ericsson & Co - 1897
[12] HET INTERNET VAN DE 19-de EEUW – Fons Vanden Berghen – 436 pages – Text in Dutch but with 650 photos!
http://www.telegraphy.eu/pagina/boek/TELEGRAFIE%2025%20APRIL%20Fons.pdf

Acknowledgement

Bill Burns, for revising and correcting my 'Flemish English'. Bill is the leading world authority regarding submarine cables and everything related to this subject. see his http://atlantic-cable.com/

Francois Van Rysselberghe. Continued from P10

The first long-distance telephone network over telegraph lines came commercially in service in Belgium on September 1, 1884.

At the world fair in Antwerp in 1885 there was a demonstration of long distance telephony over Van Rysselberghe circuits sent from a concert hall in Brussels to a hall at the world fair in Antwerp – see Fig. 8. A concert was relayed from an number of microphones of Van Rysselberghe's design in the concert hall, over a Van Rysselberghe's circuit to listeners in Antwerp. 35 people could simultaneously listen to the concert: 1885 "streaming" technology!

Fig. 8: Listeners at world's fair inAntwerp

Listeners were astonished, here a reaction (translated): "Not only were the orchestral pieces reproduced with the greatest clarity, but the violin sole executed by M. Herman, Gounod's *Meditation* could be heard in Antwerp without any detail of execution being missed by the listeners."

A new telephone was designed by Van Rysselberghe intended for use at the telegraph offices and phone booths for long-distance calls. One of the enhancements is the ebonite cylinder above the microphone, so the "sound waves" of the voice are guided to the microphone.

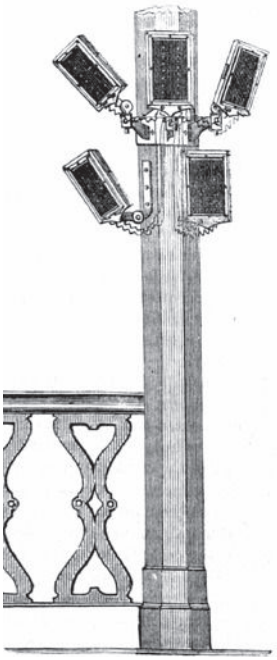


Fig. 10: Concert hall microphone

At the world fair there was also a phone booth where people could make phone calls to all major cities in Belgium, "long-distance calls" were new at that point in time!

One of the first customers to use the link Brussels-Paris also for telephony was the Paris Stock exchange. Seven phone booths were installed at the Paris Stock exchange. The customer had a small desk to make notes during their conversation with people i.e. at the Brussels Stock exchange.

Figure 12 shows an Army Telegraph unit equipped with anti-induction circuit of Van Rysselberghe. This model as was used by the armed forces for simultaneous transmission of telegraphy and telephony over the same wire.

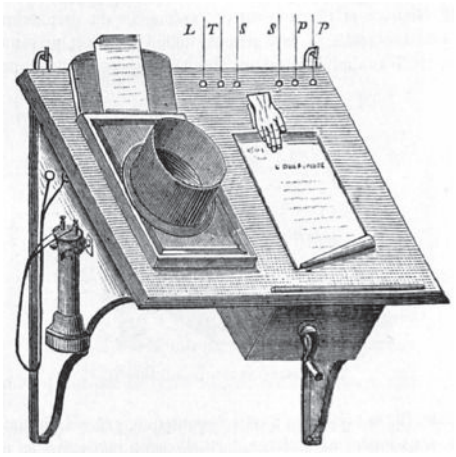


Fig. 11: Phone booth telephone

Expansion worldwide

A new telephone was designed by Van Rysselberghe and assembled at the Mourlon works, with provisions for long distance telephony and soon the Van Rysselberghe system was installed on telegraph networks in the Netherlands, France, Germany, Austria, Switzerland, Spain and Portugal. The total extent of Van Rysselberghe lines in Europe was about 17000 km.

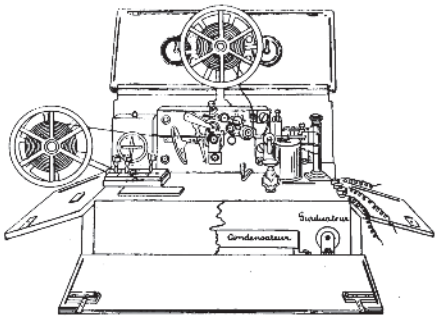
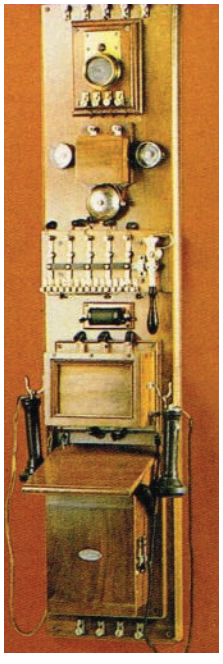


Fig. 12: Army telegraph

In the United Kingdom the responsible persons were wondering if the system should work with the high speed telegraph system used in the UK, but they never performed a test. They came up a couple years later with their own system.

Alongside is Fig.13, a Van Rysselberghe wallphone used in Portugal during the trials on the link Lisbon-Porto, Portugal (1888-89)



In 1889 Mourlon and Van Rysselberghe approached the British and French governments about setting up a cross-channel telephone line. It would be paid for by their company and repaid by a royalty on the voice and telegraph calls made on it. This proposal was turned down by both governments, they did not like not to be in control.

The system was also installed in several South American countries such as Argentina, Brazil, Venezuela and finally also Mexico.

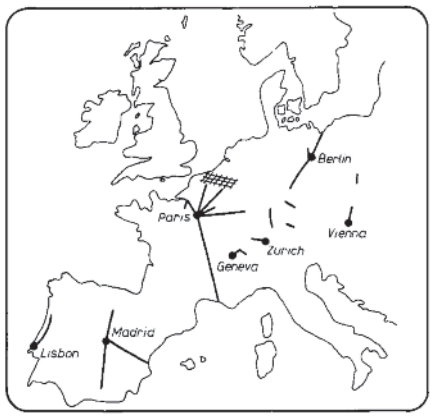


Fig. 14: European use 1890

Tests performed in the USA

Van Rysselberghe went to the US in the winter of 1885-86 and performed some successful test on telegraphic links between Chicago and New York, a distance of 1000 miles! The best results were reached on copper wire of 5 mm. Unfortunately due to local legislation his system could not be installed in the US. The separation of telephony and telegraphy under the Bell system and Western Union Telegraph made exploitation of simultaneous telephony and telegraphy difficult.

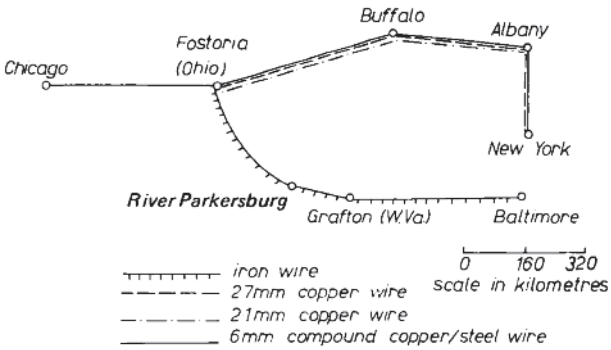
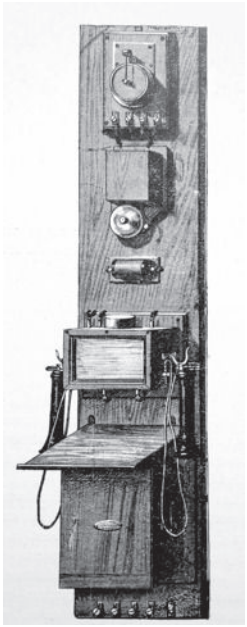


Fig. 15: Route of American experiments (1885-86)

It was not until Pupin's invention of the loading coil many years later that Bell was able to provide true long-distance calls, and by then the Van Rysselberghe's work has been forgotten.

Van Rysselberghe had the opportunity to do measurements on very long distances in the US (i.e. 1000 miles) and came back very enthusiastic: it must be possible to connect all European capitals by the same wires with simultaneous use of telegraphy and telephony!

Alongside is Fig 16: Van Rysselberghe long-distance phone with Dejongh Microphone and Bell receivers, mounted for lines with the Van Rysselberghe system



The phonopore

Mr Langdon-Davies of the UK developed a telephone called the Phonopore used in many cases by railway companies over their telegraph networks.

The Phonopore was a telephone which allowed speech to be sent and received over the same circuit as used for the telegraph. He contained elementary filter circuits which reduced the low frequency telegraph impulses from interfering too much with the telephone receiver.

Fig 17: Phonopore

It is not known if Van Rysselberghe and Langdon-Davies knew each other, but it looks like there is some resemblance in their circuitry.

Railway companies used telegraph networks already for decades to communicate. The phonopore was mainly used by railway companies in the UK and Australia. (Picture from Bob's Old Phones at telephonecollecting.org.)

Later decline of the system

The VanRysselberghe system worked pretty well at a time when the demand for long-distance telephony was rather small. As the traffic grew larger and pole routes carried a higher density of lines, cross talk between telephone circuits would become intolerable, and other solutions had to be found.

The Van Rysselberghe system served its purpose – it accelerated long-distance telephony for a small period of time, but within that timeframe it was successful.

Further inventions

In the early 1890s Van Rysselberghe focused on economic distribution of energy. He developed a system with water under high pressure steering hydro-electric turbines in substations. It was a very revolutionary design, but not efficient. Finally he obtained a licence for the public lighting of the city of Antwerp. Unfortunately he passed away unexpected at the age of 46 while he was still experimenting with this system (most likely due to a stroke at a very young age – perhaps he had hypertension).

Fig. 18 shows an experiment in generating electricity with water pressure in 1892. Pavilion with a dynamo on "Groenplaats", a square in the Antwerp city centre. (Picture from retroscoop.com)

The company called "Compagnie hydro-électrique Anversoise" went broke in 1898, five years after his inventor passed away.

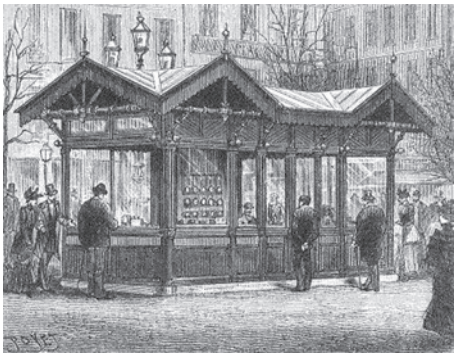


Fig. 18: Hydro-electric demonstration

Van Rysselberghe's gravestone can still be seen at the Antwerp Communal Cemetery "Schoonselhof".

Notes

[1] The "télémétéorographe" was capable of logging six meteorological parameters: air temperature, air humidity, rain- or snowfall, wind direction, air pressure and air speed.

[2] Clément Ader (April 2, 1841 - May 3, 1925) was a French inventor and engineer. Ader was an innovator in a number of electrical and mechanical engineering fields. He originally studied electrical engineering, and in 1878 improved on the telephone invented by Alexander Graham Bell. After this he established the telephone network in Paris in 1880. In 1881, he invented the théâtrophone, a system of telephonic transmission where listeners received a separate channel for each ear, enabling stereophonic perception of the actors on a set; it was this invention which gave the first stereo transmission of opera performances, over a distance of 2 miles. (See *The King listens in – in 1906* on P6) Ader is still admired for his early powered flight efforts, and his aircraft gave the French language the word "avion" for a heavier-than-air aircraft. In 1938, France issued a postage stamp honouring him. Airbus named one of its aircraft assembly sites in Toulouse after him. Clément Ader has been referred to as 'the father of aviation'.
[source: https://www.sciencesource.com]

Fig. 19: Gravestone 1893

[3] In 1884 several tests were performed. One particular concert was sent from Brussels to the royal cottage in Ostend, since the queen seemed to be interested in the new technology… and music!

References

Jan quotes far more references than we have space for here. Please contact him or the Journal editor for the full list.

Restoring two Telegrafverket phones - update

A three-part article on the restoration of two Norwegian telephones appeared in THJs 96, 97 & 99 (Autumn 2016, Winter 2016/17 and Summer 2017), along with a corrigendum in THJ 98, Spring 2017. Due to its length, the article had to be shortened even when published in segments. A postscript to the third part notified readers that an unabridged, electronic version was in preparation and would soon be available. While the task took much longer than expected, Aspi Balsara's full account of the restoration can now be viewed at:
https://tinyurl.com/Elektrisk-Bureau.

If you don't like tiny URLs and have a lot of patience in typing, the direct route is:
https://drive.google.com/open?id=19TJtsNBDJz1ezP1DkRJ9fVi7UB5ci0v5