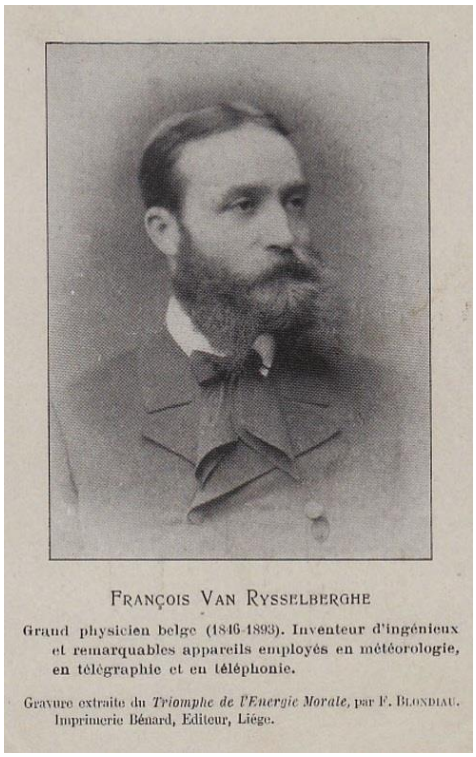
François VAN RYSSELBERGHE

(1846-1893)



FRANÇOIS VAN RYSSELBERGHE

Grand physicien belge (1846-1893). Inventeur d'ingénieux et remarquables appareils employés en météorologie, en télégraphie et en téléphonie.

Gravure extraite du *Triomphe de l'Energie Morale*, par F. BLONDIAU. Imprimerie Bénard, Editeur, Liége.

INTRODUCTION

The name Van Rysselberghe will not ring a bell with most collectors. Nevertheless, this man has made an extremely important invention and one that has remained invisible to the telegraph users of the time and to the present collectors. Indeed, his most important invention allowed the simultaneous use of telegraph lines for both telegraphy and telephony. The result was a large cost saving for the network builders and an enormous lever for the expansion of telephone traffic over great distances.

The reason I have included him in this book is because he is a Belgian inventor who is almost unknown and I think his name should be remembered. (but I will keep this chapter short…).

1. His life

Francois Van Rysselberghe was born in Ghent (B) in 1846. One of his brothers, Theo, was a gifted painter who is still well known and appreciated today.
In 1865, when he was still a teenager, Francois became a professor in the Ostend School of Navigation. He was a self-educated man, and without attending any courses, he graduated at the Ghent university in 1869 as a 'candidate in physical sciences and mathematics'.

In 1875 he became a meteorologist at the Royal Observatory of Brussels where he designed several automatic meteorological instruments like his Telemareograph and his Telemeteograph. He was awarded a gold medal at the 1875 'Congress of Geography of Paris' for the telemeteograph and another in 1881 at the Paris 'Electricity Exhibition for his telemareograph.
His "téléméthéorographe" was capable of making meteorological measurements (temperature, humidity, wind speed, wind direction, air pressure, sunshine..). The data registered in Ostend (Belgian coast) were sent via an electromagnetic recorder to the Royal Observatory in Brussels over a telegraph line. In doing so he was assessing if it was possible to make telephone calls and sending telegraph messages over the same line.

We have to consider that at that time telephone lines quite often ran alongside existing telegraph lines, the consequence being that the strong electrical pulses in the telegraph wires induced currents in the phone lines and interfered with the transmission (today we call this typical induction phenomenon "crosstalk"). This interference was not acceptable, so François began to work on a solution to his problem which he could then test over the Ostend to Brussels line (ca. 125km).

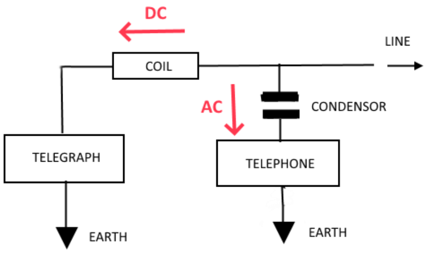
On the 16th January 1882 he successfully ran tests on a link between the railway stations of Brussels-Nord and Antwerp-East and, again, on 28th February between The Royal Observatory in Brussels and the meteorological station in Ostend. On the 16th May he obtained excellent results between Brussels and Paris (335 km). Later he made successful tests over the submarine cable between Ostend and Dover
During 1882 he was appointed as a part-time professor at the University of Ghent and was in charge of the subject 'Applications of electricity', he retained that position until his death.
In that same year he left the Royal Observatory, after donating his Van Rysselberghe System to the Belgian State, and moved more resolutely towards telecommunications.
In 1884 he was appointed as 'electrician-consultant' to the Ministry of Railways, Posts and Telegraphs in recognition of his work. In that year his apparatus was ripe for commercialisation and he continued working in close relationship on this project with the Belgian engineer and manufacturer Charles Mourlon (1851-1932).

His solution was soon widely accepted in many countries. Reference [3 > 1886] describes his activities in countries such as the Netherlands, Switzerland, Portugal, Spain, France, Italy and Germany. He also relates the strong interest of several countries in South America (including his tests in Argentina).

In his report from 1886 (reference [4]) he gives a lot of details about the very many successful tests that he made himself in the United States of America in the Winter of 1885-1886, but due to local legislation his system was never 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. Tests were never done in the UK; there the Post Office came up with their own system a few years later.

In the early 1890's he focused on other matters, for example the economic distribution of energy.
In 1881 he was appointed Officer of the Legion of Honour and in 1884 Knight of the Order of Leopold II.
He died in Antwerp on 3 February 1893 at the young age of 46.

2. His invention



Principle

Given their diverse nature (telegraphy being 'digital' direct current pulses and telephony 'analogue' alternating waveforms) this often caused problems. Trying to run both telegraphy and telephony lines attached to the same poles gave rise to the problem of interference (or crosstalk) with transmission due to induction of the telegraph signals on the telephone conversations. The influence of the strong Direct Current pulses used by telegraphy on the weak Alternating Current signals on the telephone lines was the reason for the problem. Van Rysselberghe introduced ‘filters’ to combat this by putting in a capacitor (condenser) to pass the Alternating Current to the telephone and an electromagnetic inductor (a coil with an iron core) for the telegraph.
In addition, the coil has the effect of ‘smoothing’ a pulse, and results in much less cross-talk.
Although the basic principle is very simple, he had to surmount many difficulties and to work out rather complex configurations.

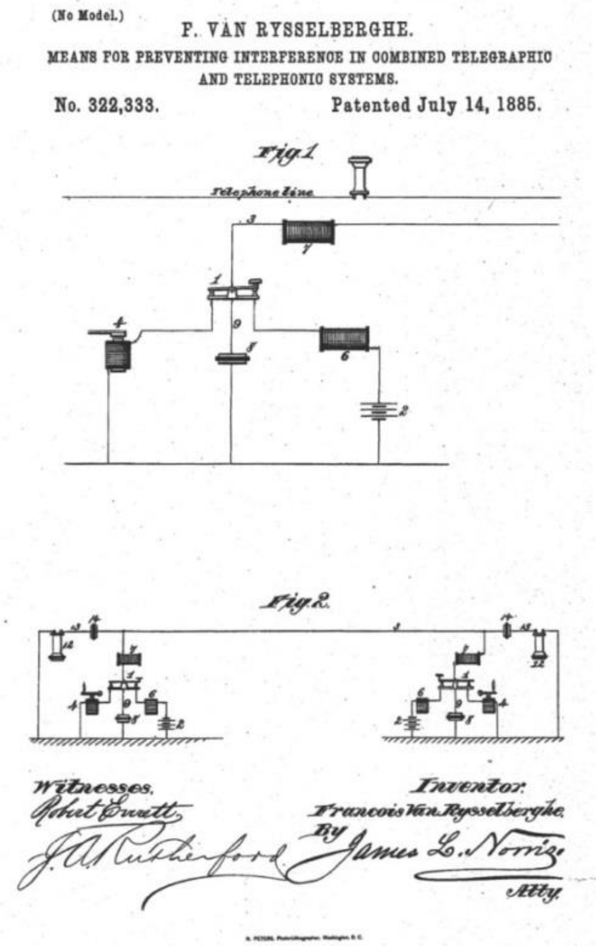
He also went on to devise adaptations that could reduce the induction effect into the existing telephones of that time. and collaborated with the French telephone manufacturer ADER.

In 1883 he worked on an ‘harmonic multiplexer’, a system that allowed simultaneously sending of up to 24 telegraph messages over a single wire. Although other inventors were active in this domain, and I am pretty sure that his model, demonstrated in his laboratory, has never been commercialised.

3. Some patents

* His first Belgian patents date from 20 February. 11 May and 17 May 1882; they contain the principles of the invention. The general patent, containing all the details, is from 16 November 1883

* His USA patent 322,333 “Means For Preventing Interference In Combined Telegraphic And Telephonic Systems” was issued on 14 July 1885 (see the front page hereunder).



Other US patents

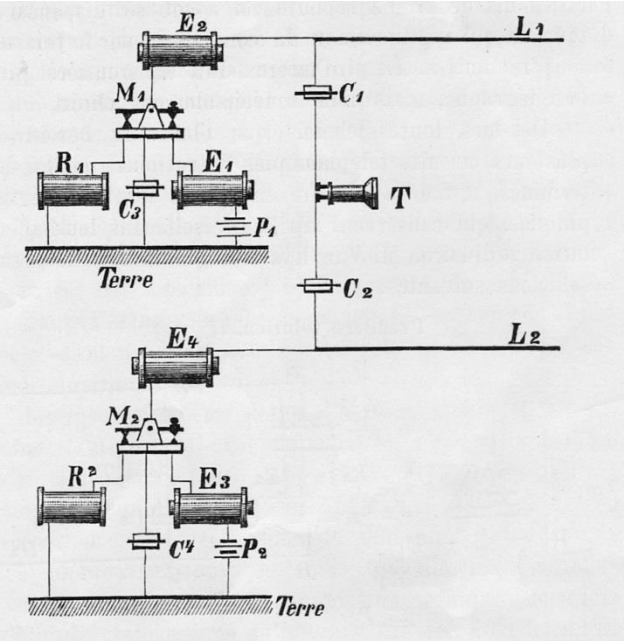
-360,492: Systems of electrical distribution
-361,734: Telegraphy
-363,188: Telegraphy
-370,575: Electric speed regulator for revolving motors
-370,576: Repeater for harmonic telegraphy
-370,577: Phono-multiple telegraphy

It might be interesting to read what William Maver, an authority (e.g. member of the American Institute of Electrical Engineers) wrote in his famous book in 1892 [7] 'American Telegraphy' about the simultaneous use of telegraphy and telephony over a single line.

QUOTE
By simultaneous telegraphy and telephony is meant the dual transmission of telegraphic and telephonic signals over the one circuit.
If a telephone "receiver" be placed in an ordinary Morse telegraph circuit, a loud crackling noise, due to the rapid and, comparatively, powerful vibrations of the diaphragm produced by the make and breaks of the telegraph circuit [sending dots and dashes], is heard in the receiver.
It is therefore evident that, before simultaneous telegraphy can be rendered possible, the noises in the receiver, due to the causes stated, must be obviated; otherwise it would be impossible to hear, intelligibly, the telephonic signals. This requirement has been met in several different ways, but, probably, **the most successful is that due to VAN RYSSELBERGHE**, who gets rid of the noises in the telephone by the introduction of apparatus into the circuit which "graduates" the rise and fall of the telegraph currents at the time of make and break of the telegraph circuit. The effect of thus graduating the telegraph currents is to produce in the diaphragm of the telephone receiver a gradual movement, to and from its electromagnet, which movement is not sufficiently rapid to cause an appropriate sound. Upon this gradual vibration, or inflection, of the diaphragm, is superposed the rapid vibrations die ton the vibratory currents originated by the transmitter of the telephone.
UNQUOTE

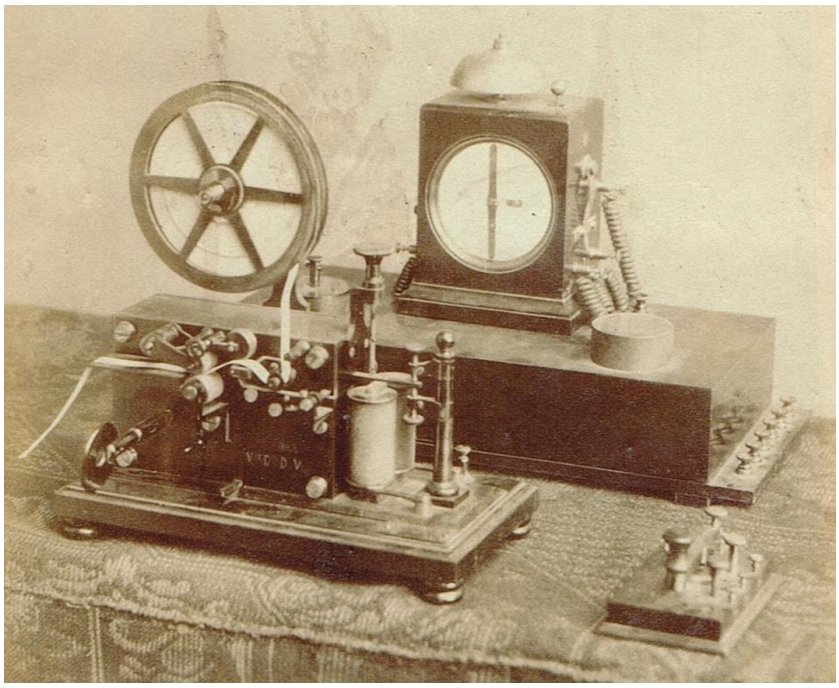
The sudden rise and fall of the beginning and end of each morse dot and dash current element results in a lot of high frequencies (cf. Fourier analysis). This effect can therefore induce disturbances on the telephone lines. To obtain the desired gradual rise and fall of the telegraph current Van Rysselberghe utilizes the retarding and prolonging effects of the self-induction of electromagnets in an electric circuit (he calls these electromagnets "graduateurs").

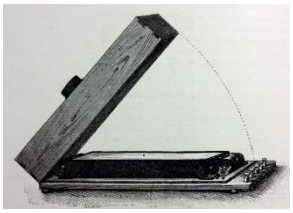
Hereby a principle diagram whereby 2 telegraph wires are shared by two telegraphs and one telephone



- L_1 and L_2 are two telegraph wires
- E_1 … E_4 are electromagnets
- C_1 . C_4 are capacitors
- R_1 and R_2 are telegraphs
- T is a telephone

4. Images





A typical box
containning
anti- induction circuitry

This photo comes out of the book [3] by Charles MOURLON (1885)
It says ‘Belgian telegraph, equipped with anti-induction apparatus
System F. Van Rysselberghe’

His gravestone is located at the Antwerp Communal Cemetery “Schoonselhof”.

BIBLIOGRAPHY

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[3] LA TÉLÉPHONIE A GRANDE DISTANCE-Système F. Van Rysselberghe - Charles MOURLON - 1885 - 3me Ed. - 149p.

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[6] TÉLÉGRAPHIE & TÉLÉPHONIE - J.PIERART - 3me Ed. - 1906 - 375p.

[7] AMERICAN TELEGRAPHY and ENCYCLOPEDIA OF THE TELEGRTAPH - William MAVER Jr.- 1912 -5th. Ed. - 695 p.

[8] FRANÇOIS VAN RYSSELBERGHE - LONG-DISTANCE TELEPHONE PIONEER - Jan VERHELST – the Telecommunications Heritage Journal - Summer 2019

THANK YOU

Jan VERHELST (B): Telephone specialist, writer, keeper of the history of the Belgian ATEA company (telephones and telephone exchanges manufacturer) for the friendly mutual exchange of information about François Van Rysselberghe.

Bob SMALLBONE (UK): For assisting in correcting my 'Flemish English'. Bob worships History's scientists, inventors and entrepreneurs. By day he is an industrial ultrasonic engineer, by night he restores and preserves bygone scientific equipment.

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