Philipp Reis

A vision becomes reality
Philipp Reis, 1860
Philipp Reis - A vision becomes reality

Introduction

175 years ago a man was born, who changed the world with his invention of the telephone like no one else: Philipp Reis. Friedrichsdorf is proud, that this moderate pedagogue spent his half life in the city of the hugenotts and also developed here at 1860 his significant „telephone“.

„I gave the world a great invention, but I have to leave to others to continue!“

Resignation and visionary foresight resonated, when the physicist and teacher Philipp Reis had expressed this sentence just before his death with 40 years at 1874. But Reis himself wasn’t going to suspect that his invention of the telephone – also the term originate from him which has been adopted in all languages of the world - would turn out to a mass medium par excellence.

At life time Philipp Reis neither got the duly acceptance as the inventor of the telephone nor he eraned somehting at it. It lasted years until it was attested that Philipp Reis living in modest circumstances and teaching at the Institute Garnier in Friedrichsdorf was the first man who managed at 1860 to reproduce tones of any kind in any distance using galvanic current.

Philipp Reis was long in Alexander Graham Bell’s shadow. Undisputabely he knew the pioneer work of Philipp Reis. At 1861 Philipp Reis performed his Telefon for he first time in public at the members ot the Physikalische Verein [Physical Association] in Frankfurt.

Unfortunately the desired and scientific acception was denied Philipp Reis. The gentlemen saw in his idea - the telephon - only a technical gimmick.
Philipp Reis – A vision becomes reality

On October 26, 1861, Philipp Reis, a teacher from Friedrichsdorf, presented a lecture to the members of the „Physikalische Verein“ [Physical Association] in Frankfurt on „Telephony by Means of Galvanic Current“ and then demonstrated the telephone he had developed:

The so-called „tall pin“ form of the Reis telephone according to
An etching by J.D. Copper
His colleague, H.F. Peter, music teacher at the Institute Garnier, remembers the remarkable presentation:

"...During the time when Reis invented the telephone (1861), I was the music teacher at the Garnier Institute. Since his experiments interested me extraordinarily, I visited him every day, helped him and made suggestions…

On October 26, 1861, I accompanied him to Frankfurt and assisted him. After the demonstration was finished, I watched members of the association come up to him and congratulate him on the success of his experiments. I played the English horn, Philipp Schmidt sang. The singing was more easily understood than the music of the instrument. In one experiment, which we conducted in the presence of Privy Councilor Dr. Müller, Pharmacist Müller and the former Director of the Garnier Institute, Professor Dr. Schenk, something happened that will interest you. First, we tried singing, then Reis' brother-in-law read long sentences out loud from the "Spiess" gymnastics book, which Reis, who was listening on the other end, understood without difficulty and repeated out loud to us. I told him, "Philipp, you know the whole book by heart," because I was not willing to believe that the experiment had been successful until he repeated a sentence that I would tell him. So I went into the room where the telephone was standing and spoke several sentences, such as "The sun is made of copper", which Reis heard as "The sun is made of sugar," or "Horses don't eat cucumber salad," of which he only understood "Horses don't eat ...". That was the last experiment we did. Everyone there was completely amazed and expressed the conviction that Reis' invention had initiated a great new future."

(From: Archiv für Deutsche Postgeschichte [Archives of German Postal History], issue 1, Frankfurt a.M., 1963, p. 47)

For six years, Philipp Reis had been teaching languages and natural sciences at the "Institute Garnier," a boarding school for boys in Friedrichsdorf, receiving an annual salary of 2000 guilders. The famous colleague and former pupil, who had come to Friedrichsdorf as a ten-year-old orphan, is remembered in the school newspaper of the institute. Johann Philipp Reis, born on January 7, 1834, in Gelnhausen, lost both parents while he was still a young child. His guardian sent the talented boy to the Institute Garnier in Friedrichsdorf, which was quite well-known at the time, to
continue his education. He was reportedly an extremely attentive pupil, and very interested in learning.

The Institute Garnier

After graduating from this school - Reis was 14 by then - he attended the Hassel Institute in Frankfurt, in order to continue his studies in foreign languages and natural sciences. At the wish of his Gelnhausen guardian, the 16-year-old had to leave school to start an apprenticeship as a merchant in the paints business of J.G. Beyerbach in Frankfurt. In his spare time, Philipp Reis took private lessons in mathematics and physics and attended the lectures by Professor R. Böttger in chemistry and mechanics at the trade school. In addition, he learned to work on a lathe, something that would be very useful to him later when building his telephone equipment. After completing his apprenticeship Philipp Reis studied at a polytechnical preparatory school in Frankfurt, because Frankfurt University did not exist as yet.
Dr. Poppe, director of the polytechnical preparatory school in Frankfurt

The director of this school remembers his former student:

"After completing his apprenticeship at the beginning of 1854, Philipp Reis came to me personally to request admission to the polytechnical preparatory school. I still have a vivid memory of the appearance of the twenty-year-old young man: his short, stocky figure, his massive head with the square, intelligent forehead and the irregular hut expressive features, with a pair of friendly, intelligent eyes looking out at you. In the list of students which I have saved as a memento from that time, Ph. Reis is listed as a future technician, according to his own statement, which shows that at that time, he was not thinking of becoming a teacher... The fact that he demonstrated a particularly lively interest in experimental physics can be explained by his sense for the practical side of natural sciences. He was very unassuming and never paid much
attention to external appearances, and also hated fashion and etiquette. Of all articles of clothing, he most disliked the tailcoat. He only wore this "piece of furniture", as he called it, when he absolutely had to, and very unwillingly; when he was out on the street, he always wore an overcoat over it. His dislike for the top hat, his "anxiety pipe", was just as great. Gloves were absolutely superfluous, as far as he was concerned. He was happiest in a simple, well-worn smoking jacket and the black silk cap that was usual at that time ..." ("Sonnez", 10/15/1898, p. 4-5 and 2/15/99, p. 4)

After leaving Mr. Poppe's institute, Philipp Reis was drafted into the military service, and one year later he resumed his studies in the natural sciences in Frankfurt. He wanted to train for the teaching profession in Heidelberg, but while on a visit to his old school director, Louis Frédéric Garnier in Friedrichsdorf, he changed his plans. Garnier offered Philipp Reis a teaching position at his institute and Reis accepted, in order to establish his own home. He bought the house at Hugenottenstrasse 93 and married the daughter of his Gelnhausen guardian on September 14, 1858.

Philipp Reis with his wife Margarethe née Schmidt and their two children Carl and Elise
Teaching left Reis enough time for research and experimentation. In his „curriculum vitae“, Reis remembers:

„Inspired by my classes in physics, in 1860 I resumed work on a topic I had already started work on earlier, the instruments of hearing, and soon had the pleasure of seeing my efforts rewarded by success, in that I succeeded in inventing an apparatus which makes it possible to clearly illustrate the functions of the instruments of hearing, but which can also be used to reproduce sounds of all types at any distance, using galvanic current. I called the instrument the telephone. “

This first telephone model had little in common with future telephones. The sound transmitter consisted of a model of the human ear carved out of oak. This ear transmitted the captured sounds to the sound receiver, a knitting needle stuck through a spool of silk - wrapped copper wire, by means of the galvanic current produced in the acid batteries. The wire was magnetized by consecutive pulses of current. A violin, to which the knitting needle was attached, served as the sound amplifier. The current was regulated by means of the vibrations of the human voice, which acted on a movable contact on a type of artificial eardrum.

The original form of the telephone
Reis made his telephones with his own hands, in a little workshop behind his house, from which he laid wires into one of the upper stories. At school, he also laid a wire for telephone experiments from the physics room to a classroom, so that just as an aside, he could check on his pupils when they thought they were unsupervised.

In the scientific circles of this time, Reis' new ideas were rejected as toys, at first. As early as 1859, he had sent a paper with the title "About the Radiation of Electricity" to Professor Poggendorf for publication in his "Annals of Physics," but it was rejected. When Poggendorf rejected another publication about the "telephone" in 1862, because he considered the transmission of speech by electricity to be a myth, Philipp Reis was very hurt and never forgot this insult. When he presented his latest version of the telephone in 1864, in Giessen, at a convention of the "Deutsche Naturforscher" [German Natural Researchers], he caused great admiration among the scientists present. Other than the inventor himself, nobody realized what possibilities this new sound transmission device offered for the future. The "telephone" was considered an interesting object for demonstrating scientific theories, so the "telephone" was discussed in scientific journals.
In his work "About Telephony by Means of Galvanic Current", Philipp Reis still gave a rather modest assessment of the practical value of his invention (December 1, 1861), when he wrote: "Much probably remains to be done for any practical utilization of the telephone. But for physics it already is sufficiently interesting in that it opens up a new area of work."

The presentation in Giessen was the last public demonstration of the telephone before an audience of experts. Philipp Reis withdrew from the "Physikalische Verein" in Frankfurt and also turned his back on the "Freie Deutsche Hochstift" [Free German High Institute], of which he was an honorary member, because they did not recognize the value of his invention. It was true that the Chairman of the "Freie Deutsche Hochstift" had presented Reis' telephone to the emperor of Austria and the king of Bavaria on September 6, 1863, but their highnesses had not given any reaction.

Reis now tried to market his telephone himself. The Frankfurt mechanic Wilh. Albert was commissioned to build a large number of Reis telephones, in the tenth improved version, and to sell them on behalf of the inventor.

A prospectus with a description that sounds very scientific was packed with each of these telephones:

*Telephone*

*Each apparatus consists, as is evident from Figure, of two parts, the actual telephone A and the reproduction apparatus C. These two parts are set up at such a distance from one another that the singing and the sound of a musical instrument can be heard from one station to another only via the apparatus. Both parts are connected with each other and with the battery B like anormal telegraph system. The battery must be sufficiently strong to attract the armature of the electromagnet affixed on the side of station A. (Three to four six-inch Bunsen elements are sufficient for a distance of several hundred meters.)*

*The galvanic current then passes from B to the terminal d, from here through the copper strip to the little platinum plate on the middle of the membrane, then through*
the foot c of the bracket to the screw b, which has a small pit into which a drop of mercury is placed. From here, the current then passes through the small telegraph apparatus e-f, then to the key of the station C and through the coil back to B via i.

If sounds with a sufficient volume are produced in front of the sound opening S, the vibrations of these sounds cause the membrane and the small angled hammer resting on it to move, the chain is opened and closed again once for every full vibration, and this causes an equal number of vibrations to be produced in the iron wire of the coil of station C, which are perceived as a sound or combination of sounds (chord) there. By firmly resting the small upper box on the coil axis, the sounds at C are very much amplified. Aside from the human voice, the sounds of good organ pipes from F - C and those of the piano can also be reproduced just as well (according to my experience). (Out of 13 triads, a well-versed experimenter was able to recognize 10 very precisely).

As far as the telegraph apparatus affixed on the side is concerned, it is obviously unnecessary for reproduction of the sounds; however, it is a very useful addition to make experimenting easier. It can be used to communicate well and reliably with the party on the other end.

This can be done in approximately the following manner: After the apparatus has been completely set up, make sure of the continuity of the line and the strength of the battery by opening and closing the chain, where upon the armature is heard to make contact at A and a very clearly audible ticking of the coil is heard at C. By rapidly alternately opening and closing at A, an inquiry is now sent to C whether the person there is ready for experimentation, and C answers in the same manner.

This was followed by detailed instructions about telegraphing, and Reis ended his prospectus with the comment that he made the important parts of the apparatus himself and only had the mechanic procure the ancillary parts and make the external housing. The telephones were to be sold for 14 or 21 guilders, depending on the model. Each apparatus was checked by Reis before being shipped, and his name, the serial number and the year of production were affixed to them. (Friedrichsdorf
near Homburg v.d.Höhe, in August 1863, signed Phil. Reis, Teacher at the L.F. Garnier Boys' Institute.)

The Reis telephone - the "cube shape" (10th model)

The operation of the "telephone" was described in the instructions written by the inventor himself. On 12/14/1863, he wrote to an unknown recipient:

Dear Professor:

Enclosed please find the best sample of six telephones which were just completed, I believe that its performance will be to your complete satisfaction.

Please send me the amount of 21 guilders for it in the manner most convenient for you.

I have enclosed the printed explanation of the apparatus and take the liberty of adding:

1) While experimenting, the glass cover of station A is laid aside.
2) It contributes to the purity of the tones if the small locking box A is opened.
3) Stronger batteries than those indicated are useless and can actually become dangerous for the interrupting station.
4) The experiments will best succeed when singing into the apparatus not too loudly, but with the mouth well opened (melodies, scales, etc.).

5) Experiments with open, wide bird whistles succeed easily and reliably. Even three tones blown at the same time are reproduced, but this experiment just as the one with the piano, requires special familiarity with the apparatus.

6) Experiments at night, performed by a small number of people, are very interesting. Reading and speaking into the apparatus, in particular, is very appealing (reading the same books at both stations and comparing the reproductions of the words).

I would be happy to give you any additional information you might require, and hope that you will contact me if necessary.

Signed, respectfully yours

Philipp Reis

In the stage just described, the Reis telephone seems to have been more suited for the transmission of tones than of speech. His critics were therefore able to claim that Reis only intended to transmit music. But according to statements of his pupils and fellow teachers at the Institute Garnier, Reis conducted his experiments with the explicit goal of transmitting human speech, as was perfectly demonstrated by the Frankfurt presentation in 1861.

One of his pupils reports:

Contemporary witness Dr. Rudolf Messel, pupil at the Institute Garnier

"... My knowledge of Philipp Reis goes back to the year 1860, when I was a pupil at the institute of Professor Garnier in Friedrichsdorf, at which Reis was one of the junior teachers. Reis, who was talkative by nature, loved to talk to us boys about his scientific experiments ... That is how it came that Horkheimer, Küster, Schmidt and I soon enjoyed the privilege of getting private instruction in physics and of being allowed to be present at many experiments, including experiments with the telephone ... Philipp Schmidt should actually still be able to remember that, since many experiments were conducted when only he, Reis and I were present. The wire was
laid from Reis’ house on Hauptstrasse, through the courtyard, to a hayloft near the garden or the field. We transmitted music (organ, etc.), sang popular songs ("Who wants to be a soldier", "I had a comrade") and spoke, or, to put it more precisely, read. We used a book and had to find out what page the person reading was transmitting at any particular time. Frequently, we used a type of "exercise regulations", a military regulation or something of that time. I clearly remember the electromagnetic receivers used, but not their structure, and that the operation of the apparatus was accompanied by a bothersome, rattling noise. The knitting needle stuck into the S-shaped opening of a violin was the preferred type of receiver, but from time to time Reis’ thinking seemed to revolve entirely around the electromagnet, like before, and I dare to assert, also afterwards it revolved around the transmitter. I left Friedrichsdorf in 1862 and hardly saw Reis after that, except for a few times at the shop of Albert, the mechanic (who built some of his telephones).

Reis telephones were sent all over the world. They were to be found in the physical laboratories of Munich, Erlangen, Wiesbaden, Vienna and Cologne. They were sent to London, Dublin, and even to Tiflis in the Caucasus. Telephones were primarily purchased in order to include them in existing collections of equipment, or to experiment with them.

The fact that Philipp Reis believed in future commercial use is shown by his participation in a trade show in Homburg. The press was impressed, but appeared to be completely blind to the possibilities that telephone connections would offer in the future. The papers read:

"... We are now standing in front of that part of the exhibition which we can certainly call the most interesting. This little box, not very prepossessing in appearance, with its accessories, is the "telephone", the telegraph for sound and speech, which its inventor, the teacher Ph. Reis from Friedrichsdorf; has exhibited here. One step further to its completion and the human spirit will reach its greatest triumph in this apparatus. Whether or not this step will be taken is something we have to leave to the future and the imaginative inventor, or others who stand on his shoulders ..."
Things became quiet around Reis' invention in subsequent years. He suffered the embarrassment of having his invention ignored as a plaything by the "Physikalische Verein" in Frankfurt and the "Freie Deutsche Hochstift" in the same city. Towards the end of his life, he was only able to practice his profession with great difficulty, because his voice was failing and he became weaker and weaker.

Philipp Reis did not become a rich man with his invention. At his death, he was able to leave his family only 400 thalers. He died on January 14, 1874, from the effects of pulmonary tuberculosis from which he had been suffering for a long time, at the age of 40. Before his death, he left his equipment to the Institute Garnier. In 1878, the subsequent director of the institute, Leon Garnier, passed them on to the Imperial Postal Museum in Berlin. During World War II, the original telephones were lost and have been replaced by accurate reproductions.

Only two years after Philipp Reis' death - on February 14, 1876 - the American [Alexander] Graham Bell filed a patent for the telephone he developed. According to his own admission, he knew the work of Philipp Reis, at least in part.
In Germany, people also remembered the experiments and telephone demonstrations of Philipp Reis, who had not been taken seriously enough in his own time. Pupils, fellow teachers and well-known scientists strove to give Philipp Reis the recognition he deserved for having developed the first usable telephone. In December 1878, the "Physikalische Verein" in Frankfurt raised a memorial of red sandstone to its former member, with a portrait medallion executed by the sculptor Carl Rumpf.

Gravestone of Philipp Reis
in the Friedrichsdorf cemetery
The former home of Philipp Reis is a historic landmark and today houses the Philipp Reis collection of the Deutsche Bundespost and the Municipal Archives.

The city of Friedrichsdorf raised a memorial to its illustrious citizen in the former courtyard of the Reis property.

On 10/26/1952, the Philipp Reis plaque sponsored by the Deutsche Bundespost was awarded for the first time. The date, 10/26, was chosen because Philipp Reis held his first public lecture with experiments about his telephone on October 26, 1861, at the "Physikalische Verein" in Frankfurt am Main. The plaque recognizes "outstanding achievements in the field of telecommunications". The Deutsche Bundespost, the Verband Deutscher Elektroingenieure [Association of German Electrical Engineers] and the cities of Friedrichsdorf and Gelnhausen have established another prize for inventions which promise innovative commercial success. This prize, endowed with DM 20,000.00, is awarded every two years to a candidate who, in memory of Philipp Reis, is not allowed to be more than 40 years old.
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Quellen: Silvanus O. Thompson B.A. D.Sc.,
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