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THE ORIGINAL REIS TELEPHONE.

In the summer of 1884 the counsel of the Overland Telephone Company obtained from Professor Silvanus P. Thompson, in London, the identical transmitter and receiver exhibited and used by Philip Reis in his lecture before the Physical Society of Frankfort, in 1861. These instruments were received by Professor Thompson from Dr. Theodore Stein, of Frankfort; and in order to verify their genuineness, the testimony of Dr. Stein was taken, and he proved that they were given to him by Professor Bottger in 1862, who assured him that they were produced and used by Reis at the meeting of the Society. Dr. Stein kept them in his possession until 1882, when he delivered them to Professor Thompson. During some recent experiments with reproduced forms of Reis telephones, made by Professor J. R. Paddock, of the Stevens Institute, this original telephone was submitted for examination. Professor Paddock, assisted by Mr. E. W. Smith, a skillful operator, long employed in the use of Bell telephones, had obtained such remarkable results that he determined to test this original instrument. It was nearly twenty-five years old, and somewhat battered, but all its parts were perfect except one of the wooden supports of the needle; and Professor Paddock and Mr. Smith soon succeeded in proving that, without any change or addition whatever except a single wooden support, it was capable of transmitting articulate speech. The results of their efforts are given at length in their testimony, taken September 19, in the Overland cases, which clearly shows that this instrument, described by Reis as a telephone and publicly used by him a quarter of a century before Bell's patent, will now transmit articulate speech. We have been permitted by Professor Paddock to make an exact drawing of this interesting instrument, which is shown on this page.

Of course in the state of our patent law the public use of such an instrument abroad would not be sufficient, in itself, to defeat Bell's subsequent patent. But in the yearly report of the Physical Society for 1860–61, Reis' lecture on "Telephony by Means of the Galvanic Current" was published, containing an exact drawing of the transmitter, and a full description of both transmitter and receiver, with directions as to their use.

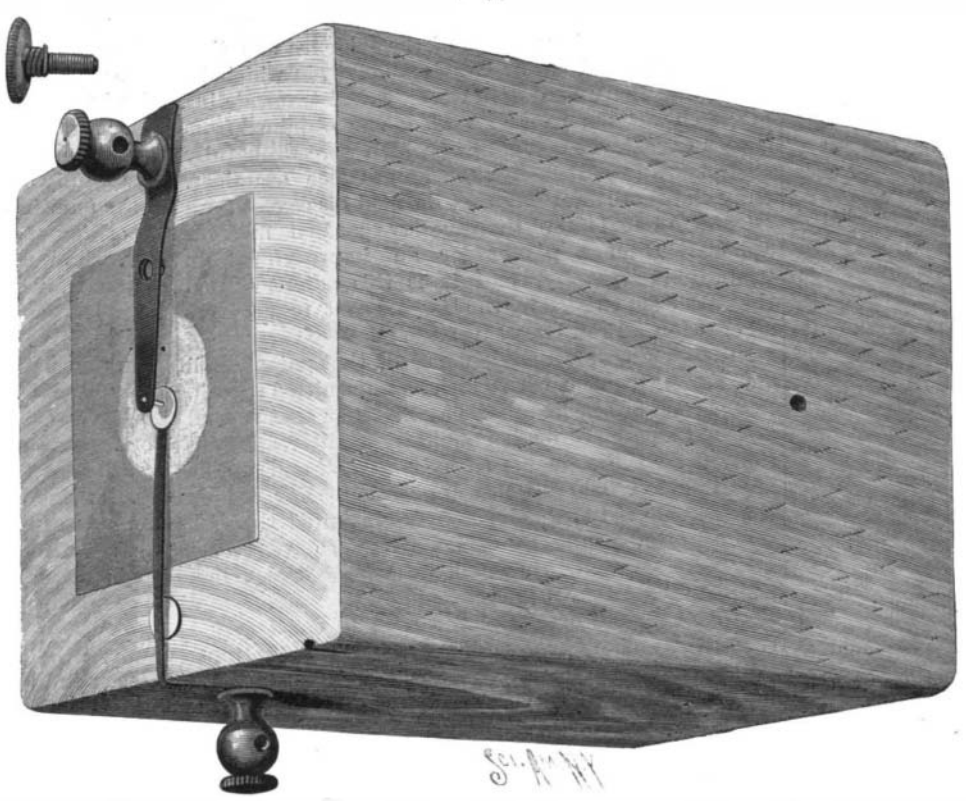

Fig. 1.—AN ORIGINAL REIS TRANSMITTER—FULL SIZE.

The body of the transmitter consists of a block of wood pierced by a conical hole, over the smaller end of which is stretched a membrane. A strip of platinum connected to the middle of the membrane forms one electrode, and a thin strip of metal extending to the middle of the membrane and provided with a platinum point, which rests on the platinum strip, forms the other electrode. The conical cavity forms the mouthpiece.

In view of the repeated assertions that Reis never attempted to transmit speech, or to reproduce the "quality" of sounds, it is interesting to recall, in connection with this old telephone, the very words he used in the lecture at which he exhibited it. He began by saying: "The extraordinary results in the field of telegraphy have probably often raised the question if it might not be possible to transmit speech itself to a distance." And after a lucid discussion of the nature of sound and the theory of vibrations, he went on to say: "As soon, then, as it is possible to produce anywhere and in any manner vibrations whose curves shall be the same as those of any sounds or combination of sounds, we shall receive the same impression as that sound or combination of sounds would have produced. With the above principles as a foundation, I have succeeded in constructing an apparatus with which I am enabled to reproduce the sounds of various instruments, and even, to a certain extent, the human voice. It is very simple, and by means of the figure will be easily understood from the following explanation."

He then gives a drawing of this transmitter, and follows it with a careful description of the entire instrument and the mode of its operation. And then, with his characteristic caution and modesty, he adds: "Hitherto it has not been possible to reproduce human speech with a distinctness sufficient for every one. The consonants are for the most part reproduced pretty distinctly, but the vowels, as yet, not in an equal degree."

Certainly no one can look at this old instrument exhibited by Reis while he uttered these words, and doubt that he intended to transmit articulate speech. And if the results of Prof. Paddock's experiments are truly stated, as little doubt can exist that he succeeded in that attempt. That was his first rude effort in pub-

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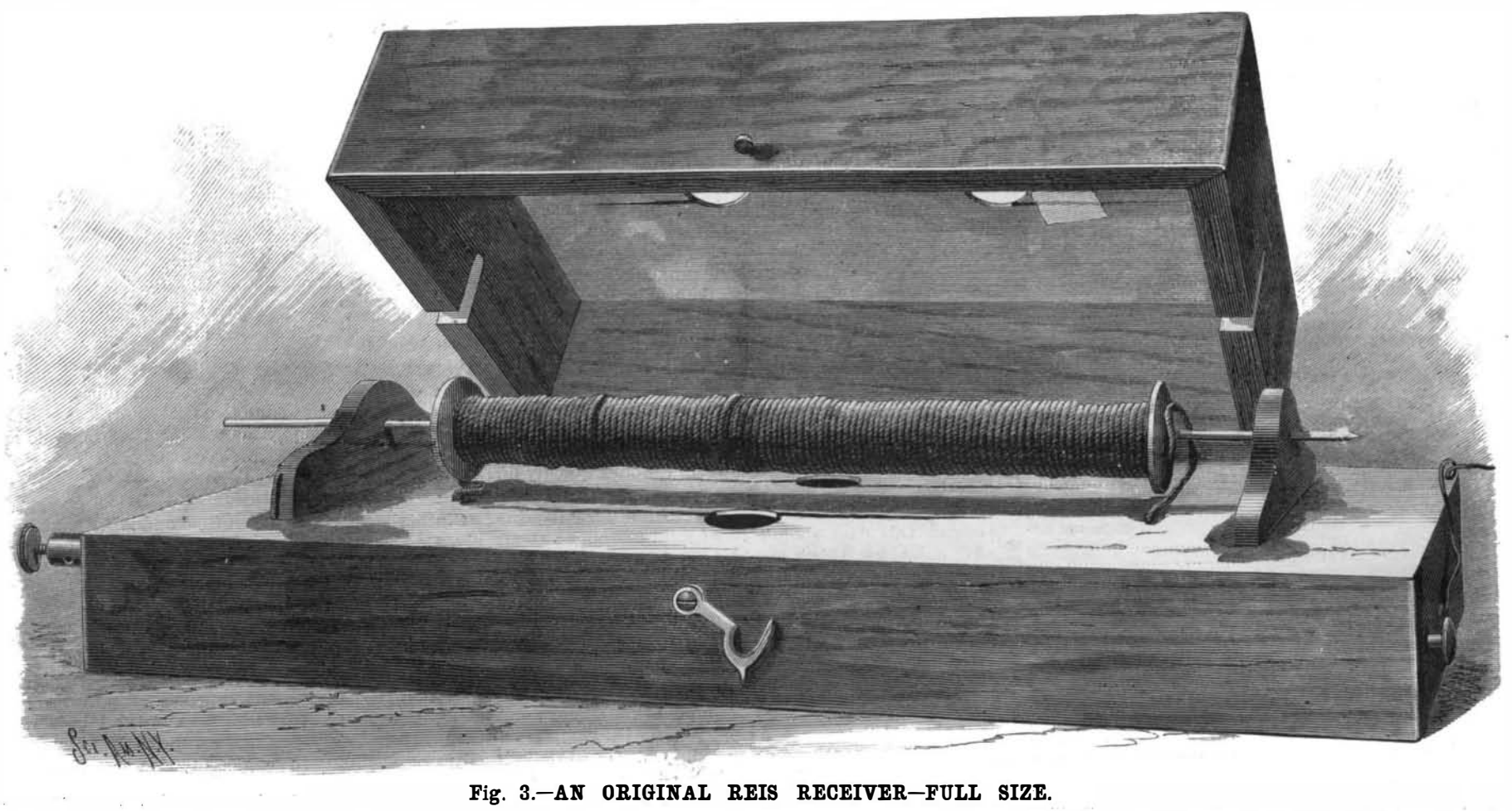


Fig. 3.—AN ORIGINAL REIS RECEIVER—FULL SIZE.

The magnet is composed of a bobbin inclosing a knitting needle, whose ends extend beyond the bobbin, and are received in bridges on the resonant case. The terminals of the bobbin are connected with the electrodes of the transmitter, a battery being placed in the circuit. Sounds uttered in the mouthpiece of the transmitter cause the membrane of the transmitter to vibrate, and so produce changes in the current at the contact of the electrodes. The fluctuations of the current affect the magnet of the receiver, so that sounds are produced in the receiver like those uttered in the transmitter.

THE ORIGINAL REIS TELEPHONE.

(*Continued from first page*).

lic, but he afterward made and described other forms which proved much more efficient. Prof. Paddock's testimony shows that during nearly three months of experiments with other forms of Reis instruments, he transmitted speech "with a distinctness sufficient for every one," showing clearly that Reis did in fact invent, use, and describe the speaking telephone many years before Bell, with full knowledge of his writings, took up the subject. In fact, Prof. Paddock and Mr. Smith show in their testimony that with the cubical box transmitter and knitting needle receiver of Reis, they transmitted one sentence containing fifty-six words.

Now, it will be instructive to put in contrast with these facts a brief statement of the substance of Bell's patent, and his own assertions as to his early results. His patent of 1876, which is the foundation of his claim to control the whole system of telephony in this country, does not mention the word telephone, nor allude in any way to articulate speech. It is called a patent for an "improvement in *telegraphy*." He has himself shown that he struck out of the first half of his claim the words "vocal *utterance*," and substituted "vocal and other sounds."

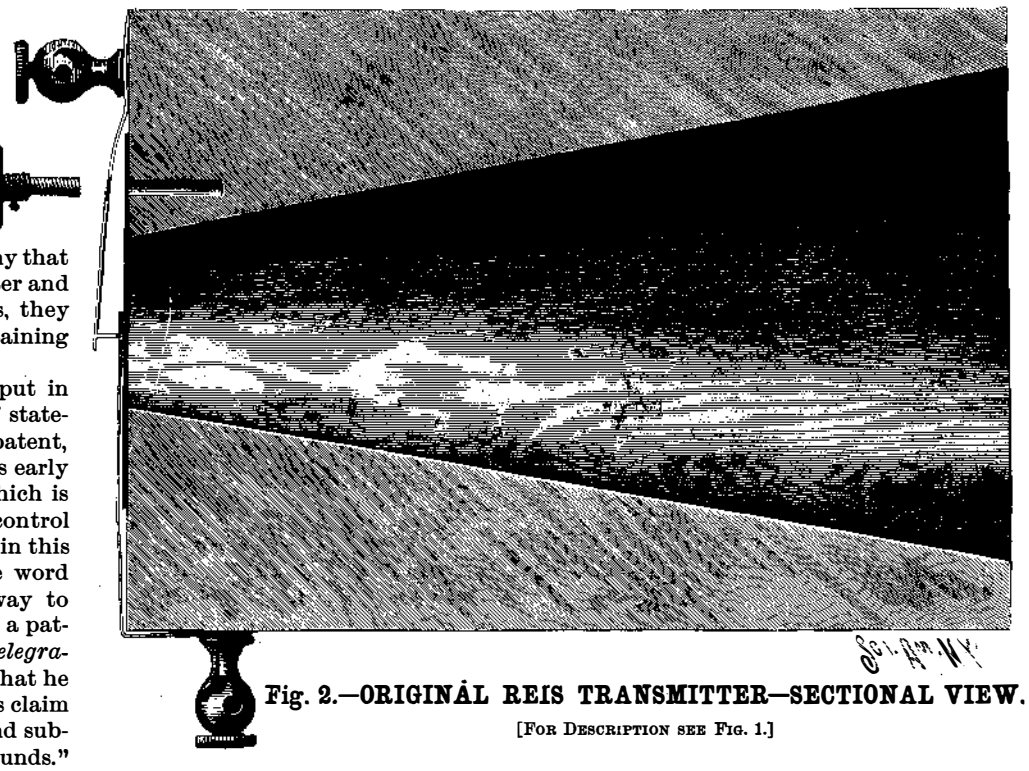


Fig. 2.—ORIGINAL REIS TRANSMITTER—SECTIONAL VIEW.

[FOR DESCRIPTION SEE FIG. 1.]

His fifth claim, upon which the whole Bell monopoly rests, is in these words: "The method of, and apparatus for, transmitting vocal and other sounds telegraphically, as herein described, by causing electrical undulations, similar in form to the vibrations of the air accompanying the said vocal and other sounds, substantially as set forth."

And the only drawing shown in the patent as the method for producing this result was Fig. 7, which is this:

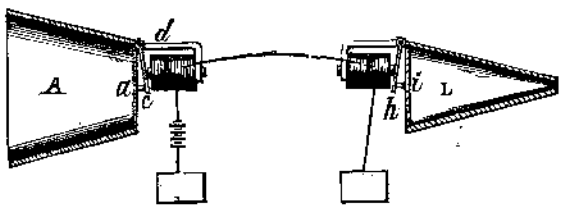


FIG. 7 OF BELL'S PATENT OF MARCH 7, 1876.

c, armature fastened loosely at one end to the uncovered leg, *d*, of the electromagnet, *b*, the other extremity being attached to the center of the stretched membrane, *a*. A, cone for converging sound vibrations upon the membrane. *f*, magnet, *h*, armature, and *i* the membrane of the receiver. When a sound is uttered in the cone, the membrane, *a*, is set in vibration, the armature, *c*, is forced to partake of the motion, and thus electrical undulations are created upon the circuit. These undulations are similar in form to the air vibrations caused by the sound, that is, they are represented graphically by similar curves. The undulatory current passing through the electromagnet, *f*, influences its armature, *h*, to copy the motions of the armature, *c*. A similar sound to that uttered into A is then heard to proceed from L. —*Bell's Specification.*

In the first decision in favor of Bell, in 1881, Judge Lowell said: "Bell *is admitted in this case* to have been the original and first inventor of any mode of transmitting speech." And when Judge Gray followed him in January, 1883, he said: "It *was decided* in the Spencer case, and *is not denied* by the present defendant, that Bell is the first inventor of a speaking telephone." Upon decisions involving these admissions all the later successes of the Bell Company have depended.

If we carefully bear in mind the earliest statements of Reis and Bell, and examine their respective instruments, as given above, and recall a few of the facts now brought out in proof, we may be sure that no future decision will be allowed to rest upon any such admission. We have space only for a bare statement of some of these facts.

1. No model of Bell's Fig. 7 or of any other instrument was filed with his application.

2. No original instrument made by him before his application has ever been produced.

3. He has admitted in his testimony that he never got a word of articulate speech through any instrument before his patent was granted.

4. It is now shown in the recent case before Secretary Lamar that Gray's caveat, filed on the same day with his application, was shown or explained to him against the rules of the office.

5. He admits that the first instrument with which he did get speech contained a liquid transmitter, as suggested by Gray.

6. He says himself that his first efforts with this were "unsatisfactory and discouraging."

7. One of the Centennial instruments, the results of which were so much vaunted, had a liquid transmitter, as suggested by Gray in his caveat, irregularly communicated to Bell.

8. Sir William Thomson, to whom Bell gave one of the other form, in his testimony in the English case on behalf of Bell's British patent, proved that this instrument was inoperative, that he had been unable to make it transmit speech, and that Bell told him at the Centennial that what he had done then was only the "embryo of an invention."

9. There is a great conflict of testimony as to whether Bell's Fig. 7 can even at this day be made to transmit an intelligible word. It certainly will not do so with a distinctness sufficient for *any* one.

10. There is no doubt whatever that it has never been and never can be used as a practical speaking telephone.

11. Bell himself, in his specification for his patent of 1877, describes his patent of 1876 as for "a method of and apparatus for producing *musical tones* by the action of undulatory currents of electricity, whereby a number of *telegraphic signals* can be sent simultaneously over the same circuit."

12. It has been proved by Professors Morton, Brackett, Young, Channing, Barker, Eaton, Paddock, Lyons, Green, and many others, that the modern transmitters in common use are improvements on Reis, and the natural outcome of his published inventions.

13. With the substitution of a carbon for a platinum contact piece, the Reis telephone is a practical commercial instrument. Bell does not claim to have been the first to use carbon contacts in the telephone, and there is no mention of carbon in his patent, nor any room for its use in the devices shown.

In spite of these facts, the Bell Company, fortified by the early Massachusetts decisions, have succeeded in demolishing their opponents in detail, and now claim to control the principle of using electricity for the transmission of speech. It seems eminently just that this enormous claim should now be subjected to a single test, in a suit in the name of the United States, in which all the accumulated knowledge on the subject can be concentrated, and the fullest decision had, before a tribunal to be selected for the public confidence reposed in it. This will be much more satisfactory than to wait until successive cases, each perhaps imperfect, can be reached in the Supreme Court. The people ought to know speedily whether one of the forces of nature, in an application necessary for the purposes of modern life, is the property of a single corporation in this country, notwithstanding the fact that a German inventor gave it freely to mankind a quarter of a century ago, and that in no other country in the world has such a claim been even attempted to be maintained. Indeed, we have only to examine the electrical journals of other countries to see that the whole "undulatory current" theory as a basis for a claim to control the transmission of speech by electricity is regarded as preposterous. They simply wonder at the audacity and skill by which such a claim has been so long maintained in the United States.

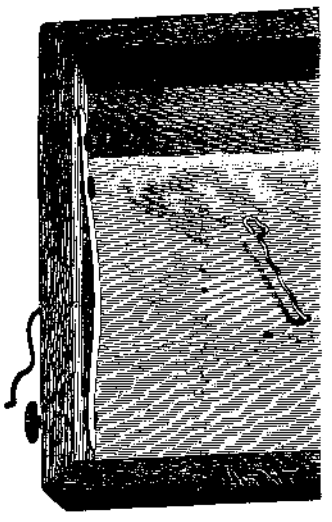
Fig. 4.—ORIGINAL REIS RECEIVER—CLOSED.—[FOR DESCRIPTION SEE FIG. 3.]

Progress of Torpedo Boats.

The construction of torpedo boats is, according to *Engineering*, by no means confined to England. Mr. F. Schichau, of Elbing, lately received an order for twenty-three boats for the German navy, and has recently delivered ten of this number. On their trial trips at Pillau, with the regulation load, they attained a mean speed of 20 knots per hour. Boat No. 10 was subjected to a continuous run of eight hours, and although a sharp wind was blowing the whole time, it averaged a speed of 19·95 knots, a most satisfactory result. These boats are of the same dimensions as those built last year; they have a length of 118 feet, with 16 feet 6 inches beam. In all cases, both boilers and engines worked most satisfactory. One boat will now be turned out each week until the order is completed.

The Chinese navy have, in addition to nine small boats 85 feet long, just placed an order with the same firm for a large torpedo boat, 164 feet long and 20 feet beam, with triple expansion engines to indicate 1,500 horse power. This boat is to run at a speed of from 22 to 23 knots an hour.

Mr. Schichau is also building three torpedo boats for the Russian navy of the same type as those for the German navy. These are to carry coal for steaming, fully equipped, 1,200 miles at an average speed of 10 knots, and are to be capable of making over 19 knots per hour. It will thus be seen that the building of torpedo boats is not the close business it appeared to be some time ago. A few years ago the English Government distributed a few orders among the leading firms here, who, it was supposed, were likely to be successful in this class of work, but the experiment was solely successful in showing that those engineers only who possessed an experience of the subject had a just appreciation of the requirements of the class of vessel.



SIGNAL KEY, REIS RECEIVER.

The American Exposition.

The North, Central, and South American Exposition, more commonly known as the American Exposition, was formally opened at New Orleans on November 10. Only about a third of the exhibits were in place, but it is hoped that everything will be in complete order early in December. The withdrawal of last year's Government exhibit left a large space unoccupied, and fears were entertained that there would be more room than goods; but nearly all of the State exhibits have been so far enlarged that, had more space been available, it could readily have been occupied. Business in the city was suspended on the opening day, and the interest manifested has made the managers confident of success.