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EARLY TELEPHONES.

Our readers are familiar with the fact that many authorities on the history of telephony claim that in the instruments invented, described, and constructed by Philipp Reis, of Germany, over twenty years ago, may be found complete and operative speaking telephones. The claims of the Bell patents, practically speaking, are now held by the courts to cover the art of transmitting the sound of words by electricity. All the suits brought by the Bell Company are brought upon this basis, that no speech can be electrically transmitted without infringing their patents. Hence, anything in the shape of an authentic early telephone possesses much interest as tending to deprive this patent of its extraordinary breadth of interpretation.

We here present a number of early telephones, including three general types—the microphone, the magneto, and the magnetization forms. They are from photographs of the original instruments, all, according to sworn testimony, constructed years before Graham Bell thought of applying for a patent for telephones.

Fig. 1 represents the Holcomb instrument. It is a horseshoe magneto, somewhat similar to the well-known Overland Co.'s receiver. It was made by Alfred G. Holcomb in 1860-61. The curved bar in front of the magnet coils is the vibrating armature. The conical ear piece, closed at its larger end with a piece of wood carrying the armature, is designed to concentrate the sound. This instrument talks, and talks well. Its faults are due only to wrong proportions. Its armature is too small, apparently, for the best results. Its results compare with the early speaking Bell telephones.

Holcomb had a friend, George W. Beardslee, with whom he spoke concerning this instrument, and Beardslee undertook to make one himself. Prior to 1865 he constructed the identical instrument shown in Figs. 2 and 3. Its interior construction is shown in Fig. 2. The ideas of Holcomb are, in general, carried out by his friend, who substitutes for the original massive horseshoe magnet one of a different shape, and with that as a basis constructs a regular magneto telephone. This instrument is as operative as the Bell receiver of to-day. The crank seen projecting from its side corresponds to an alarm or calling attachment.

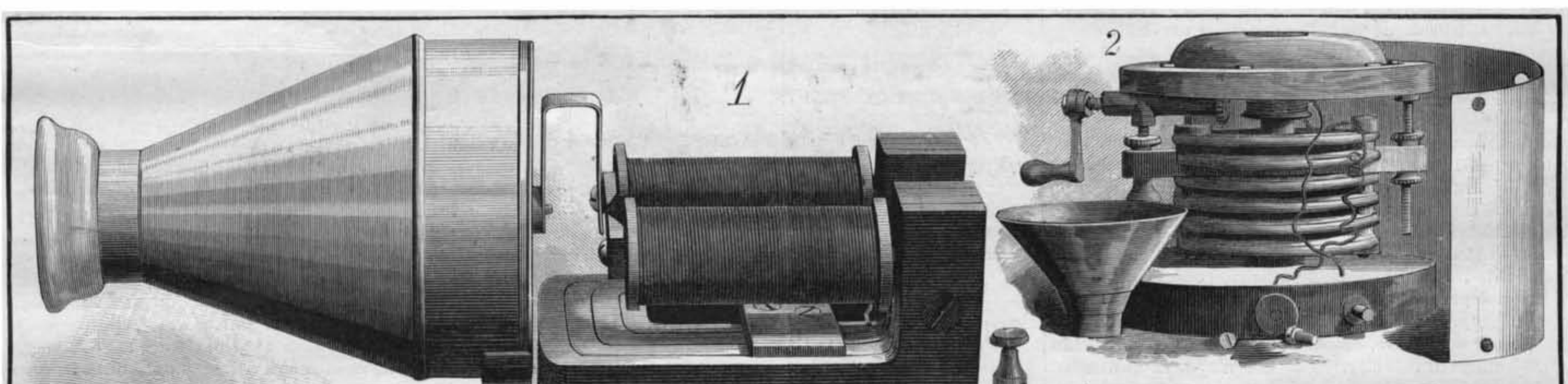
These are two perfectly good magneto telephones, and with some modifications could be used in actual service. In practice it is found that this class is only adapted to perform the office of receivers. For transmitters something stronger is wanted—something that will directly regulate a battery current. This is found in instruments of the microphone type, precisely such as invented and used by Reis, and as constructed in this country by Professor Van der Weyde in 1869. An original transmitter by this inventor is shown in Fig. 4. A rectangular box is fitted with a mouthpiece to be spoken into. Its top has a central aperture covered with membrane that actuates a microphone contact. Couple this instrument with a battery and with any of the magneto receivers shown in our illustration, and we have an operative telephone line such as is in use to-day.

Reis, for receiver, availed himself of the sounds of magnetization. A rod of iron rapidly magnetized and demagnetized undergoes molecular changes, as in length, which are accompanied by slight sounds. The magnetizations are simply effected by surrounding the bar with a coil of wire and passing intermittent currents through it. If by a microphone these currents are made to vary with the utterances of the voice, the magnetization sounds become articulate, and the receiver speaks.

In Fig. 5 we represent such a receiver, constructed about 1869 by Professor Van der Weyde. It is a simple rod of iron surrounded by a coil of insulated wire, with a species of resonating attachment at one end. The great trouble with this receiver is the weakness of its sounds. In the one shown, an attempt is made to re-enforce its vibrations by a species of sounding board or vibrating plate. Reis, we know, adopted similar expedients, sometimes mounting the coil and inclosed rod on a sounding box. Such a coil surrounding a knitting needle gives very pure sounds, and the form is often referred to as the knitting needle receiver.

So pure are the sounds produced by this arrangement, that it has seemed strange that some attempt has not been made of later days to utilize them. A simple wire, surrounded by a coil and carrying on one end a wooden disk to be pressed against the ear, forms a very fair receiver.

Prof. Van der Weyde was not content to rest with instruments of these two types only. A year or so



1. Magneto Telephone made by Alfred G. Holcomb in 1860-61. 2. Magneto Telephone made by George W. Beardslee, at College Point, N. Y., prior to 1865. 3. Same, inclosed ready for use. 4. Telephone Transmitter made by Philip Van der Weyde about 1869. 5. Telephone Receiver made by Philip Van der Weyde about 1869. 6. Telephone Receiver made by Philip Van der Weyde in 1870.

EARLY TELEPHONES.

later, in 1870, he made a magneto, shown in Fig. 6. Here we have a horseshoe electro-magnet mounted back of, and facing, a plate armature. It is simply a powerful electro-magneto receiver, something like, but immeasurably superior to, the instruments shown in the Bell patent of six years later. Like all the other instruments shown, it will play its part in transmitting speech. Placed in circuit with a battery and a microphone such as is shown in Fig. 4, it will talk.

Our readers will feel with us that the above represents a most interesting collection of instruments. In many instances, even in suits, alleged anticipating telephones are shown by models. This always casts a shade on their testimony, for the suspicion always exists that some change in construction has been made. It may be so minute as to be indefinable in the light of the testimony concerning the originals, yet enough to change inoperative devices into practical working instruments. Such, at least, is the suspicion that is apt to be aroused by model telephones. But in the instruments here shown we have what are testified to as being instruments actually made fifteen or twenty years ago.

Prof. Van der Weyde originally used his telephones for the transmission of music. He did not at first use them for that of words. Any one who has experimented with early telephones, the Bell included, will find the articulation faint and uncertain at times. In some cases, such is the degree of this uncerta'nty that we can readily believe that the early workers with untrained ears failed to catch the feeble utterances of their instruments. Every one has noticed a great difference between individuals as speakers or listeners at ordinary telephones. If this is so with the perfected instruments of to-day, *a fortiori* must it be so with the older types. There is a sound sometimes produced by a telephone that is unmistakable—a peculiar buzzing, as if it were on the verge of talking. When that is reached, articulation is only a matter of adjustment. The early workers must often have reached this stage, and failing to recognize its importance, they did not pass it as successfully as we do.

The Reis and Van der Weyde instruments divide themselves into two classes, transmitters and receivers. It is worthy of remark that the practical working instruments of to-day follow the lines indicated by the German school teacher. A battery current is acted on by a transmitter, and the receiver delivers the message. In the Bell patents, magneto or electro-magneto telephones were prescribed for both ends of the line. Any such service is inferior. A microphone is essential at present for transmitter; the Bell instrument is of use only as receiver.

Another interesting feature of the instruments we have described is the fact that they are all American productions. There is always a certain dissatisfaction in looking to Europe for an anticipation. Legally speaking, foreign use does not anticipate; so in the case of Reis' inventions publication has to be shown, and this has to be coupled with the operativeness of the telephones. The inventors whose productions we have just spoken of were residents of America, and did their work here. Most or all of it was done within a few miles of this city. Van der Weyde concentrated his thoughts on the transmission of music; Holcomb felt that his was not sufficiently perfected to be worth patenting, and so their work went for nothing.

It is the old story, so often retold in the history of invention, that the race is to the swift. Bell, by working out a successful telephone company, has succeeded in establishing for himself and associates the most valuable patent of the world. Any of the instruments shown are far in advance of the telephones of his 1876 patent, but unpushed by business energy they passed out of sight, only to be resuscitated as useful aids in combating the claims of the Bell Company.

More Scared than Hurt.

According to *Bradstreet's* careful recapitulation, there are about 43,000 workingmen who are on strike in this country at the present time. The whole number of persons employed in manufactures, mining, trade, and transportation is about 5,640,000. So it appears that not one man in a hundred of those engaged in the industries named has stopped work in consequence of disagreement with employers. But the one striker is making more noise in the land than the ninety-nine workingmen who keep about their business. Trade is hurt more by the apprehension of mischief than by the actual extent of it.—*Phila. Record.*

Origin of Sulphur in Coal.

M. Dieulefait has been inquiring why there is so much sulphur in stone coal, and why there is so little of free alkaline carbonates in the ashes. For this purpose he has analyzed the surviving species of the families of the coal plants, particularly the Equisetaceæ, and has found in them a proportion larger than usual of sulphuric acid. Hence he deduces, as the answer to his questions, that the coal plants were more highly charged with sulphur than most existing plants, and that for that reason their alkaline constituents assumed the forms of sulphates instead of carbonates.

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SCIENTIFIC AMERICAN SUPPLEMENT

No. 548.

For the Week Ending May 29, 1886.

Price 10 cents. For sale by all newsdealers.

OFFICIAL REPORT ON THE PANAMA CANAL.

M. Rousseau, the delegate appointed by the French Government to inspect the work on the Panama Canal, has made a report which is likely to be more seriously disappointing to M. De Lesseps than was the exceedingly cautious and tentative one of the Hon. John Bigelow, who assisted at the inspection in behalf of the New York Chamber of Commerce, the points of which were summarized in our issue of May 8. M. Rousseau denies the correctness of the canal company's statements respecting its facilities for construction, the time when the canal will be completed, and the amount of money still required to accomplish the work. This appears to be the first public criticism in France of the canal project, the forwardness of the enterprise, and its financial condition, as these matters have been explained by its directors and promoters; and, as a result, it is announced that the Government cannot authorize a proposed issue of lottery bonds, to provide further means to prosecute the work, until the position of the company is made clear. Nearly all the capital thus far subscribed for building the canal has come from people of small means, four-fifths of it being represented by individual sums ranging from $100 to $500. It is thus also that the French national debt is mainly held. To make these small loans popular, the canal company wished to float them with a lottery scheme, but a governmental authorization of such scheme would be a most serious affair in the event of any failure to complete the canal or the interminable postponement thereof, with constantly added cost. De Lesseps may, it is true, succeed in obtaining the necessary funds to keep up work on the canal, notwithstanding this adverse report; but as the calculations of its ultimate cost increase, the difficulty and expense of placing any loans will be augmented, and it seems inevitable that, looking at the project as kindly as possible, the work must drag on for a far longer period than any that has yet been fixed for its completion, even if that is ever accomplished.

GALVESTON HARBOR.

In 1874 the improvement of Galveston harbor was commenced on plans designed by Maj. Howell, U. S. A., approved by a board composed of Generals Tower, Wright, and Newton, U. S. A. The plan contemplated two parallel jetties 12,000 feet or about 2¼ miles apart. They were to be submerged, no part of them being higher than mean low tide, and only a portion of them as high as that. From the shore out for several thousand feet, they were several feet below low tide, thus forming huge gaps to facilitate the flow of the tide to fill the bay of Galveston, a tidal basin about 450 miles in extent. The average rise of the tide is about 14 inches. These jetties were to be built of *gabions*. Each gabion was made of willows in the form of a basket, about 12 feet long, 6 feet wide, and 6 feet deep. This willow structure was plastered over with hydraulic mortar about three inches thick. They were placed end to end in the line of the jetty, and sand was then pumped in them and covers secured on them to keep the waves from washing it out. The jetties were to extend out only to 12 and 13½ feet depth, respectively.

Nearly two miles of the north jetty were built in this way prior to 1880. This entire work was completely obliterated in 1880, and then Col. Mansfield was put in charge. He recommended the building of the jetties with brush mattresses, ballasted with stone in a manner quite similar to the Mississippi jetties, and on substantially the same locations chosen by Maj. Howell. The advisory board was reconvened to pass upon the new plans, and it advised putting down a trial section of mattress work near the outer end of the old north gabionade, and also the changing of the direction of the south jetty, so that its outer end would be distant only about 10,400 feet from the north one, thus destroying the parallelism of the two jetties.

The vigorous prosecution of the south jetty was then begun (1880), and in March, 1884, Col. Mansfield reported it officially as being completed. It was then 4¼ miles long from the shore to 13½ feet water.

About this time the people of Galveston became disheartened, declared that no real benefit had resulted from the works in ten years; and after consultations and meetings, the mayor, city council, and a large number of the chief citizens of the place addressed a letter to Capt. Eads, then in England, to know if he would undertake the improvement on the "no cure, no pay" principle, which he had undertaken to do with the Mississippi jetties. The result was that an offer to do this and secure 30 feet depth of channel was made by him, and was formulated into a bill, which was introduced in the last Congress. It provided for the construction of the necessary works and made the compensation depend upon the securing of a 30 foot channel for $7,750,000.

This bill was vigorously opposed by Gen. Newton and Col. Mansfield, and by others of the Engineer Corps of the army. These two officers, in their official reports to the Senate and House Committees, assured Congress that with $750,000, or less than one-tenth of what Capt. Eads proposed, they could complete the official plan of 1880, and secure a 25 foot channel. A