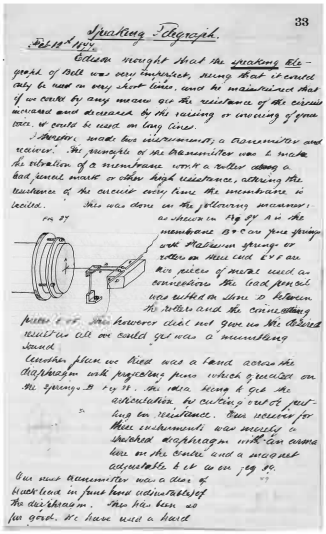
[Menlo Park,] Feb 12th 1877.

Notebook Entry: Telephony

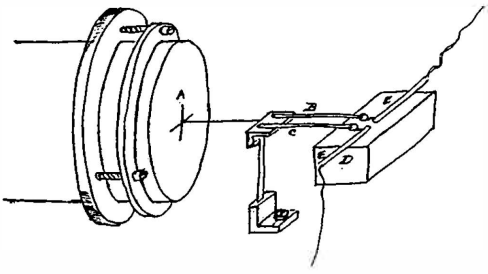


Speaking Telegraph.

Edison thought that the speaking telegraph of Bell was very imperfect, seeing that it could only be used on very short lines, and he maintained that if we could by any means get the resistance of the circuit increased and decreased by the raising or lowering of your voice, it could be used on long lines.

I therefore made two instruments; a transmitter and receiver. The principle of the transmitter was to make the vibration of a membrane work a roller along a lead pencil mark or other high resistance, altering the resistance of the circuit every time the membrane is excited. This was done in the following manner:—as shewn in Fig 37[1]

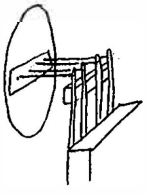
Fig 37



A is the membrane, B & C are fine springs with Platinum springs or rollers on their end E & F are two pieces of metal used as connections The lead pencil was rubbed on stone D between the rollers and the connecting pieces E & F This however did not give us the desired result as all we could get was a mumbling sound.

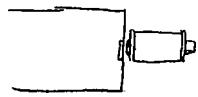
Another plan we tried was a band across the diaphragm with projecting pins which operated on the springs B Fig. 38.

38



The idea being to get the articulation by cutting out or putting in resistance.[2] Our receiver for these instruments was merely a stretched diaphragm with an armature on the centre and a magnet adjustable to it as in fig 39.

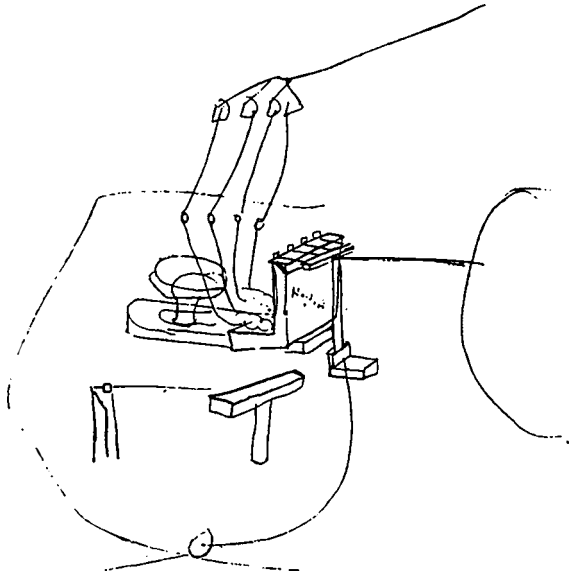
39



Our next transmitter was a disc of black lead in front (and adjustable) of the diaphragm.[3] This has been so far good. We have used a hard rubber diaphragm covered with blacklead. As the diaphragm vibrates it touches in more places and reduces the resistance. With this apparatus we have already been able to distinguish clearly (known) sentences well between New York and Menlo Park.[4]

X, NjWOE, Batchelor, Cat. 1317:33 (*TAEM* 90:673). Written by Charles Batchelor.

1. Charles Batchelor later testified that this design was a "method of increasing and decreasing the resistance of a current in a closed circuit by the movement of a diaghragm moving two springs, with rollers on their ends, on a film of plumbago or other conducting material, which film was part of the circuit, the movement of the diaphragm increasing the length of the film in circuit." In testing the transmitter the staff used a receiver consisting of "an electro magnet in front of an iron diaphragm placed in front of a resonant chamber, with an iron diaphragm on its end." Batchelor also commented that he had made the instrument himself and that it transmitted the human voice, but that he thought work on this design had begun previous to 6 February. A drawing of that date shows such a transmitter in a circuit. However, in a diary entry of 12 February, Batchelor drew a picture of this transmitter (and the receiver in figure 39) and said that he "Stayed [in Menlo Park] and worked all day on a new talking telegraph." The following day, he wrote "Worked all day on Talking Telegraph . . . not much good as yet very little encouragement from instruments." Batchelor's testimony, TI



A telephone transmitter design that uses a four-pronged contact instead of four individual pins to cut resistances in and out of the circuit.

2:230–31; Edison's Exhibit 6-11, TI 2 (*TAEM* 11:92, 225); Cat. 1233:43–44, Batchelor (*TAEM* 90:74–75).

2. Two pages of drawings of 11 February (Exhibits 9-11 and 10-11), as well as an instrument introduced into the Telephone Interferences, are related to the work described here. They are similar to Batchelor's Figure 38 but have a four-pronged contact attached to the diaphragm rather than four individual pins. According to Batchelor's testimony, "They illustrate the principle of cutting in and out resistance or batteries by means of a diaphragm or springs, in order to accomplish the rise and fall of tension of current in a circuit which always remains closed." Each spring is attached to a different resistance; for example, the ones in Exhibit 10-11 were labeled "1500," "1000," "800," and "500." TI 1:231 (*TAEM* 11:92); Edison's Exhibits 9-11–10-11, Exhibit Instrument 10-11, all TI 2 (*TAEM* 11:227–28, 647).

3. This is the first time that either Edison or one of his associates mentioned using a disk of solid carbon against the diaphragm in order to vary the resistance. In previous experiments, the carbon was layered on a surface such as a rubber disk or cylinder (see Docs. 799 and 860) or in an unpacked, unshaped form in a container (see Doc. 844 and Edison's testimony, TI 1:46 [*TAEM* 11:44]).

4. Notes from about this time made during telephone experiments (probably between Menlo Park and New York) are in Vol. 8:230–32; also see Vol. 8:123–24; both Lab. (*TAEM* 3:652–56, 555–56).