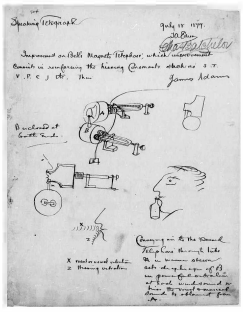
-972-

[Menlo Park,] July 18 1877.

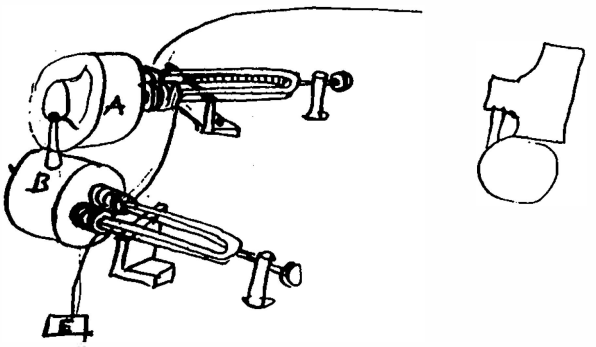
Technical Note: Telephony and Phonograph

Speaking Telegraph

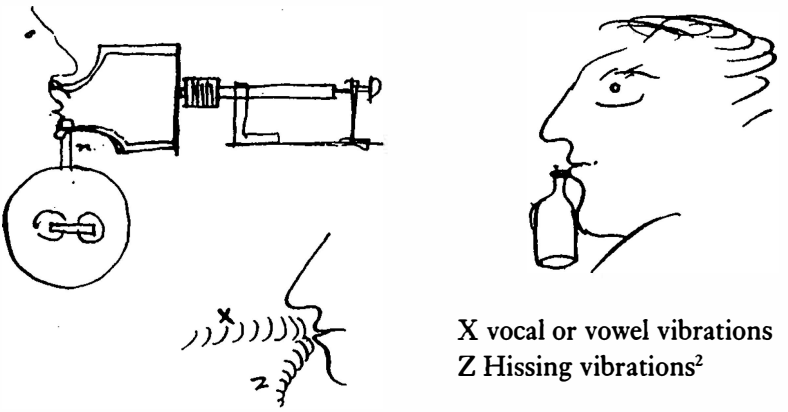
Improvement on Bells Magneto Telephone;[1] which improvement consists in reinforcing the hissing Consonants such[a] as S, T, V, P, C J etc. Thus



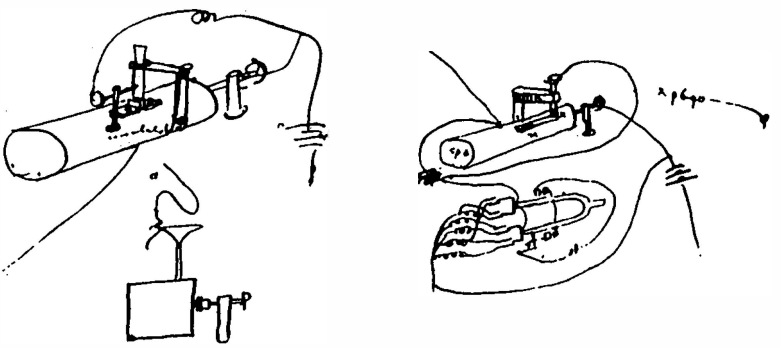
B enclosed at both ends.



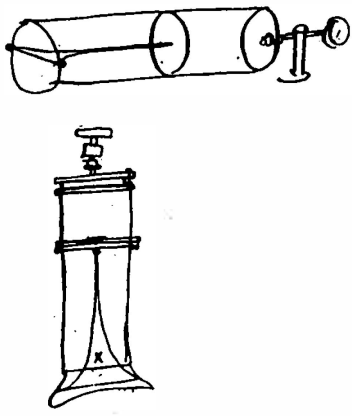
Conveying air to the second Telephone through tube ~~inn~~ in manner shewn sets diaphragm of B in powerful vibration at each wind sound or hiss the vowel & musical sounds be obtained from .A.



X vocal or vowel vibrations
Z Hissing vibrations[2]

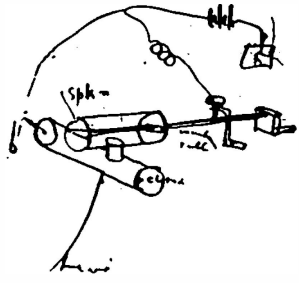


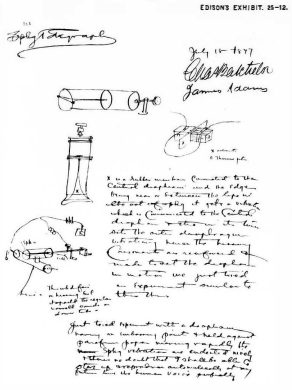
A hiss produces a wind pressure in tube & this raises n with more or less pressure against the plumbago point X this throws in a hiss sound produced by a tuning fork arranged to give a number of Contacts 1 after the other. [b]



X vulcanite
B Thermo pile

X is a rubber membrane connected to the central diaphram and the edge being near or between the lips in the act of spkg it gets a vibration which is communicated to the central diapham & this in its turn sets the outer diaphragm vibrating hence the hissing consonants are reinforced & made to set the diaphram in motion we just tried an experiment similar to this thus[3]





This wkd fair on hissing but it spoilt the regular vowell sounds on lower tube=

Just tried experiment with a diaphram having an embossing point & held against parafin paper moving rapidly the ~~new~~ spkg vibrations are indented nicely & theres no doubt that I shall be able to store up & reproduce automatically at any future time the human voice perfectly[4]

T A Edison

Chas Batchelor
James Adams

X and X (photographic transcript), NjWOE, Lab., Vol. 12:26; TI 2, Edison's Exhibits 24-12–25-12 (*TAEM* 4:15; 11:366–67). Document

multiply signed and dated. [a]Obscured overwritten letters. [b]Followed by row of closely spaced dots.

1. Bell's 1877 telephone transmitter did not use batteries to generate a line current. Instead, sound vibrations moved the metallic diaphragm in front of a permanent magnet, inducing a current in the line wire, which was wrapped around the magnet. Here Edison seems to be using long magnets (possibly permanently magnetized tuning forks) in an attempt to increase the strength of the signal, a serious problem with the Bell magneto telephone.

2. Figure labels are "insulated"; and "spk," "n," "X," and "X pbgo."

3. Figure labels are "spk=," "membrane rubber," "closed," and "line=." Two days later the staff further developed this idea of two chambers connected by a narrow tube to enhance sibilance. Edison's Exhibits 28-12, 32-12, TI 2 (*TAEM* 11:369, 371); Cat. 1233:201, Batchelor (*TAEM* 90:153).

4. Charles Batchelor later testified about these first sound-recording experiments (cf. App. 2).

> The first experiment, as I remember it, was made in this way: Mr. Edison had a telephone diaphragm mounted in a mouth-piece of rubber in his hand, and he was sounding notes in front of it and feeling the vibration of the center of the diaphragm with his finger. After amusing himself with this for some time, he turned round to me and he said: "Batch, if we had a point on this we could make a record on some material which we could afterwards pull under the point, and it would give us the speech back." I said, "Well, we can try it in a very few minutes," and I had a point put on the diaphragm in the center. This I had mounted on a grooved piece of wood that had been used for an old automatic telegraph. With this machine we got some of the old automatic telegraph paper, coated it over with wax, and I pulled it through the groove, while Mr. Edison talked to it. On pulling the paper through a second time, we both of us recognized that we had recorded the speech. We made quite a number of modifications of this the same night, and Mr. Edison immediately designed a machine which should be better adapted for giving us better talking.
>
> . . . The diaphragm holder was screwed down to the wood, but the screw at one side could be raised or lowered a little in order to bring the knife down for adjustment. . . .
>
> The shape of the channel at the bottom was perfectly flat. The adjustment, I think, was about a sixteenth of an inch, or thereabouts, and this was obviously necessary, as we could not tell exactly how thick our wax would be coated on the paper.
>
> The operation was: We put in the waxed paper, then adjusted the diaphragm so that the knife cut slightly into the wax, and then pulled it through, talking at the same time. Sometimes we adjusted the knife till it only just touched the wax. We adjusted this knife very many times in the first experiment; tried it in many different ways. I remember, when the wax was very thick, or when we had other devices, that I have lifted up the diaphragm as much as a thirty-second of an inch by putting washers under the screw-head, thus making an adjustment for a much thicker substance. [Pp.

586–87, *American Graphophone v. U.S. Phonograph* (*TAEM* 116:367)]

Edison's first public account of these experiments was in "A Marvelous Discovery," published in the *New York Sun* of 22 February 1878 (Cat. 1240, item 378, Batchelor [*TAEM* 94:115–16]). William Applebaugh, a telegraph and telephone company executive and friend of Edison's, related a story similar to Batchelor's in February 1878 ("Phonograph: A Machine that Talks and Sings," *Brooklyn Daily Eagle,* 26 Feb. 1878, Cat. 1240, item 385 [*TAEM* 94:117]). Other stories of the phonograph's genesis, more or less attributable to Edison, differ in many ways and often condense the time involved (e.g., App. 1.G24–26, Shaw 1878, and Lathrop 1890).