Phonautograms Made for the New York Metropolitan Elevated Railroad in 1878

Preserved at
the Thomas Edison National Historical Park
EDIS 30101 (1878)

Facsimile Edition by
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FirstSounds.ORG

Making the earliest audio recordings accessible to all people for all time
Introduction

Thomas Edison and Charles Batchelor began “experiments to determine the cause of the noise on the Metropolitan Elevated Railroad” in the hot Manhattan summer of 1878. Rather than record on tinfoil and make reproducible recordings of the noises, they modified a “Brady” phono-graph to trace waves on lamp-blackened paper which could be visually examined, per the Scott-Koenig phonautograph.

Compare the phonograph in the CDV to the left to the etching of the modified “Brady” phonograph used to trace phonautograms of elevated railroad noises in mid-1878 (below). The etching is remarkably true to the “Brady”, with alterations and additions specified by Batchelor’s design of July 7th (below). It offers the additional information that a pulley was incorporated to slow the rotational speed of the cylinder. From the New York Daily Graphic, July 19, 1878.

(Below) Batchelor’s mechanical drawing in which he specified to John Kreusi modifications and additions to be made to an existing phonograph. On the left, a long stylus bar is connected to the diaphragm and hinged to the casing, which leverages lateral waves onto the cylinder. The assembly to the right of the cylinder was used to mark the recording as it was being made.

Page 6 of Laboratory Notes Number 62.
Edison acknowledged to the New York Herald that “the principle [of the phonautograph] is the invention of Leon Scott, of France.... By the additions which I have attached for this purpose we are enabled not only to record all the sounds but to analyze each particular sound and tell the working condition of every section of a railroad.”

Edison likened each phonautogram to “a Chinese puzzle; all there but you’ve got to put it in proper shape.” However, he and Batchelor were unable to visually interpret the recordings, and Edison avoided every demand by MERR to testify at the grand jury inquisition into the matter.

He did succeed, however, in drawing extensive press attention to himself and this endeavor. The following images from the July 13 1878 editions of the New York Daily Graphic offer one of the more entertaining accounts.

Details from the front page of the New York Daily Graphic, Saturday, July 13, 1878. The David Giovannoni Collection.
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Preservation Notes

On October 26, 2007, First Sounds digitized primary documents related to the phonautograms made for, of, and on New York’s Metropolitan Elevated Railroad in 1878 by Thomas Edison and Charles Batchelor, at the Edison National Historic Site in New Jersey. Curator Jerry Fabris facilitated access to Laboratory Notes Number 62 and 16 unbound phonautograms taken between July 10th and September 19th (EDIS-30101). Although the relevant content of the notebook is published by the Edison Papers Project, the low resolution of the three phonautograms bound into the book has hindered researchers’ study of the intricate tracings. Moreover, images of the unbound phonautograms did not exist.

Examination finds the three bound phonautograms to be folded upon themselves. The material applied to preserve their tracings (possibly shellac) has adhered, which obliterates access to approximately one-third of each recording. The expert services of a paper or art conservator will be required to expose the tracings.

The unbound phonautograms were fixed with a lighter finish (possibly collodion) and are not folded. Their recorded surfaces are fully exposed. However, their tracings are generally less distinct than those on the bound phonautograms, and several sheets are frayed and torn on the ends.

The low-resolution images that follow document the relevant pages of the lab book, including one of the three bound phonautograms.

We extend our sincere thanks to Superintendent Greg Marshall, Supervisory Museum Curator Michelle Ortwein, and Curator Jerry Fabris of the Edison National Historic Site, National Park Service, for making these documents available for detailed study.

ENHS curator Jerry Fabris carefully prepares an unbound phonautogram for scanning.

Photos by David Giovannoni
LABORATORY NOTES.

Number 62.

Experiments to determine the cause of the noise on the Metropolitan Elevated Railroad.

T. A. EDISON,

Menlo Park, N. J.
Elevated railway noise  

July 8th 1874

1. We find that every joint is made directly on the cross tie.
2. We find that in riding inside the car there is a great noise where there are upright side rails to the road and a great number of girders.
3. We find that in most places when the cars go over the rails sink about 1/2 inch showing rails to be lifted up by heat or otherwise.
4. We find that the lattice girders some of which are weighted in malleable cast as leeks and continue the vibration for a long time after the train has passed.
5. We find that the part between Chambers St and Grand St is wide (very) with many spans far apart.
6. We find that the diagonal cross rods vibrate strongly.
7. We find that nearly all the rails but together leaving no room for expansion although that might be with the excessive heat today.
8. We find that trains run above (a little) do not make so much noise perhaps it would be better to stop and start quicker than run slower.
9. We find that most of the noise is due to the hammering on the guard rails by the trucks.

Edward M. Marchello 10 cents each
On the tracks we find that there is a sound produced by trucks on ends of rail also sound produced by wheel passing over every tie as it is much more relied on ties than between and the difference makes noise then again can also be noticed a truck peculiar to the wheel passing over every cross beam these all help to make the roar

Edum + Martheson $10 hours each
( ( ( First Sounds )) )))
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Handwritten note:

"Manuscript for experiments on Elevated V.R.

July 9th 1875

C. A. Batchelor"
Page 6 diagram (visually restored)
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July 4 1845

Aerophone

Wherever you put a small bell on centres in this fashion to the rod by pin and shellaced to diaphragm with a piece of solid rubber between. You will have to put a ring of metal between the mouthpiece and the body of casting in order to raise diaphragm high enough.

Can't be put together so.
1. In taking records from window on 6th av
I notice that the noise from a car that had
curtains round the wheels and also one that
a wooden box round the wheels was less
than any other train but very little.

2. I notice that there is a roar caused
by the wheels rubbing in the hollow
bottom of the car. The car also had some
about 4 or 5 inches deep and when the train
was rocking and starting it is plainly heard
to resound to the noise of the wheels over the
pavement and end of track. When at full speed
this seems to be a pure roar.

3. In taking records I notice on the train that
if I am in the end of train I get a very
more roar whereas if I am near Engine I
get very prominent waves. Therefore I know
there is a great deal of noise due to the
engine itself.

4. Noticed also from window on 6th av that when Engine
alone passed made a great deal of noise although it
F irst S ounds


gave poor record owing to it going so slow.

Tapping for exhaust is very difficult and when the rain gets too great a speed we stop and take again when it slows down a little.

On Aug 19th in tapping for crossjoints we had the machine out on end platform and at 9 it very poor record although it was sensitive. I think it was due to being as far away from engine.

Between Bleecker and Grand coming down so exceeding noisy and they run very fast there sometimes.
Example of Unbound Phonogram
(negative image)