

Tinfoil Phonograph Exhibitions - in Sight and Sound

By David Giovannoni

If press accounts are any indication, the public exhibitions of tinfoil phonographs in 1878 were really something. People reacted skeptically, then with amazement and awe, as THE WONDER OF THE AGE "Talks, Laughs, Sings, Coughs, Whistles, Produces the sounds of animals, and PLAYS CORNET SOLOS." It may seem quaint to us today, but in 1878 the idea that one's voice and other quintessentially ephemeral sounds could be captured from thin air, stored indefinitely, and repeated at will—at any speed, or backward, even after the speaker's death—blew peoples' minds.



A trade card promoting public phonograph exhibitions in Chicago. Note the scrap of tinfoil attached to the card, its recording intact. René Rondeau collection.

Curiously, little documentary evidence exists of public tinfoil exhibitions beyond these expansive and colorful newspaper accounts. The recordings were often destroyed, cut into pieces and recycled as souvenirs. Only a smattering of full foils purportedly from 1870s exhibitions survive; their provenance typically shaky, their recordings essentially irretrievable.

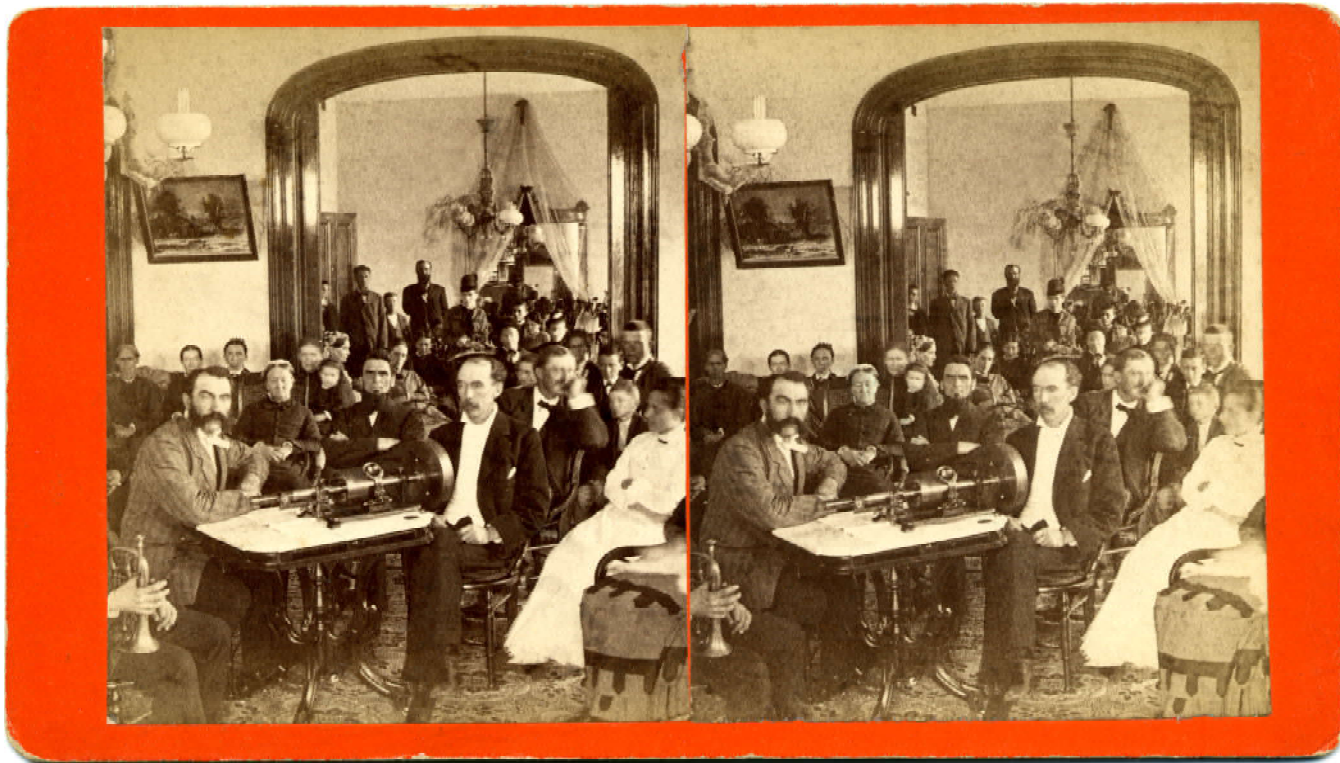
Even more curious is the absence of photographs taken at exhibitions. We might assume such public spectacles would be photo-worthy. However, newspapers did not send men with cameras as they were not yet able to print photographs.¹ Moreover, indoor photography required long exposures that precluded action shots of rapidly revolving mandrels and triple-tonguing cornetists.

What we can "see" of early phonographic soirees is typically limited to artists' renditions, and these images are limited to the March-April period of exhibitions for scientific bodies and influential individuals—not the paying public.

To our knowledge, only one photograph and one interpretable tinfoil made at public phonograph exhibitions survive from the 1870s. The image is in private hands; the recording is in a museum. Both are American, and both are sufficiently solid in provenance to convince us they are neither recreations nor fakes intended to deceive.

"Phonograph in Sanitarium Parlor"

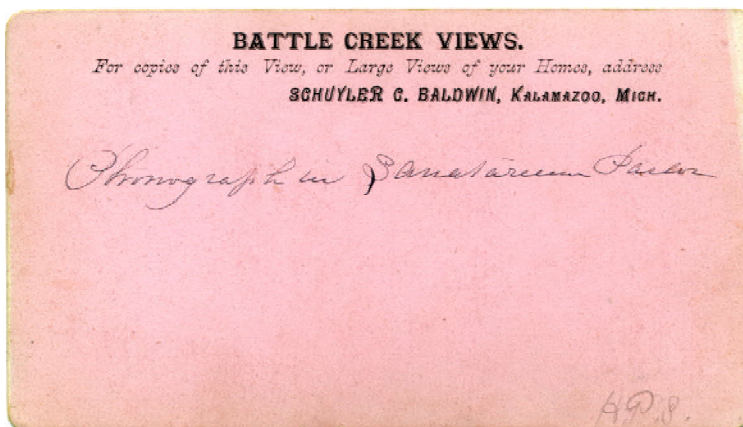
Amazingly, the only known photograph of a phonograph exhibition is a stereoview. Hand-written script on the backside reads "Phonograph in Sanitarium Parlor". The card is in the series Battle Creek Views and is the work of Schuyler C. Baldwin's studio in Kalamazoo, Michigan.²



"Phonograph in Sanitarium Parlor" by "Schuyler C. Baldwin, Photographer, Kalamazoo, Mich." Shown actual size (4" x 7"). The author's collection.

The Sanitarium is none other than John Harvey Kellogg's renowned Battle Creek Sanitarium—the health and wellness facility in which Granola and corn flakes would eventually be invented (think Kellogg's of Battle Creek). Dr. Kellogg sits frame left, arm resting on the table that holds the phonograph. Frame right is Ella Eaton in her flowing white nurse's uniform. (She and Dr. Kellogg were married in that very parlor in February 1879.) An unidentified exhibitor sits at the phonograph table.

Barely visible are the hand of a cornetist and his cornet. The image is remarkable in many ways, not the least of which is how the mirror on the back wall reflects the audience members, the backs of their heads further enhancing the perspective.



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“The San”

In 1866 a group of Seventh-Day Adventists opened the Western Health Reform Institute in Battle Creek, Michigan as an experiment in healthy living. It began modestly with a staff of two doctors, one nurse, and assorted assistants. In July 1876, 25 year-old John Harvey Kellogg was hired as Physician-In-Chief and immediately began raising funds for an institute worthy of grander aspirations. In the spring of 1878 a beautiful new facility opened its doors to a capacity of 300 guests. This "Medical and Surgical Sanitarium" would become better known as the "Battle Creek Sanitarium" or simply "the San".

"Sanitarium" was a word of Kellogg's own devising, meaning a place where people got well and learned to stay well. Viewed by many as a "temple of health," the San's halls carried mottoes such as "Eat That Which Is Good" and "Air and Sunshine, Nature's Tonics." Kellogg believed the keys to good health lay in "biologic living," a concept that emphasized fresh air, good posture, exercise, a healthy vegetarian diet, various European health therapies such as "Swedish movements" and massage, muscular stimulation by electricity and abstention from stimulants such as alcohol or tobacco, and clothing that allowed the body and bowels to move freely (no corsets!). Although those measures were common to the broader health reform movement, Kellogg claimed to have made them "scientific" for the benefit of mankind.

The Sanitarium sought to refresh the body, mind, and spirit by offering the best elements of "a medical boarding-house, hospital, religious retreat, country club, tent Chautauqua, and spa."³ Education of its guests was paramount, and on Wednesdays and Fridays at 9:00 a.m. Kellogg or guest speakers offered lectures in the grand parlor on the first floor—the "Sanitarium Parlor" shown in the stereoview.

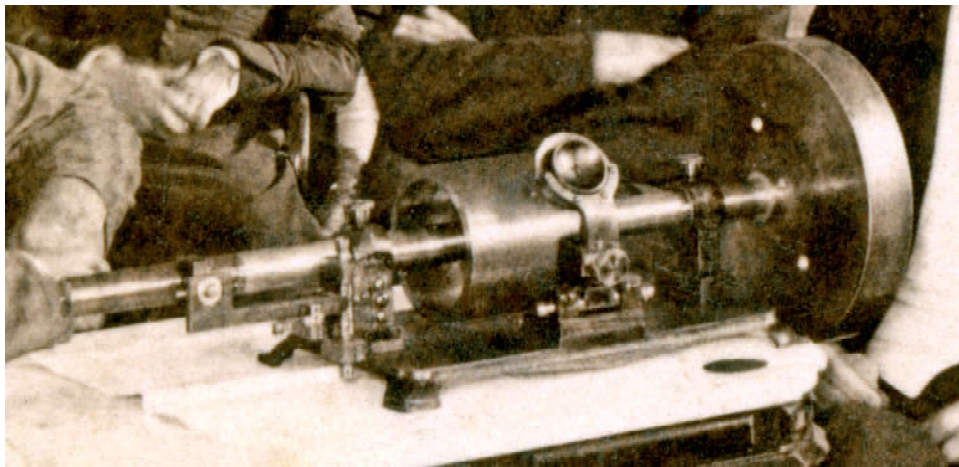


Guests exercise with hand weights in the Sanitarium's gymnasium to the accompaniment of organ music. "Air and Sunshine, Nature's Tonics" is the motto mounted on the back wall. (Not shown at actual size of 4" x 7".) The author's collection.

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The date of the photograph has yet to be determined, but the phonograph itself provides some clues. Records of the Edison Speaking Phonograph Company⁴ indicate phonograph no. 9 was sold to George H. Lott of Grand Rapids, Michigan in May 1878. The phonograph in the image looks as if it might be a variant on an early model (a variant not known to have survived),

Schuyler C. Baldwin, self-portrait. Kalamazoo Valley Museum. Baldwin's images are highly valued for their quality and often unique historical views. A number of institutions, including the New York Public Library and the Getty Museum, hold significant collections of his work. Perhaps other images of this phonograph exhibition or even the negatives of this view still exist!



but with modifications that in their entirety would not become available until the fall of 1878—a large heavy flywheel, a throw-out lever, and a tilting speaker arm with means to adjust the depth and position of the stylus.

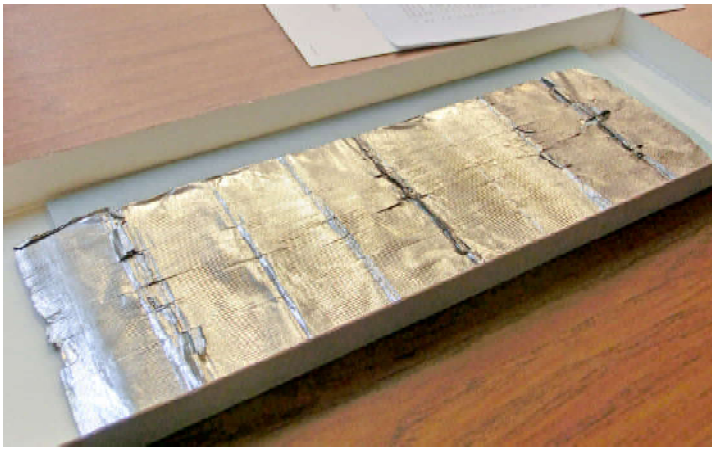
The photograph was posed rather than taken during recording or playback.

Still, it virtually transports us into the room during the phonograph's exhibition. If only we had some sound to go with it....

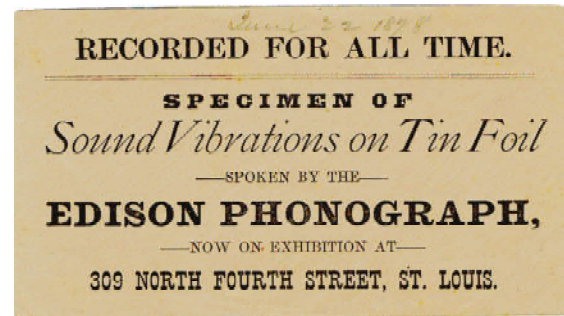
The "St. Louis Tinfoil"⁵

In July 1978 Helen Sweet Maier (1897-1988) donated a tinfoil recording to the Schenectady Museum for display in General Electric's centennial exhibition. The artifact had belonged to her father, Forest G. Sweet (1869-1956), a collector of historical documents who lived in Battle Creek, Michigan. The foil arrived folded in a souvenir envelope from an Edison phonograph exhibition at 309 North Fourth Street in St. Louis, Missouri, "June 22, 1878" written in pencil at the top. To better conserve the artifact, museum curators removed the recording from the envelope, unfolded it, and placed it in an archivally-appropriate acid-free box for permanent storage.

Records of the Edison Speaking Phonograph Company⁶ indicate that two Exhibition Phonographs were sold into St. Louis in early 1878. Thomas Mason acquired serial no. 8 in April and K. K. Eldred bought serial no. 3 in May. Given these and the June 22nd dates, the phonograph on which the tinfoil was recorded was most likely made by Hope Machine Works of East Newark, New Jersey, or Partrick & Carter of Philadelphia, Pennsylvania. Both machines lacked the flywheel that would later help stabilize rotational speed while cranking (quite apparent in the raw digital playback). They also lacked a crimping channel in the



The tinfoil in its current archival housing, and the front and back of the envelope in which it was preserved for its first 100 years. Courtesy of miSci, Museum of Innovation & Science, Schenectady, New York.



mandrel. The tinfoil has no end crimps, and its 20 grooves per inch match the 20 TPI mandrels observed on surviving phonographs.

Exhibition notices first appeared in the St. Louis Post of May 30, 1878. An advertisement ran consistently between May 30th and June 15th, with brief notices appearing through June 17th in the "amusements" column. Per the final notice:

The phonograph now on exhibition at 309 North Fourth street is proving to be a great attraction. I.X. Peck shows and explains the wonderful invention daily.

I.X. Peck was Thomas Mason's pen name. Mason was described as a writer of "funny sketches" who worked as a clerk in a Main Street wholesale hosiery house; "had he lived in the present day of newspaper pictures he would have succeeded as an illustrator of his own writings, for he was a natural born artist and caricaturist."⁷ It is likely, though not certain, that the tinfoil contains his voice. He died of sunstroke the following month in an Ellston, Missouri heat wave.⁸ He was 49 years old.

In 2012 Earl Cornell and Carl Haber at Lawrence Berkeley National Laboratory recovered raw audio signals from the tinfoil. The recording yielded a cornet solo and two spoken nursery rhymes, performances totally consistent with published accounts of exhibitions. Unfortunately, cranking irregularities and noise from the folded, torn, and otherwise distorted foil made the audio difficult to interpret. In fact the sound was so bad that listeners thought they heard persons who didn't record and words that weren't spoken!

To be fair, the phonograph's audio quality wasn't terrific in June of 1878, either. Its frequency response was extremely limited and its pitch instability was off the charts. Edison himself was quick to admit that exhibitions demonstrated the concept but not the potential of the phonograph. Exhibitors addressed these deficiencies by performing material familiar to all (e.g. nursery rhymes) and playing back recordings immediately after they were made. Analysis of the foil reveals that the phonograph was indeed stopped after each performance so the audience could hear the playback while the original was fresh in their minds. Listeners who knew what to expect heard what they expected—whether the phonograph delivered it or not!

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Forensic Speed Analysis of the St. Louis Tinfoil

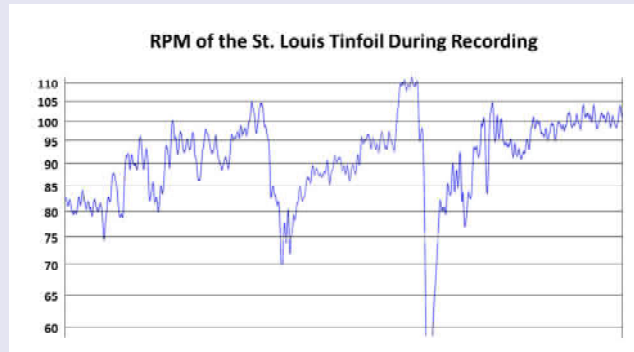
Speed instability during recording results in pitch wavering on playback. And although exhibitors spun the odd sounds as comical effects, they were (and are) flaws, not features, burned into every hand-cranked recording. The St. Louis foil was recorded on an early phonograph that lacked a heavy flywheel to smooth speed variations, so it's particularly wobbly.

Audio restoration begins by ironing out these fluctuations. Unfortunately there's no way to know the speed at which a tinfoil phonograph's mandrel was rotating at any time. The raw audio retrieved via scanning must be played back at an arbitrary constant rotational speed which, by necessity, is wrong at virtually every point along the foil. The pitch of the audio wanders upward when cranking speed slowed during recording and sinks downward when cranking speed accelerated.

We can compensate for the wavering lathe by closely analyzing pitch changes in the recorded content. It takes specialized software, a trained ear and a lot of patience, and as with any restoration there's some subjectivity. But the result is a recording that's easier to hear and interpret accurately.

The process yields a nice forensic bonus by documenting the ever-changing speed at which the mandrel was cranked during recording. The graph here shows the cranking speed of the foil along its full length in RPM (revolutions per minute). The speed changed literally microsecond to microsecond. There are three sources of speed fluctuation.

- The first, the finest, is caused by the operator propelling harder on the downstroke than the upstroke (or vice versa). Variation of a semitone within a revolution is not uncommon. It's the "wow" sound made by an off-center disc or cylinder on playback, except more extreme and less regular in its waver.
- Lathe drift is the second source of variation. The operator sped up his cranking as each performance progressed. During the cornet recording, for instance, speed rose from roughly 80 to more than 100 RPM. Without correction during playback, the cornet sinks in pitch by five semitones.
- The grossest source of speed variation comes from stopping and restarting the phonograph while recording. The two steep plunges on the graph are where the mandrel was stopped before playing back the new recordings. "Old Mother Hubbard" was being spoken as the phonograph was coming up to speed in the third track. Before correction, twenty-first century listeners unfamiliar with this phenomenon misinterpreted what they heard as a woman's voice. This effect is commonly heard on wax cylinders recorded at home for the same reason—the phonograph was ramping up to speed when little Jimmy or Grandma started yowling.



The estimated recording speed at every point along the tinfoil as determined by the author. Celemony's CAPSTAN and iZotope RX 7 Advanced were used in the restoration of the audio.

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Today we lack the benefit of having heard the recordings as they were made, and we need to undertake a lot of forensic analysis and digital restoration to retrieve what was recorded that day. A few years ago I began analyzing and correcting the pitch changes caused by uneven cranking during the three performances. With these restorations now done, it's fair to claim that we can hear the performances better than anyone has heard them since they were recorded in 1878.

You might want to listen while viewing the stereoview in 3-D. That's about as close as we'll ever get to a pioneer phonograph exhibition in the first year of the invention's infancy.

Restored audio of the St. Louis Tinfoil can be heard at <https://www.antiquephono.org/tinfoil-speed-corrected-version/>, or use this QR code from your mobile device.



For reference, LBL's audio from 2012 is here: <https://www.antiquephono.org/tinfoil-original-version/>, or use this QR code.

Thanks to Chris Hunter at miSci for sharing his research and miSci's images of the "St. Louis Tinfoil", to LBL for the foil's raw audio, and to Patrick Feaster for his interpretive ear.

NOTES

1 The first photomechanical reproduction of a photograph published in an American newspaper appeared in the *New York Daily Graphic* on March 4, 1880.

2 See "Schuyler C. Baldwin: Pioneering Kalamazoo Photographer". Kalamazoo Public Library, <http://www.kpl.gov/local-history/biographies/schuyler-baldwin.aspx>, retrieved April 19, 2019.

3 Gerald Carson, *Cornflake Crusade* (New York: Rinehart & Company, Inc., 1957), 12.

4 René Rondeau. *Tinfoil Phonographs: The Dawn of Recorded Sound*, 2001, p. 158.

5 From unpublished research by Chris Hunter, Vice President of Collections & Exhibitions, miSci—Museum of Innovation & Science, Schenectady, NY.

6 René Rondeau. *ibid.*

7 *Publications of Missouri Historical Society*, Volume 1, Issue 12, 1896, p. 19.

8 *New York Daily Tribune*, July 18, 1878. The article also mentions the continuation of the heat wave that topped 102 degrees on July 17, killing 145 people due to sun stroke with another 1,500-2,000 requiring medical attention.

9 Dyer, F. and Martin, T. (1910). *Edison*. New York: Harper, p.210.

TRANSCRIPT OF THE ST. LOUIS TINFOIL RECORDING

CORNET SOLO

SPEAKER:

Mary had a little lamb
Its fleece was white as snow
And everywhere that Mary went
That lamb was sure to go.
{feigned laughter}

SPEAKER:

Old Mother Hubbard
Went to the cupboard
To get her poor dog a bone.
But when she got there
The cupboard was bare
And so the poor dog got none.
{feigned laughter}
Well, that was pretty hard on the old dog!
{imitation of a rooster's crow}

