NPS Form 10-900 OMB No. 1024-0018

United States Department of the Interior
National Park Service

799

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in National Register Bulletin, *How to Complete the National Register of Historic Places Registration Form.* If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions.

1. Name of Property

Historic name: Standard Material Company/Gyro Motor Company
Other names/site number: _____
Name of related multiple property listing:

_____

(Enter "N/A" if property is not part of a multiple property listing

2. Location

Street & number: 770-774 Girard Street, NW, Washington, D.C. 20001
City or town: Washington, D.C. State: DC County: _____
Not For Publication: ☐ Vicinity: ☐

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended,

I hereby certify that this _X_ nomination ___ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60.

In my opinion, the property _X__ meets ___ does not meet the National Register Criteria. I recommend that this property be considered significant at the following level(s) of significance:

_X__national ___statewide _X__local

Applicable National Register Criteria:

_X__A _X__B ___C ___D

DAVID MALONEY, DC SHPO 8/4/2014
Signature of certifying official/Title: **Date**

DC HISTORIC PRESERVATION OFFICE
State or Federal agency/bureau or Tribal Government

In my opinion, the property ___ meets ___ does not meet the National Register criteria.

_____
Signature of commenting official: **Date**

Title : **State or Federal agency/bureau or Tribal Government**

4. National Park Service Certification

I hereby certify that this property is:

✓ entered in the National Register

___ determined eligible for the National Register

___ determined not eligible for the National Register

___ removed from the National Register

___ other (explain:) _____

Patrick Andrus — Signature of the Keeper

9/30/2014 — Date of Action

5. Classification

Ownership of Property

(Check as many boxes as apply.)

Private:	X
Public – Local	
Public – State	
Public – Federal	

Category of Property

(Check only **one** box.)

Building(s)	X
District	
Site	
Structure	
Object	

Number of Resources within Property
(Do not include previously listed resources in the count)

Contributing	Noncontributing	
1		buildings
		sites
		structures
		objects
1		Total

Number of contributing resources previously listed in the National Register 0

6. Function or Use
Historic Functions
(Enter categories from instructions.)
INDUSTRY/PROCESSING/EXTRACTION

Current Functions
(Enter categories from instructions.)
VACANT/NOT IN USE

7. Description

Architectural Classification
(Enter categories from instructions.)
_OTHER/Vernacular__
_____
_____
_____
_____
_____
_____

Materials: (enter categories from instructions.)
Principal exterior materials of the property: _Brick_____

Narrative Description
(Describe the historic and current physical appearance and condition of the property. Describe contributing and noncontributing resources if applicable. Begin with **a summary paragraph** that briefly describes the general characteristics of the property, such as its location, type, style, method of construction, setting, size, and significant features. Indicate whether the property has historic integrity.)

Summary Paragraph

The Standard Material/Gyro Motor Company building consists of an early 20th century, two-story, brick industrial building located on two large urban lots at the rear of 770-774 Girard Street NW in the Pleasant Plains section of the Columbia Heights neighborhood of Washington, D.C. The building was constructed in two principal phases in 1902 and 1910-11, with a rear addition dating to 1945. The original 1902 section of the building is the two-story, five-bay eastern section, constructed for the Standard Material Company for operations related to improving the flat disc record for sound recordings. In 1910-11, the slightly taller, seven-bay, two-story western wing was added to the building to house the Gyro Motor Company, involved with the improvement of the Berliner Gyrocopter; the manufacture of the Gyro Motor(s) for use in the bi-plane; and for the improvement of the Berliner Helicopter. A one-story 1945 brick addition at the rear of the building was constructed as a machine shop for the Modern Machinists Company. The entire building is set back from Girard Street with a large asphalted area in front. The 1910-11 western wing and the 1945 addition extend to the rear of the lot with frontages on the alleyway.

The Standard Material/Gyro Motor Company building is located along a densely residential street of modest two-story rowhouses and small to medium-sized apartment buildings built between 1890 and 1940 with some occasional contemporary infill.

Narrative Description

The Standard Material/Gyro Motor Company building is a two-story brick industrial structure designed with minimal architectural embellishments. The building was constructed in three phases, clearly distinguishable by its three distinct parts: the 1902 eastern wing; the 1910-1911 western wing; and the one-story 1945 addition at the rear of the lot. The building is set well back from Girard Street with its north elevation facing the street. As seen from Girard Street, the north elevation consists of the five-bay-wide eastern wing (1902) and the seven-bay-wide western wing (1910-11) with a single-story bay addition at the eastern end of the building. This entire elevation is clad in a stucco finish painted white that attempts to unify the separate phases of construction.

The 1902 eastern wing sits upon a low foundation and is covered with a flat roof that is slightly lower in height than the roof of the western wing. This roofline has been raised several feet from its historic height, but is not discernible on the exterior due to the stucco finish. The change in height is clearly visible on the interior where several rows of concrete block sit atop the brick supporting the new sloped roof. The irregular bays are defined by single window openings with segmental-arched brick lintels on both the first and second stories. Double-wide replacement doors are located on both the first and second stories in the second bay from the west. A long metal stair and landing extends along the side of the façade to this second-story entry level.

The north elevation of the western wing has seven bays of single windows in both stories. A pedestrian door is found in the eastern-most bay of the first story rather than a window. The westernmost window on the second floor was historically a larger opening with a block and tackle pulley system, still apparent on the interior. All of the windows on this façade have vinyl replacement sash with false multi-light muntins. Two small chimneys project from the roofline of the north elevation of the western wing. A one-story, one-bay addition is located at the far eastern end of the building connecting the façade of the building to the 1945 rear addition.

The south elevation of the building includes the south elevation of the western wing, and a partially exposed south elevation of the eastern wing, obscured by the 1945 one-story addition. The south elevation of the western wing has five windows and a large vehicular door opening on the first story and seven windows at the second story. The door, located in the western-most bay, retains an early double metal door. Continuing east along the south elevation are four like-windows and one of a notably smaller size, all of which feature replacement window units appearing to be faux multi-light and vinyl. The second floor has seven windows, six of which are standard sized and one of which is smaller. These windows include both replacement and historic window sash. There are several original wood windows in need of restoration.

The remnant of a former loading dock is located between the south elevation and the alleyway. The concrete loading dock was built at the ground floor level of the south facade extending over an exposed, English-style basement that also spans much of that elevation. Due to the deterioration of the loading dock platform, the basement entrance is fully exposed. The basement maintains a pedestrian entrance and is approximately eight-feet deep. A single pedestrian door is located at the basement level.

The south elevation of the eastern 1902 wing is set back from the alley and from the eastern side wall of the western wing. It is abutted at the first story level, by the 1945 wing, leaving only the second floor of the 1902 wing visible along this south side. This second story level includes five single windows set within segmental arched openings with brick lintels. Prior to construction of the 1945 addition, the recessed 1902 wing and the deeper 1910-11 wing, created a courtyard area between them that was used as an assembly area and workspace for the Gyro Motor Company.

The 1945 wing fills in this court area. It is set upon a raised concrete foundation with walls of brick above and is covered by a slightly sloping shed roof. Unlike the two principal wings, the addition is of an irregular form extending between the east and west wings to the southeast corner where it turns to append the entire east wall of the 1902 wing, terminating at the north elevation of the building. The south elevation of the 1945 wing faces the alley and has three large steel sash windows behind metal grates. The second story of the 1902 wing rises above the 1945 addition exposing the second story of the eastern wing's east elevation. This wall is brick with no openings, but with a stepped roofline.

The west elevation of the property includes the west elevation of the 1910-11 western wing and consists of an exterior brick wall with two openings located near the southwest corner of the building. The two windows are standard size and feature vinyl replacement windows.

Interior Description: The Standard Material/Gyro Motor Company's interior is a largely unfinished industrial space with brick masonry walls and concrete floors. Wooden structural columns carry wooden beams which extend the length of the rooms and support wooden floor joists above. The building consists of five rooms: the first and second floors of the 1902 Standard Material Company building (eastern wing); the first and second floors of the 1910-11 addition made for the Gyro Motor Company (western wing); and the interior of the 1945 one-story addition. The spaces are open with no finishes or features surviving. All of the original windows and window trim are missing, though the original brick arches and wood sills are intact. There is evidence of plaster having coated the brick walls, but presently all of the walls are exposed brick. The raw state of the interior reveals several alterations to the building. Of particular note, the ceiling and roof of the 1902 building were raised by several feet; the second floor windows on the south side have been filled in to accommodate the 1945 rear addition; and a large second-floor opening on the façade of the 1910-11 wing (at the western end) has been filled in to the size of a regular window opening. The original beam for a block and tackle pulley system survives on the interior where this opening was historically. According to the 1904 Sanborn Map, the first floor of the then Standard Material Company building (eastern wing) was used for storage, while the second floor was used for manufacturing of flat disc records. There

are no equipment or fixtures associated with the building's use as either the Standard Material Company or the Gyro Motor Company.

INTEGRITY

The Standard Material-Gyro Motor Company retains integrity of location, setting, design, materials, workmanship, feeling, and association. The building--an industrial brick building with no architectural or artistic embellishments—remains on its original site and location and retains its original massing and fenestration patterns. A modest addition from 1945 exists at the rear of the building, but it does not detract from the massing of the two principal wings of the building and is in keeping with the industrial and commercial use of the building. And, while the original windows have been replaced, the openings remain intact. These alterations do not detract significantly enough to diminish these aspects of the building's integrity.

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

- [X] A. Property is associated with events that have made a significant contribution to the broad patterns of our history.
- [X] B. Property is associated with the lives of persons significant in our past.
- [ ] C. Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- [ ] D. Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations
(Mark "x" in all the boxes that apply.)

- [ ] A. Owned by a religious institution or used for religious purposes
- [ ] B. Removed from its original location
- [ ] C. A birthplace or grave
- [ ] D. A cemetery
- [ ] E. A reconstructed building, object, or structure
- [ ] F. A commemorative property
- [ ] G. Less than 50 years old or achieving significance within the past 50 years

Areas of Significance
(Enter categories from instructions.)
COMMUNICATIONS
ENGINEERING
TRANSPORTATION

Period of Significance
1902-1926

Significant Dates
1902; 1909; 1910-1911; 1920; 1926

Significant Person
(Complete only if Criterion B is marked above.)
Emile Berliner

Cultural Affiliation

Architect/Builder

Statement of Significance Summary Paragraph (Provide a summary paragraph that includes level of significance, applicable criteria, justification for the period of significance, and any applicable criteria considerations.)

The Standard Material/Gyro Motor Company building at 770-774 Girard Street, NW in Washington, D.C. is eligible for the National Register under Criterion A, at the local level, and under Criterion B, at the national level of significance. The property meets Criterion A for its associations with important advancements in flat disc records; experimentation and advancements in vertical flight; and the improvement and commercialization of the first Gyro Motor used in the bi-plane. All of these events occurred at least in part within the building, designed in two phases for use by the Standard Material Company and the Gyro Motor Company.

The two-story factory building at 770-774 Girard Street was built in 1902 by and for the Standard Material Company, organized in 1900, officially by Joseph Sanders, as owner, but in collaboration with Emile Berliner who served as the company's president until 1920. The company was established to improve the quality of the flat disc record, and to that end, Sanders and his team used the building on Girard Street to develop a compound that would create a more durable material for the production of the flat disc. The company continued to experiment with improving the material for discs, produced discs, and conducted other experiments, including developing a tone arm, or divided horn on-site. In addition, the company used its institutional knowledge of the gramophone to repair and provide parts for the gramophone which were then being manufactured exclusively by Victor.

In 1910-11, the Standard Material Company built an addition to abut the west side of the 1902 building, more than doubling its size, to house the Gyro Motor Company. The Gyro Motor Company was established in June 1909 by Emile Berliner and co-founders Robert S. Moore, and J.L. Simmons for the experimentation and manufacture of light engines and apparatus for vertical flight. The team had been experimenting with engines and flying machines for use in flight in the years prior to establishment of the Gyro Motor Company. In 1902, Berliner designed the Berliner Aeroplane (ultimately unsuccessful) and in the ensuing years devised the Aeromobile. Between 1905 and 1908, Berliner began development of an engine type for use in his aeromobile, a vertical flight apparatus that was later improved to become the Berliner Helicopter.

During this period, the Gyro Motor Company developed and patented several versions of the Gyro Motor that came to be noted for its endurance rating. By the mid-1910s, the Gyro Engine had become a preferred choice for use in bi-planes. In 1919, Henry Berliner (Emile's son) joined the family business and the father-son team reinvigorated Emile's experimentation with vertical flight engine and apparatus design. Their experimentation was primarily conducted at 770-774 Girard Street, which by 1920 was entirely occupied by the Gyro Motor Company. The experimentation culminated in the successful invention of the Berliner Helicopter. The Berliner Helicopter flight in June 1922 at College Park, Maryland achieved not only vertical lift-off, but controlled forward flight. The flight created a national frenzy and is considered a landmark in

the history of vertical flight. The building housed the Gyro Motor Company until 1926 when the company moved to Alexandria, VA and later Baltimore, MD.

The building also meets National Register Criterion B for its associations with the genius, innovations, and inventions of Emile Berliner. The building is the only known remaining physical resource associated with the major accomplishments in the life of inventor, scientist, humanitarian and philanthropist, Emile Berliner. German-born Washington, D.C. resident Emile Berliner (1851-1929) had an extraordinary life with internationally recognized and notable inventions and accomplishments in the fields of science, technology, and health. Berliner's greatest contributions to modern technology are generally considered those related to the invention of and improvement to the transmission, recordation and reproduction of sounds, namely the microphone, gramophone and the flat disc record. At the same time, however, Berliner also made great strides in the nascent aeronautics industry, experimenting with and designing engines and vehicles for use in flight. Although several of these inventions—the Berliner Aeroplane and the Aeromobile—proved unsuccessful, others such as the Gyrocopter, the Gyro Engine, and the Berliner Helicopter contributed significantly to the progress of both traditional and vertical flight.

The Period of Significance for the Standard Material/Gyro Motor Company building extends from 1902 when the first section of the building was constructed for the Standard Material Company until 1926, the last year when the Gyro Motor Company is known to have operated out of the building.

Narrative Statement of Significance (Provide at least **one** paragraph for each area of significance.)

The Standard Material/Gyro Motor Company building is significant in the Area of Communications for its improvement to and production of the flat disc record. The Standard Material Company operated in the eastern wing of the building from its construction in 1902 until 1920 when the Gyro Motor Company took over the entire building. Establishment of the Standard Material Company followed years of patent issues and legal battles between Emile Berliner and others over the gramophone. Although Berliner ultimately ceased all operations related to the production of the Gramophone in the United States, his interest in perfecting "records of sound" endured. Berliner employed a small staff to perfect the flat disc record, including his nephew and son-in-law Joseph Sanders, who established Standard Material Company in 1902 on his behalf. In 1905 Sanders patented, under his own name, a composition for sound record tablets and resinous material as a substitute for rubber. The Standard Material Company was reorganized to produce this composition and negotiate the patent rights to the leading disc record manufacturers throughout the world. The Standard Material Company building at 770-774 Girard Street was a primary site of these innovations that ultimately improved the quality of the reproduction and recording of sound. This remained the predominant material used to produce flat disc records until after the Second World War.

The Standard Material/Gyro Motor Company building is significant in the Area of Engineering and Transportation for its contributions to the advancement of aeronautics. Following his inventions related to sound and sound recording, Emile Berliner's principal interest became that of the advent of vertical flight. Creating a successful helicopter required a lighter engine than had been developed previously, and so Berliner hired a team of experts to experiment with developing one. His innovations led to the development of the ante-torque mechanism that exists as a Berliner contribution of the Helicopter today. However, the engine, as rebuilt, was an improved aircraft engine and, when employed in the bi-plane, it broke flight records and increased endurance. This presented a commercial opportunity for Berliner, diverting his attention from vertical flight to the establishment of the Gyro Motor Company and its manufacturing operations at 770-74 Girard, allowing for important strides in aviation.

Once the bi-plane engine had run its course, Berliner was able to rekindle his interest in vertical flight, coupled with his son, Henry, who in 1919 had graduated from MIT and joined his father at the Gyro Motor Company. At this time Henry Berliner, along with his father and the other Berliner employees at the Gyro Motor Company, developed a new version of the helicopter, which would lead to an important "first flight" at College Park, Maryland, where the "Berliner Helicopter" would be the first of its kind in history to rise vertically and then move forward.

The headquarters of the Gyro Motor Company were located at 770-774 Girard Street NW from the construction of the Gyro Motor Company addition to the building in 1910-11 until 1926 when the company moved to Alexandria, VA.

The Extraordinary Life and Accomplishments of Emile Berliner (1851-1929)

Native to what was, in the mid-19th century, a socially progressive Germanic kingdom, it is no surprise that Emile Berliner formed to be one of the most eminent and successful Americans of the late 19th and early 20th centuries—not to mention of primary eminence in Washington, D.C. Emile Berliner was born to Samuel and Sarah (Friedman) Berliner, on May 20, 1851 in the family's four-story stone building—he was the fourth of at least twelve children. While operating a linen manufactory, Samuel Berliner (1813-1872) was also highly literate, devoting his time to the study of Talmud. In traditional Judaism, women did not, and still do not, study religion, but are geared towards domesticity—fortunately, for Sarah (Friedman) Berliner (1826-1903), this segregation allowed her to pursue her love of music, a passion so great that it would be instilled in all of her children. The greater Berliner family had been a fixture in the Hannover's Jewish community since the late 18th century.[1]

By the 19th century, Germanic kingdoms had evolved into the most socially progressive nations for Jews outside of Bohemia, allowing the population to flourish as a community within the greater realm of German society. This was especially true in Hannover under King George V (1819-1878), who reigned from the year of Berliner's birth until 1866 when Hannover was

[1] Wile, Frederic William. *Emile Berliner: Maker of the Microphone.* Indianapolis: Bobbs-Merrill Company, 1926.

overtaken by Prussia. While George V was best known for his interest in the industrial development of Hannover, the king also had a great interest in music. It is well known historically that George V was completely blind, which no doubt accounted for his acute awareness of sound(s). As a result of his love for music, the royal opera was free to the citizens of Hannover. This included the Jewish population. In turn, this enabled and fed Sarah Berliner's love of music. Even with eleven-surviving children, Sarah Berliner instilled a love for music in her brood—especially, in her bubbala, Emile—taking him often to the Opera, just the two of them. This luxury diminished at the close of George V's reign in 1866.[2]

Berliner's education consisted of public school in Hanover until his tenth year, at which time he matriculated as one of the 35 students at Scunsanschule of Wolfenbuttel—one of the foremost Jewish schools in the German states located 30 miles southeast of Hannover. Here he realized his talent in drawing and penmanship—he also excelled in reading, portrait painting and music. This component of his education occurred from 1861/62 to 1865. Upon graduation, Berliner was an apprentice with his uncle, Meyer Berliner, who was a washer and dyer of silk and wool, perhaps enticing his nephew's interest. This was a strict lifestyle of long days and hard work. As stated, in 1866, Hannover became subject to the Prussian government, which, in turn, led to the prevalence of Prussian militarism. Between 1867 and 1868, Berliner changed professions. He took up employment in a mercantile, during which time he worked to improve his father's business. This family-inspired, part time job led him to improve their mechanical devices. Berliner developed a more efficient loom. He was then roughly 16.

In anticipation of Prussian conscription, Berliner passed examination for the *Einjährige-Freiwillige*, requiring only one year of military service of the "educated" citizens. However, with Prussian rule also came the subtle restoration of anti-Semitic sentiments, making his once progressive Hannover less pleasant for the Jewish community. Around this time, Nathan Gotthelf, a family friend and recent American emigrant, secured Berliner a position in a Washington, D.C. dry goods firm. With anti-Semitism looming and, more importantly, conscription, Berliner's removal to America was eminent.

Immigration to America

Berliner emigrated to America in April 1870. After a two week journey, the *Hammonia* berthed at Hoboken, New Jersey, allowing Berliner to take in the views of New York City prior to his immediate journey to Washington, D.C. Aside from the most essential, minimal personal belongings, Berliner purported that he brought only one sentimental possession from the old country—a tuning fork, which he always kept and would later called his "steel wishbone," striking the device throughout his career for good luck in solving the endless problems.[3]

Berliner arrived in D.C. on May 12, 1870, taking a position as a clerk with Gotthelf, Behrend & Co., then a partnership mercantile at 816-18 7th Street, NW. Berliner worked for the company in

[2] Wile, Frederic William. *Emile Berliner: Maker of the Microphone.* Indianapolis: Bobbs-Merrill Company, 1926.

[3] Clarke, Nell Ray. "He Caught the World by the Ear: How Emile Berliner, a Clerk, Made World's First Microphone from a Child's Drum," Popular Science Monthly. August 1926.

its early days, selling "Dry Goods," when they were still called "Fancy Goods." Both antiquated terms were typically applied to non-perishable merchandise. His first years in the city were devoted to mastering a command of the English language, which he did by reading discarded copies of the congressional journals.

Apparently Berliner grew restless with his job in D.C. and after three years, he moved to New York to try his luck at other employment. He ultimately became a traveling salesman for a production company in New York City, a position that took him to the mid-west and which led Berliner to another job selling "gents wears."

In 1875, Berliner worked briefly in the laboratory of Dr. Constantine Fahlberg (1850-1910), a noted scientist and, eventually, the discoverer of saccharine. Several accounts purport that Berliner was Fahlberg's janitor (a looser term at the time)—others note him as a lab assistant. Berliner did not specify his role at Fahlberg's in interviews, but mentioned that he taught himself chemistry at night by reading textbooks, etc. Berliner gave up employment with Fahlberg due to the relatively low wages of $6 per week, as he had been making roughly $12 per week working for Behrend in more affordable city of Washington. During this time Berliner earned extra money by painting landscapes and the backgrounds of tintype photographs. However, after leaving Fahlberg, he was unemployed for several months and ran up some small debt in New York, compelling him to return to Washington, D.C.

Berliner resumed employment at the 7th Street store, working then as a bookkeeper. During this period, he became acquainted with the local realm of scientific and progressive technology of Washington, D.C.—then a very small community. He began "poking around" in what he later called the "…only electrical shop…" in the District of Columbia. George C. Maynard (1839-1918), known best as the Curator of Mechanical Technology at the United States National Museum in Washington, D.C., was first listed in the District of Columbia City Directory in 1871—as "tele oper" of 1426 New York Avenue, NW. Maynard worked for the United States Signal Corps as a telegraph operator during his first years in Washington, D.C. The directory listing had transitioned by 1872—George C. Maynard, "electrician signal o, at 1711 G Street, NW." Simply an electrician by 1873, the only one in Washington, D.C., "Electricians" formed a section of the directory by 1875—"Maynard Geo. C. 701 15th nw…" and "Bosworth A.L. Dr. 921 D nw." Since Dr. Bosworth was a "medical electrician," especially interested in female complaints, Berliner was probably correct in describing Maynard's as the only electrical supply venue in town.

Berliner described Maynard's as a place with telegraph keys and sounders, blue-stone batteries, and one or two kinds of induction coils. This environment fascinated Berliner beyond any of his other endeavors.

The Transmission of Sound: The Microphone and the Loose Contact Transmitter

Alexander Graham Bell applied for and was issued three early patents related to what was then called telephony—the First Bell Telephone (1875), Bell's Magneto System (1876), and Bell's Magneto Telephone (1877). Upon hearing about Bell's innovations in telephony, Berliner

undertook his own experiments by the latter part of 1876. Roughly 25 years old, Berliner was still working as a clerk, renting a room in a typical District of Columbia row house—No. 812 6th Street, NW.[4] The room was actually a bedroom/laboratory, but that was Berliner's doing. Having purchased some electric wires, etc. from Maynard, Berliner spent his day off (Sundays) and most evenings in experimentation. In fact, his landlady and her two children were involved in his experiments, which included electrical wires running to their apartment within the house.[5] As previously stated, Berliner read about and studied Bell's initial inventions, but had never actually seen the device in person.

In his little 6th Street room, Berliner built upon Bell's telephone invention, which he described as the following:

> Bell had invented a magneto telephone, the energy of the voice producing the current that went over the wire. It occurred to me that the proper way to transmit speech would be by means of battery current. It seemed to me that what I should do would be to make a diaphragm and a contact pin, or screw, touching it in the center, and in some way produce an undulatory electric current by continuous action of that contact. [6]

The betterment of the transmission of sound was his goal, which he thought might be done more efficiently than could be accomplished by the Bell telephone. Berliner's first specimen consisted of a crude assemblage: a half-sawn toy drum, the front portion mounted on a small block of wood with its sheepskin facing outward, on the back of which was glued a cork with an ordinary needle through the cork and sheepskin. Through the needle's eye, wire was threaded. Yet upon his initial assembly of the device, it did not transmit speech. Unbeknownst to Berliner, there was but one detail missing.

Since there were but a few men interested in electricity and science in general, Berliner had become acquainted with Alvan S. Richards, Chief Operator at the Fire-Alarm Telegraph office. In the early part of 1877, Berliner visited Richards, having taken an interest in learning telegraph operation as part of his self-education. In the midst of one of Berliner's lessons, Richards noticed his pupil was not pressing down on "the key" in a firm manner. Since it would make contact either way, Berliner was confused by his teacher's constructive criticism, so Richards explained:

> …you have to make firm contact; otherwise your message might not be readable at the other end; for instance, in long distances where the resistance is high, you have to press down considerably, in order to get efficient long-distance work in telegraphing. We use men for long distance work exclusively because they

[4] District of Columbia City Directory. Washington, D.C., 1876
[5] Wile, Frederic William. Emile Berliner: Maker of the Microphone. Indianapolis: Bobbs-Merrill Company, 1926.
[6] Berliner, Emile. "The Loose Contact Transmitter." Address made before *The Telephone Society of Washington, D.C.*, December 1, 1910.

> naturally press down hard. Women would not do that, and, therefore, for long-distance work, women are not adaptable.[7]

Berliner was immediately compelled to ask: "Do you mean to say that more current passes over the contact when I press hard?"[8] With Richards reply, "Decidedly," Berliner went straight home to employ the same concept in the mechanisms of his telephone device. This led to the addition of "…a steel button, polished it up nicely so as to make clean contact." All and all " worked, at which time he had invented something entirely different and far more usable than the Bell Telephone. Berliner had created a transmitter and a receiver that were an advancement, addition, or improvement upon Bell's invention(s).

As will be detailed in the forthcoming explanation, Berliner filed the patent application in 1877.

In 1877, Berliner was visited by Thomas A. Watson of the Bell Telephone Company. Berliner showed Watson his invention and its innovations, what he called the loose-contact telephone. Watson responded immediately that the Bell Telephone Company would want to make use of Berliner's invention. However, Berliner was to wait at least one year before being employed by Bell. At first, the Bell Company had used Bell's invention as receiver and transmitter. Berliner found that best results were obtained by using Bell's invention as the receiver and his microphone as the transmitter, the two forming the perfect supplements to each other, as they are in our telephone today. As would later be detailed by Federal courts, the U.S. Patent Office, the Bell Telephone Company, and after years of legal battles regarding the innovation of telephony and of progressive innovations thereafter, Berliner invented the microphone transmitter in January 1877 and discovered the adaptability of this device as a receiver in April 1877. As noted in records from an 1893 Circuit Court of the United States court case,

> "The function of the Berliner transmitter is to produce in an electrical circuit undulations corresponding to the sound waves which actuate it. It is an apparatus for Bell's undulatory current and, in its perfected form, is a better device for that purpose than the magneto transmitter of Bell…Transmitters operating specifically on these principles are known as microphones. The claims of the Berliner application cover every possible form of microphone."[9]

If the industrial revolution made one thing clear, it was that one invention and/or innovation leads to a natural progression of that initial discovery. As Berliner openly admitted, it was the innovations of Alexander Graham Bell's telephone invention or telephony, Patent No. 174,465 of March 7, 1876 (Bell Telephone Patent 1876) that inspired Berliner to build his own version of the telephone in order to understand telephony as a science and, in turn, this allowed him to improve its devices through subsequent invention. Bell had filed his application on February 14, 1876, the same day that Elisha Gray filed a caveat to an 1875 patent with the U.S. Patent Office

[7] Berliner, Emile. "The Loose Contact Transmitter." Address made before The Telephone Society of Washington, D.C., December 1, 1910.
[8] Ibid.
[9] Circuit Court of the United States: District of Massachusetts. No. 3106: United States of America, Complainant, v. American Bell Telephone Company and Emil Berliner, Defendants—Pleadings. Boston, Massachusetts, 1893

for a telephone design that used a water transmitter. Officially, the Bell Telephone Patent 1876 lay claim to the "…method of, and apparatus for, transmitting vocal or other sounds telegraphically…by causing electrical undulations, similar in form to the vibrations of air accompanying the said vocal or other sound." The Bell Telephone Company was established in 1876. Gray withdrew his caveat and did not contest the Bell Telephone Patent 1876 on the grounds of the Caveat.

After the Bell Telephone Patent 1876, Thomas Edison filed a similar application April 27, 1877 that aligned with Bell's invention (Edison Application 1877). At this time, the U.S. Patent Office employed a procedure called "interference" that would hold like-patent applications, requiring investigation and resolution if the like-application was filed within two years of the earlier application. The interference process was commonly initiated by the U.S. Patent Office upon submission of like inventions within the statute of limitations without being "officially" contested or invoked by applicants. However, there were always feelings of foul play. Investigation and resolution could lead to an initial decision of the U.S. Patent Office. If this decision was contested or disputed, the process would escalate to public resolution administered by the Patent Administrator. If still unresolved, matters would then be referred to the U.S. Supreme Court system. This was a process that often invoked years of legal battles and was often said to provoke the preservation of monopolies. The Edison Application 1877 lay claim to the concepts of the Bell Application 1876, causing both applications to be subject to interference proceedings.

Emile Berliner filed an application for the microphone transmitter on June 4, 1877 (Berliner Application 1877). While the Berliner application did not lay claim to the general invention of telephony nor its general concepts, the microphone and telephone transmitter certainly drew from concepts that were initialized in the Bell Application 1876 and allegedly in the Edison Application 1877. The Berliner Application 1877 laid claim to a four part concept that constituted the microphone and telephone transmitter. Claims 1, 2, and 3 were related to the invention of the microphone transmitter, while claim 4 was related to the use of the microphone transmitter as a receiver. The Berliner Application 1877 was found to be in conflict with the Bell Application 1877 as it involved the method of transmitting speech by the production of an undulatory current. On March 26, 1878, the Berliner Application 1877 was put into inference with the Bell Application 1876 by the U.S. Patent Office—this interference included a number of other pending applications as well. When put into interference proceedings, notice of such proceedings is made public and, as a result, the Bell Telephone Company became aware of Berliner's invention. As a result, the Berliner Application 1877 was purchased by the Bell Telephone Company at some point in 1878; however, the precise purchase price and the terms remain unclear. This was the same year that Berliner would go to work for the American Bell Telephone Company. Berliner's solicitor took the position of the soclitor solicitor that had been representing the Bell Telephone Company. One of the other applications awaiting Letters Patent was the Edison Application 1877, which The Berliner Application 1877 was also in conflict with related to the concept of the carbon microphone.[10]

[10] Circuit Court of the United States: District of Massachusetts. No. 3106: United States of America, Complainant, v. American Bell Telephone Company and Emil Berliner, Defendants—Pleadings. Boston, Massachusetts, 1893.

The existing interference questions were further complicated by Elisha Gray on June 22, 1877 when he filed an application laying claim to the concepts of the Bell Application 1876 and incidentally the Edison Application 1877 (Gray Application 1877), which, in turn, further complicated the question of the Berliner Application 1877 in the same way that it had begged the question of "conception" related to the Bell Application 1876.

During the interference period, the Bell Telephone Company instructed, Anthony Pollock, its attorney, to review the patents in order to gain control over any that were of interest. The only patent Pollock pursued was that of Emile Berliner. Almost immediately Thomas A. Watson, famously known as Bell's assistant as well as then Superintendent of the Bell Telephone Company, had visited Berliner in his 6th Street room, where he exhibited his "loose-contact telephone." Watson's immediate response, "We want that, Mr. Berliner.," a response followed by a meeting with Gardiner G. Hubbard, who assured Berliner of Bell's interest, but informed Berliner that he would have to wait for a job until the telephone company was more firmly established.

While the interference process that delayed the Berliner Application 1877 was detrimental to Berliner's personal and professional success and directly benefited the American Bell Telephone Company, the interference proceedings were not officially invoked by the company. In fact, given that the U.S. Patent Office pursued such proceedings, it was officially the U.S. Government that assailed Berliner. Perhaps in the endless sea of complications, Berliner's nerves were tested to a level that he could not bear, as he suffered a nervous breakdown in 1878. He was a patient for six weeks at Providencetown, Massachusetts and was to take a hiatus from work for at least one year.

The American Bell Telephone Company and Emile Berliner

In September 1878, Berliner reported directly from hospital to a loft at 66 and 68 Reade Street—the office of the Bell Telephone Company in New York City. There he joined the entire staff—Watson and a Mr. Devonshire, who later would become Comptroller of the A. T. & T. Company. Francis Blake, Jr., once of the Geological Survey, also joined the staff around the same time, allowing him to eventually become the father of the Blake transmitter. Although, Berliner was to complete the Blake Transmitter during his employment with Bell, Berliner's stay in New York City was brief, as the entire office relocated to Boston, Massachusetts on February 1, 1879. Berliner's first office was in the factory of Charles Williams, Jr., who was the first manufacturer of telephones. It was at this factory that Bell actually invented the telephone. Here Berliner worked on the Blake Transmitter, solving its principal problem—the carbon button, which eventually led to manufacturing of the device.

Between 1879 and 1880, four patents were issued to Berliner for forms of carbon microphone, all of which were purchased from him by the American Bell Telephone Company.[11] Matters

[11] Circuit Court of the United States: District of Massachusetts. No. 3106: United States of America, Complainant, v. American Bell Telephone Company and Emil Berliner, Defendants—Pleadings. Boston, Massachusetts, 1893

regarding the various patents were complicated further by William L. Voelker on both May 19 and September 24, 1879 when he filed patent applications for improvement in speaking telephones. The Voelker Application(s) 1879 laid claim to concepts that aligned with the Berliner Application 1877. Specifically, the Voelker Application(s) 1879 lay claim to the microphone component of the Berliner Application 1877. And, if matters were not complex enough, there was to be one more complication and his name was Daniel Drawbaugh.

While the application was not filed until July 26, 1880, Daniel Drawbaugh filed the broadest application regarding claims to the inventions of telephony, which put the Drawbaugh application into controversy with both Bell and Gray's claiming rights to telephony; the Bell application itself, claiming invention of the magneto-telephone; the Berliner application, claiming invention of the microphone; and the Edison application, claiming invention of the carbon microphone (Drawbaugh Application 1880). Drawbaugh claimed that the concept(s) of his invention(s), encompassing the entirety of the aforementioned applications, was completed as early as 1867. Nevertheless, his first filing related to the Bell, Gray, Berliner, Edison and Voelker applications was in 1880. Applications were in controversy and that, along with a technical objection of the actual Drawbaugh application, made the Drawbaugh application a separate matter.

It was Berliner who was brought to bear the longest brunt of Daniel Drawbaugh and his belated application. As previously explained, the U.S. Patent Office and its implementing laws upheld a two-year statute of limitations related to like patent applications. As a result, the Drawbaugh Application 1880—July 26—was barred from laying claim on the Bell Application 1876, the Gray Application 1877, the Berliner Application 1877, the Edison Application 1879, and etc. due to a statute of limitations that was held up by the U.S. Patent Office. Drawbaugh contested this decision, drawing out an entirely separate "extension" matter.

Because the U.S. Patent Office as well as the Bell Telephone Company had convinced Berliner that his only chance at advancement of the telephone was through another patent, separating the previously mentioned four-part claim of the Berliner Application 1877, Berliner filed another application on September 3, 1880 (Berliner Application 1880). Based on the Berliner Application 1880, Patent No. 233969 was issued on November 2, 1880. Patent No. 233969 was based on an advancement of the microphone transmitter—a separate invention from the receiver. The Bell Application 1876 related to telephony had previously been held up against the Gray Caveat 1876. This was again resolved after 1880, ruling again that Bell had indeed been the first to implement experiments and invent a device proving the concept of telephony. Therefore, the Bell Application 1876 and the Gray Application 1877 were both eventually ruled as being related to telephony in general; therefore, eliminating both from the Berliner controversy. The Edison Application 1877, related to the carbon microphone, was upheld against the Berliner application, yet Berliner still lingered because of Drawbaugh.

Finally, the Drawbaugh Application 1880 had run its course with the U.S. Patent Office and was referred to the U.S. Supreme Court. On December 5, 1884, a Supreme Court ruling was rendered in favor of the Bell Telephone Patent 1876. It was not until March 3, 1885 that the Berliner Application 1877 was upheld over the Voelker Application 1877.

In regards to Drawbaugh, he appealed yet again; however, the previous decision was upheld on March 19, 1888. This cleared his claim to the Berliner Application 1877. However, because of the Berliner Telephone Patent 1880, including a revision of Berliner Application 1877, the U.S. Patent Office was able to further delay the issuance of a patent related to Berliner Application 1877 on a technicality. Naturally, the American Bell Telephone Company had advised Berliner to file this application which would further delay Berliner's claim to the invention. This delay was not overcome until February 25, 1889, as Berliner Application 1877 was finally ready for issuance. Yet, Drawbaugh's appeal regarding the two-year statute of limitations and Drawbaugh Application 1880 still lingered. The microphone component of the Berliner Application then went to the U.S. Supreme Court. Yet Judge Carpenter of the Circuit Court of the First Circuit stated the following in judgment:

> The proposition is that the Bell Company intentionally delayed the prosecution of the Berliner application, and the issue of the Berliner patent, for the purpose and with the result of prolonging their control of the art of telephony, which would cease with the expiration of the Bell patent in 1893; and that they did this by submitting to delays on the part of the officers of the Patent Office, which delays, they, the Bell Company, had it in their power to prevent, and refrained from preventing, for an unlawful purpose. This conduct is alleged to constitute a fraud practiced upon the public through the Commissioner of Patents and his assistants. And it is claimed that the patent so obtained by such fraud may be and should be annulled by the decree of the court on the authority of the United States vs. American Bell Telephone Company, 128 U.S. 315, because there is no substantial difference between a fraud practiced upon the Commissioner as an agent, and a fraud practiced upon the public with the Commissioner's connivance or acquiescence.[12]

The Berliner Application 1877 was finally issued as Patent No. 463569 on November 17, 1891. However, on February 13, 1892, the Attorney General filed a bill to make the Berliner Application 1877 null and void. The life of the application [Berliner Application 1877] in the [U.S.] Patent Office exhibits three distinguishable periods: the first, from June 4, 1877, to June 9, 1882, when Berliner was notified that the claims had been found allowable, but that the issue of the patent was suspended in view of a probable interference; the second, from June 9, 1882, to March 19, 1888, during which time the application awaited the trail and decision of the Drawbaugh case, first in the Circuit Court, and then in the Supreme Court; and the third, from March 19, 1888, to November 17, 1891, when the patent issued.[13] The Bell patents expired two years later.

[12] Circuit Court of the United States: District of Massachusetts. No. 3106: United States of America, Complainant, v. American Bell Telephone Company and Emil Berliner, Defendants—Pleadings. Boston, Massachusetts, 1893
[13] Circuit Court of the United States: District of Massachusetts. No. 3106: United States of America, Complainant, v. American Bell Telephone Company and Emil Berliner, Defendants—Pleadings. Boston, Massachusetts, 1893

Emile Berliner of Mount Pleasant: 1458 Columbia Road, NW, Washington, D.C.

After what probably seemed like a lifetime of unjust treatment by the American Bell Telephone Company and the U.S. Patent Office, Berliner's $50,000 pay-off from the telephone magnate seemed a minimal, yet liberating removal from his life in Boston allowing him to finally and forever return to the District of Columbia. He had frequented the District often enough; in fact, it was there that he met his wife, probably while a clerk. Coincidently, his wife's father was a merchant with his own business dealing in Fancy/Dry Goods, which had been Emil's trade while a clerk.

Born in 1871, Cora Adler was originally from the City of Washington, in the District of Columbia. Henry Adler, Cora's father, had immigrated from Hessen-Darinstadt, now part of Germany, and settled in the District of Columbia where he married Cora's mother, Hannah Stern, a native of South Carolina. However, Hannah died before Cora was even married and by the time she married Emil Berliner in 1881, her father kept a full house at 604 H Street, NW—himself and Cora; his daughter, Henrietta; his son, Morris; his brother and sister-in-law, Adolph and Bertha; his nieces Cora, Ida, Estella, and Leona; and Eleanora Jones, an African American servant.

The Adler house at 604 H Street was at the juncture of H and 6th Streets, NW—notably the former home of Mary Surratt. In 1877, Berliner was living at 812 6th Street, NW, the block across the street and to the north of the Adlers. He experimented with his "loose contact" transmitter telephone invention by running wires to several houses—the Adler house was one of them and it was during this time that he met Mr. Adler's daughter Cora.

Berliner spent time in Europe between 1880 and 1881 peddling his telephone inventions, which eventually led to business ventures, including one in Hannover. Upon his return to America in 1881, Berliner returned briefly to Washington to claim Miss Cora Adler—the two were married in March. Immediately, he resumed working for Bell and the newlyweds lived in Cambridge, Massachusetts within walking distance from Harvard Square. Emile Berliner worked at the Bell factory for two more years.

While Cora Berliner's native ties to the District of Columbia were deeper than it being Emile's first home in America, the Federal City had also been the place where his genius was able to play out and it was because of the small community of science that existed there that this was entirely possible. And despite the few charms of the city in the period of what would have been the Arthur Administration, there were few indications of the impending importance and grandeur that would develop in the early 20th century with the enlargement of not only the nation, but the concept of the national government. However, Berliner had not forgotten his past in Washington nor his scientific connections and resources and as a result, his departure from Boston was, if not a return, essentially, a permanent removal to the District of Columbia, where he felt he could best advance in the scientific community.

On June 11, 1883, C.A. Didden, Architect, filed Application For Permit To Build No. 1562, at what was then known as Columbia Road between 14th and 15th Streets, for the design and

construction of a Dwelling for "Mr. E. Berliner." Located in the middle of the block, Berliner's lot was 200-feet wide by 145-feet deep. Set back roughly 30 feet from the street, the fully detached dwelling was a three-story brick structure with stone trimmings beneath a pitched, slate roof. While the primary block (44' by 44') already comprised a large house, there was also a "back building" (20'by 20'), which no doubt housed his earliest laboratory on the property that would be known as 1458 Columbia Road, NW. The house cost roughly $10,000 with furnace heat as its most modern convenience—plumbing was on hold for the year. The permit was granted that day.[14]

While waiting for the house to be constructed, the Berliners lived nearby at 710 13th Street, but were in residence by early 1884. Emile and Cora Berliner raised all of their children at 1458 Columbia Road, NW. Over time, the Berliners would provide temporary lodgings for their married children and their grandchildren. The Berliner house was also a center for Cora's family that was largely based in Washington, D.C. and, by the 1880s, Emile Berliner's sister Rebecca Berliner Sanders had moved with her family to the District of Columbia.

Columbia Road was not only home to Emile Berliner and his family, but also to the advent of the Gramophone and the Flat Disc Record. These innovations took place within his house and its interior laboratory in a front upstairs room that he used as a laboratory. It was also from this address that Emile Berliner would become an advocate for Public Health—including pure milk and tuberculosis.

Indeed, Berliner's property on Columbia Road was as much a working compound as a family one. Over the course of several years, Berliner erected several secondary structures on his property related to his experimentations and scientific research. For instance, on December 2, 1901, Emile Berliner applied for the construction of a laboratory by builder Frank L. Harvey. The laboratory was located east of the house within the premises of the 1400 block of Columbia Road, and on its own lot—50' by 145', fronting the alleyway. Projected to cost roughly $2500, the laboratory was a two-story masonry building (40' by 25') with a pitched, slate roof.[15] Berliner used this laboratory for several purposes, which included the improvement of the gramophone and the flat disc record, and his work on acoustical tiles, which he would not fully perfect and patent until the 1920s. A team of individuals worked at this address to execute various of Berliner's experiments, inventions, and innovations.

In 1906, Emile Berliner filed another permit to erect a two-story load bearing masonry garage, fronting the alleyway directly behind the house at 1458 Columbia Road. Construction took place from May 4 to June 21, 1906.[16] This garage likely housed the Berliner's Peirce-Arrow Limousine and even a Victoria Steamer. Both Emile Berliner and Joseph Sanders owned vehicles operated by motive power as soon as it was possible. The Berliners erected another garage several years later. [17] The garages were useful; although, the "motor cars" were usually parked in front of the house—ready to depart or, simply, on display.

[14]Didden, C.A. Application for Permit to Building, No. 1562. Inspector of Buildings. Washington, D.C. 11 June 1883.
[15] Harvey, Frank L. Application for Permit to Build, No. 935. Inspector of Buildings. Washington, D.C. 30 April 1906.
[16] Boyer & Smith. Application for Permit to Build, No. 2891. Inspector of Buildings. Washington, D.C. 30 April 1906.
[17] Berliner, Emile. Application for Permit to Build, No 3562. Inspector of Buildings. Washington, D.C. 10 March 1914.

Around 1906, Joseph and Hannah Berliner Sanders began construction of their own semi-detached duplex dwelling adjacent to the Berliners at 1460-62 Columbia Road, NW. The Sanders occupied the dwelling at 1460 Columbia Road while using 1462 as a rental property.

On November 15, 1923, Application for Permit to Build, No. 4544, was filed by Emile Berliner for erection of an "Educational Building" at 1464 Columbia Road, NW, designed by Stern & Tomlinson, Architects, and constructed by A.L. Smith & Co., Builders within the Woodward Building. Located immediately to the west of the Sanders' duplex house at 1460-62 Columbia Road, the building was to serve as Berliner's Bureau of Public Health, which would often be confused as a government sponsored agency rather than his charitable, public health enterprise.

The Talking Machine: Recordation of Sound, Records of Sound, Players for Records of Sound, The Gramophone and The Flat Disc

In a 1913 address, Berliner answered the question, "What is a Talking Machine?" as plainly as possible, and his response illustrates the basic principles of his innovations and inventions in relationship to the Talking Machine or what became the Gramophone and the Flat Disc:

> "As early as 1887 I had tried to make records by pressing a matrix into sealing wax and it is interesting to realize that these modern composition disc records are in reality seals of the human voice because the substance they are made of is a modified sealing wax, both containing shellac as a basic substance."[18]

Emile Berliner was thirty-six years old when he was issued Patent No. 372.786 on November 8, 1887 (Gramophone 1887) for an improved phonograph device that employed a new method of duplicating records of sound. He called the device "the gramophone." The apparatus and process would undergo improvements that would consume roughly ten years of Berliner's life, as indicated by the following patents: Patent No. 372.786, November 8, 1887, Gramophone (Gramophone 1887); Patent No. 382,790, May 15, 1888, Process of producing records of sound, (Record Process 1888); Patent No. 534,543, February 19, 1895, Gramophone (Gramophone 1895); Patent No. 548,623, October 29, 1895, Sound-record and method of making same (Sound-record 1895); and Patent No. 564,586, July 28.

Gramophone 1887 was a two component invention—the device and the recordation process. The issuance of Gramophone 1887 was a process for transferring lateral undulations scratched in soot that would make a needle and diaphragm-vibrate, making an etched groove. This process was known as photo-engraving. In March 1888, Berliner manipulated the process wherein the recordation process involved scratching the lateral vibrations, making a groove, directly on a rotating zinc discs. This, Record Process 1888, employed a method in which a highly burnished zinc disc 18cm in diameter was flowed with a standard solution of wax in benzene; however, the film of wax proved so thin that the touch of a camel's hair could be damaging to the disc, which eventually would invoke Sound-record 1895. After Berliner's second patent, he demonstrated

[18]Berliner, Emile. The Development of the Talking Machine. Read before The Franklin Institute, of Philadephia, May 21, 1913.

both a recording machine and a reproducing machine at the Franklin Institute in Philadelphia, Pennsylvania on May 16, 1888. However, it was his demonstration at the Elektrotechnische Verein of 1889 in Germany that led to the commercialization of his devices as a realized product. The initial commercialization, the product of Gramophone 1887 and Gramophone 1888, was a venture with toy companies in the production of toy gramophones and five inch records—available only in Europe. These products were manufactured by Kammer and Reinhardt of Waltershausen. During this time Berliner, and his right hand man, Joseph Sanders, spent time in Germany selling the Gramophone invention to European toy makers; however, Berliner returned to the United States in 1890 to establish the infrastructure for production of the gramophone in America. Berliner would not diverge from "toy production" to the manufacture of the first disc records until April 1891, when the American Gramophone Company was incorporated in Washington, D.C. While Berliner had begun the earliest production of disc records in June 1892, the product was not officially released for public consumption until late 1894. The first flat disc records for sale were issued on November 1, 1894, containing 52 titles—band music, cornet solos, a drum and fife number, a trombone solo, a piano solo, an instrumental quartet, a clarinet solo, a vocal quartet, children's songs, Native American Indian songs, baritone songs, soprano solos, and a recitation. The official production of flat disc records was conducted by the American Gramophone's successor company, the United States Gramophone Company, which was established in April 1893, also in Washington, D.C. United States Gramophone was eventually known as E. Berliner's Gramophone, which was formally established in 1894.

The E. Berliner Gramophone Company, then the United States Gramophone Company

The United States Gramophone Company made and sold gramophones and seven inch flat disc records. By the close of 1894 roughly 90 flat disc records had been produced—at that time a configuration of black celluloid and later hard rubber, from zinc masters. Rather than the paste-on labels, the record label, "E. Berliner's Gramophone," was actually engraved onto the disc record, including the Gramophone 1887 and Gramophone 1888 patent information.
Over the ten-year period the patents improved dramatically. Gramophone 1895 employed a reconfiguration of the Gramophone device, wherein the prepared flat disc is placed on a revolving plate so that its surface is touched by the point of the recording stylus. Sound-record 1895 entailed an improvement to the sound recordation process and the production of flat disc records, as to make records less prone to damage. Sound-record 1895 involved placing the record disc into an etching bath similar to that used by photo-engravers. While Berliner had manufactured toy gramophones starting in 1888, his improved patents of 1895 invoked investments of $25,000 for the commercialization of Gramophone 1895 and Sound-record 1895.

On October 8, 1895, the Berliner Gramophone Company was incorporated in Philadelphia to manufacture disc players and discs under patents held by the United States Gramophone Company. The building was located on Filbert Street, in Philadelphia which would later be razed in 1983 for construction of the Gallery II shopping mall. Also in 1895, a retail store was opened nearby, which was managed by Alfred Clark. Berliner maintained his laboratory at 1458 Columbia Road. Gramophone 1896 followed the establishment of this company. In 1896, the National Gramophone Company was established by Frank Seaman in New York, essentially a contractor to spearhead Berliner's advertising and sales nationwide. Across the Delaware River

from the Philadelphia operations in Camden, New Jersey, was another component of the Berliner's gramophone enterprise with Eldridge R. Johnson as a principal innovator. Like Berliner's genius to Bell's, Johnson made numerous improvements to Berliner's gramophone. These improvements included a spring motor, replacing the hand cranked device, and a replacement of the zinc master disc record with a disc of wax. While Seaman's first year was profitable, it wasn't until the invention of the spring motor that profits began to soar. Johnson's version of the Berliner device was named the Improved Gramophone. Johnson is primarily credited for the spring motor invention, while Alfred Clark, then manager of the retail store, as well an assistant, was responsible for the sound box innovation. The improved Gramophone was marketed by Seaman under the trade name Zonophone, which displayed the iconic Nipper painting in 1899.[19] Emile Berliner registered the Nipper trademark in July 1900. The new product also included the use of shellac pressings—"plates" with smoother playback, a product of the Duranoid Company of Newark, New Jersey.

Meanwhile, Berliner had established both the Deutsche Grammophon Gesellschaft in Hannover and the Gramophone Company in London in 1898. Joseph Berliner (1858-1938), a German engineer, as well as Emile's brother, headed up the operations in Germany. Deutsche Grammophon Gesellschaft was founded at the same address where Emile and Joseph had founded the J. Berliner Telephon-Fabrik on August 3, 1881, an establishment related to Berliner's microphone patent. William Barry Owen led Berliner's English operations of the Gramophone Company, which had actually been established earlier in 1897 as a branch of the Berliner Gramophone Company. The Deutsche Grammophon Gesellschaft and the Gramophone Company were actually a bifurcation of a larger production process in Europe. Pressing was completed in Hannover and recording took place in London.

In 1899 the Berliner operations were established in Canada as "E. Berliner, Montreal." This branch of the company included four record presses and "a shop" where machines were assembled. In America, sales escalated from 248,652 discs in 1897 to about 2 million discs by April 1900. During this time, a dispute formed between Seaman and Berliner, most likely resulting from Seaman's failure to persuade Berliner to take on more cheaply made gramophones. As a result Seaman ceased orders for Berliner's gramophone and Berliner discontinued supplying Seaman with discs. The National Gramophone Company discontinued as it had no Berliner products to sell—the purpose of its establishment. Seaman's second company, the National Gramophone Corporation, was established at this point. By this time, Johnson acquired his own patents as well as the Nipper trademark that Berliner had previously registered. An injunction was instigated by Seaman and the American Gramophone Company, which, in turn, forced the Berliner Gramophone Company to cease record production in May 1900. The Berliner Gramophone Company closed its doors in July 1900. The gramophone passed to the Consolidated Talking Machine Company that same year and on to its successor firm, the Victor Talking Machine Company in 1901. Berliner retained a one-third interest in Victor. Nipper would not reappear until January 1902, when he was used as the representative of the Victor record labels.

[19] Hoffman, Frank W., Editor. Encyclopedia of Recorded Sound, Volume 1. 1994.

Lawsuits related to the initial phonograph invention and numerous other innovations thereafter ensued before 1900. The American Gramophone Company first sued Seaman's National Gramophone Company regarding the priority of the Chichester Bell and Charles Sumner Tainter patents, specifically regarding the recording processes using method of cutting into wax via disc or cylinder. These lawsuits would ensue until 1902 with compromises all across the board. Lawsuits related to the Berliner patents and enterprises would result in the formation of the Victor Talking Machine Company—recognizing Berliner's Victor-y. American Gramophone would become Columbia Records. Both companies controlled the flat disc record market by 1902. This control would endure until both the expiration of the patents and the advent of electrical recording necessitated new competitors.[20]

The Standard Material Company

Despite substantial holdings in the stock, Berliner had very little to do with the Victor Talking Machine Company after its official formation and establishment in Camden, New Jersey. However, his right-hand man and son-in-law, Joseph Sanders, worked as an expert for the company for many years. While Berliner did not have rights to manufacture his own gramophones and flat discs in America, the power of knowledge did not escape him and because of that he set his mind to the further improve the flat disc record. This effort was led by Sanders and Berliner served as the advisor and/or overseer of the project on a greater scale. In many ways this technique allowed Berliner to serve in numerous roles, as is the mechanism by which most great people operate and accomplish.

The Standard Material Co. was organized early in 1900, officially by Joseph Sanders, but, certainly, by both Sanders and Berliner. Sanders and a very small team of educated and technically skilled men alike worked to produce a compound that would create a more durable material for the production of flat disc and would also improve the quality of the record. The enhancement of the record of sound was Berliner's primary interest, while Sanders, more business minded, also focused on the material and its affordability and adaptability to use. Yet it was Sanders who did the main experiments related to the development of a "standard material" better fitted for the flat disc record. Berliner advised.

Between 1901 and 1905, Sanders and a few select others developed a composition for sound record tablets, or discs, with a basis of oxide of iron, fibre, and resinous material as a substitute for rubber.[21] This was just one among a laundry list of improvements made by Sanders, under Berliner's advisement, through his ownership of the Standard Material Company. By 1904, Sanders had improved the flat disc, which was filed on April 20, 1904 in his Sound-Record Tablet patent application. Sander's Sound Record Tablet included various improvements to the flat disc, which included the adaptation of the spiral groves related to the sound waves. This application was on hold for many years while the formula for the standard material was solidified. In the same vein Sanders had also made improvements to the Gramophone, which he

[20] Newsom, Iris. "The Berliner Gramophone Companies." Wonderful Inventions: motion pictures, broadcasting, and recorded sound at the Library of Congress. Washington: The Library, 1985.
[21] Derby, George. White, James Terry. The National Cyclopedia of American Biography: Volume D. New York, J.T. White & Company, 1930.

filed with the U.S. Patent Office on December 13, 1904. This was complex, being directly tied to the gramophone and would not be issued as Patent No. 785,766: Gramophone until March 28, 1905. Between 1905 and 1906, this patent was amid interference proceedings with at least two other parties including the Victor Talking Machine Company.[22] The same occurred with these improvements to the gramophone when submitted to the German Patent Office.[23]

The Standard Material Company was reorganized to produce this composition and negotiate the patent rights to the leading disc record manufactures throughout the world. The firm of Lyons & Bissing, Patent Attorneys, submitted Sanders' application to the United States Patent Office, Department of the Interior, on March 21, 1905.[24] The standard material became Patent No. 787,001: Composition of Matter for Sound-Record Tablets dated, officially, April 11, 1905, in essence, the first turn from rubber discs to those produced of a resinous material compound.25
Yet another of his recognized improvements to the Gramophone was filed on August 4, 1905, at which time he filed a patent for a stylus arm type that would later be accepted in Patent No. 834,326: Gramophone on October 30, 1906.

While Sanders founded the Standard Material Company, owned the building in which it was housed, and ran its day-to-day operations, his dairies from 1906 and 1907 illustrate the vital role played by Emile Berliner in the company.[25]

Much of Sanders' life was consumed by work—especially in the first quarter of the 20th century. Almost all of his interests were co-mingled with Emile Berliner. Not only was Sanders the nephew of Berliner, but, in 1905, he would become the son-in-law, marrying his cousin Hannah Berliner. The young couple had a very short honeymoon, quickly returning to Washington so that Joseph Sanders could return to work for his father-in-law, whom he always referred to as "Uncle." In fact, Joseph and Hannah Sanders lived at 1458 Columbia Road with the Berliners until their own home was built at 1460 Columbia Road.

As stated above, Berliner's priority was Standard Material's operations, as, by 1906, the company was producing discs of the resinous company and conducting experiments and tests related to improving the said standard material. At the same time, Sanders developed a tone arm, or divided horn, which was extensively used by manufacturers and led him to make further improvements. This innovation became Patent No. 834,326.[26]

Through the Standard Material Company, Sanders also began work on the improving the efficiency record matrices and the production process between 1901 and 1906. This was

[22] Snow, C.A. Letter to Joseph Sanders. Washington, D.C., 25 January 1907.
[23] Dittmar, G., Patent Solicitor and Mechanical Expert. Letter to Joseph Sanders. Washington, D.C., 29 May 1906.
[24] United States Patent Office. Form 2-191. Petition to the Commissioner of Patents (Serial No. 189,889): Composition of Matter for Sound Record Tablets. Lyons & Bissing: Washington D.C., March 1905.
[25] See, Sanders, Joseph. Personal Diary (handwritten). Within the Collection of the Library of Congress. Washington, D.C., 17 July 1906; 27 August 1906; and 24 September 1906.
[26] Derby, George; White, James Terry. The National Cyclopedia of American Biography: Volume D. New York, J.T. White & Company, 1930.

discussed by Sanders on numerous occasions in his own diary.[27]0 For the next decade, through 1920, the operations of the Standard Material Company would continue. On January 11, 1908 Joseph Sanders filed an application for the patent of his Method of Manufacturing Sound-Record Tablets. This was a new process for the production of record matrices that was used worldwide in record production. Sanders filed another patent application one year later, on February 8, 1909 with the submittal of Patent No. 1,179,660: Manufacturing Sound Record Tablets.[28] Patent Letters for this invention were not issued until April 18, 1916. On July 25, 1916, Patent No. 1192567: Methods of Manufacturing Sound-Record Tablets was finally issued by the U.S. Patent Office as Letters Patent to Joseph Sanders.[29]

In between 1909 and 1916, Joseph Sanders filed Patent No. 1,206,034: Method of Producing Disk Sound Records. Letters Patent were issued on November 28, 1916.[30] Around the same time, Sanders filed Patent No. 1,206,034: Method of Producing Disk Records of Sound on January 11, 1913. Letters Patent were issued on November 28, 1916.

Another component of the operation of the Standard Material Company was to use the institutional knowledge to repair and provide parts for the gramophone, which was basically an unknown service before that time. Victor produced new disc players and discs, but did not produce parts nor provide service for players at this point. Given the relatively limited types of complex machines per household in the early 20th century, the idea of repairing a mechanical device was not something that was thought of a normative household service. Almost all of the repair persons we employ today for mechanical devices did not exist. Homes had gas and other heating systems, many had plumbing, there were telephones and perhaps some people owned early motor-powered vehicles, but as far as other devices later common, the gramophone and its predecessor, was among the first real mechanical type of devices used for entertainment in a home. Emile Berliner was President of the Standard Material Company from the time of its establishment until roughly 1920—Sanders founded the company and maintained ownership until 1920.

Public Health: Pure Milk and Tuberculosis in the District of Columbia

"Das ist alles!" (meaning, "that is all," in German), were the words said to be spoken by Emile Berliner when his wife Cora gave birth to their seventh and last child on April 29, 1901 at 1458 Columbia Road. Family lore tells us that "…alles!" translated to Alice—as the youngest of the Berliner brood was named Alice Elizabeth Berliner. Since their previous child, a son, Henry Berliner had been born in 1896, it is perhaps safe to assume that Alice was unexpected. Nevertheless, the "…alles!" story could only tickle the sense of humor for a few months, as it soon became clear that Alice was physically wasting away—a common sign of children suffering from Tuberculosis.

[27] Sanders, Joseph. Personal Diary (handwritten). Within the Collection of the Library of Congress. Washington, D.C. 1906.
[28] United States of America. Letters Patent No. 1,179,660, Manufacturing Sound-Record Tablets. Washington, D.C., 18 April 1916.
[29] United States of America. Letters Patent No. 1192567, Methods of Manufacturing Sound-Record Tablets. Washington, D.C., 25 July 1916.
[30] Sanders, J. Method of Producing Disk Sound Records.

At the turn of the 20th century, 3 out of 10 infants born in the District of Columbia would not survive one year of age—a statistic that Nathan Straus had reduced in New York City from a 25 percent national rate in 1890 to 15 percent. While it's a well-known fact that before the advent of more modern health standards and medical professionalism, the number of children lost in child birth was significantly higher; it is less known that nearly a third of those born would not survive their first year of life. Even with medical advancements made through the end of the 19th century, the number of children that died within their first year continued to grow on a per capita basis as the American cities saw dramatic rises in population.

One of the deadly words of the day was Tuberculosis—a common and primary cause of death that was historically known as "Consumption." By six months of age Alice Berliner weighed almost a pound less than she did at birth. Consultation with the best physicians of the District of Columbia proved futile. However, as always, Berliner decided to take matters into his own hands, as he had with all of his improved inventions. Long before Straus, the renowned French chemist and microbiologist Louis Pasteur developed the pasteurization process. The first pasteurization test was completed by Louis Pasteur and Claude Bernard in April 1862. The process was originally conceived as a way of preventing wine and beer from souring.

Little Alice was not consuming much wine or beer during infancy; however, she was drinking raw milk from local dairies. While the origins of the pasteurization of milk are arguable, some evidence dating to the eighteenth century and even earlier, pasteurization of milk was formally suggested by Franz von Soxhlet in 1886. This involved scalding, not boiling, milk before consumption, which would kill the infectious disease. The American medical profession on a whole rejected this suggestion and ignored the movements made towards "pure milk."

One of the first major proponents of pasteurization was Nathan Straus (1848-1931), the eminent merchant and philanthropist who co-owned two of New York City's biggest department stores – R.H. Macy & Company and Abraham & Straus, had distributed pasteurized milk among the Lower East Side poor in Manhattan, which proved beneficial to that population. In 1892, he and his wife privately funded the Nathan Straus Pasteurized Milk Laboratory to provide pasteurized milk to children, fighting both infant mortality and tuberculosis. The Strauses also published a book on the subject.

While Tuberculosis was certainly a problem for everyone in society and among people of all ages, children were especially vulnerable, not only because of their young immune systems, but also because milk was prescribed by doctors at the primary nourishment for youth. The consumption of raw milk was considered the only correct diet for bottle-fed infants. Adults were less likely to get Tuberculosis through consumption of milk not only because they're immune systems were more developed, but, more importantly, because prior to the age of refrigeration, milk consumption was limited primarily to infants, children, and sometimes the elderly. The elderly were often vulnerable to Tuberculosis as well due to their weakening immune systems.

Berliner decided to scald his youngest daughter's milk. By one year of age, Alice Berliner weighed 22 ½ pounds. She would go on to lead a full life. Once he'd saved her life, Berliner

realized the horror of the medical profession's rejection of pasteurization, as well as the dairy industry's failure to respond to the possibilities of this advancement. Berliner began preaching public health. He started his crusade by publishing advertisements in the *Washington Post* and other papers of the period. After some time, the "Scald Milk" advertisements had an effect on mothers at home with their infants, yet advertisement and word of mouth was only a minor part of Berliner's work.

In 1907, Berliner established the Washington Milk Conference, involving both U.S. Government officials and some representatives from the medical community. "Milk Standards," a paper outlining the pasteurization and its relationship to dairies was presented by its author—Dr. A.D. Melvin, then chief of animal industry within the Department of Agriculture. The "Melvin Milk Standards," as they would later be known, were gradually adopted throughout the United States.

By 1925, the number of infant deaths was reduced from 1 out of 13 in 1900 to 1 out of 82 in 1925. His fight against raw milk was in no way to limit the consumption of milk, but, instead, to make pasteurized milk the only legal variant for consumption. In fact, when interviewed by the *Washington Post* on November 28, 1926, the journalist noted that Berliner's "high noon luncheon consists of a sandwich, a bit of Danish pastry and a bottle of buttermilk." The reporter also described Berliner's property:

> At 1464 Columbia road stands a stately brick building—a monument to Berliner's fight for public hygiene. It is his personally maintained bureau of health education which he erected in 1924 and endowed in the interests of public health. Child welfare work is his diversion and recreation. Many people think that the bureau of health education at Washington is a government bureau and do not know that it is the gift of this humanitarian who has won for himself not only the confidence of the public but the cooperation of the United States government.

Early Flight and the Gyro Motor Company of Washington, D.C.

> The experiments of Mr. Berliner are not of recent origin. Eighteen years ago (Circa 1885) he constructed a full sized model flying machine, which was not successful, and nearly thirty years ago (Circa 1873), in a communication in the Scientific American, the proposed the very principle of propulsion of flying machines, a stream of compressed air or gas, which he is using in his experiments.[31]

While the greatest of Emile Berliner's contributions to modern technology and progress, as we think of progress today, are related to the transmission, recordation and reproduction of sounds microphone, the gramophone and the flat disc are among Berliner's greatest achievements, his daring and tireless efforts made strides in the nascent aeronautical establishment of the pre-WWII United States. Berliner kept two scrapbooks on the subject of flight reflecting his self-education and his own activities. The earlier scrapbook contains articles and clippings related to

[31] The Berliner Aeroplane, *Scientific American*, September 26, 1903.

the early days of flight innovation on an international level, starting with articles from the Scientific American in 1892. Although, according to the Scientific American, Berliner had built his aircraft by 1885 and had proposed the idea of flight through the use of propulsion as early as 1873—shortly after his arrival in America. The 1890s could easily be called the period of his self-education regarding aeronautics and aviation, which includes annotation throughout.

Berliner's flight-related experiments were never really geared towards traditional flight, but, instead, were directed at advancing vertical flight. However, his inventions, and innovations would lead to component advances in general aviation and vertical flight. His inventions would include several early contraptions—both the Berliner Aeroplane and the Aeromobile—that would prove unsuccessful. Yet others such as the Gyrocopter, the Gyro Engine, and the Berliner Helicopter would contribute to the greater progress both traditional and vertical flight. And while he advanced several aspects of early flight, Berliner's primary interest had been in vertical flight.

While the origins of vertical flight may rest with the bamboo flying toys of Chinese children circa 400 BC, the first formal prototypes for what eventually became "the helicopter" date to the sixteenth century drawings of Leonardo da Vinci. Yet the realization of these devices came about as a result of the frenzy surrounding the aeroplane. With ideas regarding the use of propulsion in flight by 1873 and the construction of a flying machine by 1885, the first sign of flight-related experiment in the 20th century can be seen through a photograph, dated 1902, within Emile Berliner's second, "Gyro," Scrapbook (1902-1928). The photograph depicts a crated propeller and mounting(s), marked at the bottom "..in an old barn 1458 Col Rd."[32]

Between 1902 and 1903, Berliner designed the Berliner Aeroplane. The design entailed a small model of a flying machine that presumably lifted into flight a weight of over one pound for every square foot of horizontal area at a speed that was estimated at less than 20 miles per hour. While this model did rise eight feet and fly forward 40 feet, it was ultimately unsuccessful.36 However, Berliner continued to developed new models. "Model # 3" was tested at William J. Rhee's estate in October 1903. Images show the new model on October 22 and November 2, both in 1903 and at Rhee's estate. Another image depicts improvements of this model in December 1903. These early models were given up as unsuccessful by the middle of the decade and a new model was under development.

In France, the Breguet brothers first took flight in 1906 with their official vertical debut in 1907—recorded as Gyroplane No. 1.[33] While this is acknowledged by history, the craft was unsteady or "untethered" in flight, and required a lighter engine, among other improvements. The Aeromobile was the next of the Berliner's aircrafts to be constructed. However, this model was kept secret for several years before the media was able to report on the new design:

> Mr. Berliner's aeromobile consists essentially of a frame carrying a gasoline motor geared to a shaft, upon the upper end of which is a two-blade propeller. The

[32] Berliner, Emile. Scrapbook: Gyro. Emile Berliner Collection, Smithsonian Institute, National Air and Space Museum. Washington, D.C., 1902-1928.
[33] Berliner, Emile. Scrapbook: Gyro. Emile Berliner Collection, Smithsonian Institute, National Air and Space Museum. Washington, D.C., 1902-1928.

> superficial area of the blades is 36 square feet and their length over all is 17 feet. To the unscientific eye they look much like the fans that keep the flies off your table when you lunch at a downtown restaurant on a hot summer day. Exhaustive experiments made by Mr. Berliner have proven that this propeller can, when thrown in full speed by the motor, make a dead lift, of 360 pounds. The whole machine weighs only 210 pounds, so that there remains as available force an extra 150 pounds…But herein lies the novel departure of Mr. Belirner's creation. The apparatus is so arranged that the propeller, instead of revolving in a horizontal plane, is tilted at an angle of 15 degrees. When the propeller is thus revolved the result, as shown by Mr. Berliner's many tests, is that the entire aeromobile is lifted into the air and rapidly moved forward.[34]

Yet the design of the machine and its propeller(s) was only one component of the device. The engine was the other. The invention of the "light gasoline engine" of the "rotating cylinder type" was not by Berliner, nor was its use in flight completely his idea either. Clippings dated October 25, 1902 illustrate the Engine Cylinders Grouped for Direct Connection to Crank Axle, which Berliner makes note of in his endless reading and research.[35] The initial steps in creating an improved "high powered, light weight" engine involved intensive study and experiment.

Between 1905 and 1908, Berliner also began the development of an engine type that would be used in his aeromobile. He hired Robert S. Moore as his Chief Laboratory Assistant. Moore was an engineer and inventor, and would work for Berliner for nearly a decade. Eventually, Berliner and Moore identified that a light-weight, gasoline-powered, revolving cylinder-type engine would best suit the aircraft. At the time, the most advanced revolving-cylinder motor was made by Adams-Farwell of Dubuque, Iowa, also operating as The Adams Company at one time.

The Adams Company was established in 1895 in Dubuque, Iowa when F.O. Farwell joined Herbert and Eugene Adams in their experiments with gasoline powered engines. The company produced an air-cooled engine in which the crankshaft was anchored solidly to the rear frame of the cylinders rotated around it, enabling the engine to serve as its own flywheel and, in turn, the engine had excellent cooling. In addition, the centrifugal force served as a horizontal gyroscope that held the car level. In 1907, the Adams Company designed a Rotary 5 Engine that was used in automobiles, which weighed roughly 15 pounds per horsepower.

Berliner sought a Rotary 5 Engine, but needed it to be lighter in weight than those being produced by the Adams Company at that time. Late in 1907, Berliner sent Moore to the Adams Company in Dubuque, Iowa to discuss the construction of a similar motor weighing less than three pounds per horsepower. After spending two days with Farwell, Moore returned with an offer to build an engine nearing Berliner's specifications that would weigh less than 100 pounds at 35 horsepower. For this service, the Adams Company was paid the sum of $2,000.[36] F.O.

[34] Emil Berliner, Inventor of Swift Aeromobile, Says His Airship Will Travel 150 Miles an Hour. The Washington Post. Washington, D.C., 13 September 1908.
[35] Mott, S.D. Aerodomes. *Scientific American Supplement*, No. 1399. 25 October 1902.
[36] Berliner, Emile. Letter to the Smithsonian Institution. Within the Smithsonian's Collections at Washington, D.C. Washington, D.C., 7 May 1917.

Farwell constructed the two specimens with the assistance of Glenn Muffy, who then worked for the Adams Company and would later work for the Muffy Motor Company of Chicago, Illinois.[37] The motors were produced for Berliner as requested and were received by May of 1908.[38] The changes in the engine included the base plate, bevel gears, horizontal shaft, and the sprocket wheel. Study and experiment led Berliner and his assistants to rebuild the engines—cylinders were remade, along with new pistons. Other details were reworked to the highest quality of workmanship resulting in a much-improved engine for the purpose of the aircraft that was designed by Berliner.

By the summer of 1908, Berliner was doing well enough financially that he could escape the heat of Washington, D.C. With Moore employed full-time, Berliner could oversee the experiments from afar. On July 10, 1908, Berliner received a telegram at 111 Belmont Avenue, Atlantic City, New Jersey from R.S. Moore—"Ready for Test."[39]

Images dated July 28, 1908 show the new aircraft assembled. Telegrams through August 1908 updated Berliner on the tests that were being conducted at Washington, D.C. By September 1908, it was reported that Berliner would officially test his new aircraft:

> The Berliner machine comes under the class of airships known as helicopters. There have been but few of these machines constructed up to date, according to aeronautical experts now in Washington, although there have been one or two isolated instances of successful machines of this type…The helicopter rises in the air by a sort of screw motion and if properly balanced under sufficient control, is considered the best flying machine man could produce.[40]

Thus, the *New York Times*, in essence, evolved the Berliner Aeroplane into the Berliner Helicopter; although, it would be years before that title would officially take hold.[41]

> "I have lately constructed an experimental propeller of such power that, placed horizontally, it is capable of lifting 300 pounds in a calm straight up into the air," says Mr. Berliner.[42]

The announcement of Berliner's potential vertical flight stirred papers across the country:

> The principal advantage of this class of aerial craft is the fact that they can rise straight up and that they will be able to fly in almost any wind. Aeromobiles would be a model apparatus to have on board war vessels to be sent up at a moment's notice for scanning the area beyond the ship's horizons for the vessels of the enemy. They would be hard to hit by shot and shell and the propellers could

[37] Muffy, Glenn. Letter to Charles D. Walcott, Secretary. Within the Smithsonian's Main Collections, Washington, D.C. Chicago, Illinois, 1 May 1917.
[38] Berliner, Emile. Gyro Scrapbook. Smithsonian.
[39] Moore, R.S. Telegram to E.B. Berliner via The Western Union Telegraph Company. Washington, D.C., 10 July 1908.
[40] Washington Man Planning to Fly. *The New York Times*. New York, 4 September 1908.
[41] Ibid.
[42] "Berliner Has A Bird." *The Evening Star*. Washington, D.C., 8 September 1908.

> have steel spurs which would rip the enemy's balloons by merely touching them.[43]

And while the aircraft appeared ready for official tests in the fall of 1908, it would be almost a year before the newspapers reported success:

> Washington, June 30—For the First time in America a helicopter, a heavier-than-air type of flying machine, which depends on screws operating in the horizontal plane for its lifting power, has successfully lifted itself with an operator. A machine built by J. Newton Williams and Emile Berliner of this city lift Mr. Williams from the ground on three occasions. The experiment was made a day or two ago in Mr. Berliner's laboratory at Brightwood, a suburb of this city.[44]

The test flights took place in late June 1909. There was success in lifting the aircraft into the air; however, the flight was unsteady with jumps and starts, as described by Berliner, himself. Between June 1909 and 1914, Berliner worked with R.S. Moore to further improve the aircraft and its engine. Yet it was clear in June 1909 that an improvement had been made to the engine used then in the bi-plane and, as a result, Berliner and Sanders worked together to raise roughly $100,000 capitol, which included contributions from both Moore and J.S. Simmons. The Gyro Motor Company filed for articles of incorporation under Emile Berliner, R.S. Moore, and J.L. Simmons, of Washington, D.C., under the laws of the state of Delaware with a capital stock of $100,000.[45] By August 30, 1909, the *Washington Post* mentioned that "...a lighter and more powerful..." engine was being built at Berliner's new laboratory "...in Columbia Road..."[46]

On November 21, 1910, the Standard Material Company received a permit to extend the façade of the Standard Material Company building "…44 ft. west…" Construction of the two-story brick wing more than doubled the building's size. Construction occurred from November 29, 1910 to January 30, 1911. The Gyro Motor Company began operating at 774 Girard upon completion.

A mechanical engineer, Spencer Heath, was the company's first general manager. Heath had previously been associated with the American Propeller Company, also a manufacturer of aeronautical mechanisms and products in Baltimore, Maryland. However, Sanders would eventually take over the management of the company, as Heath's tenure was short-lived. Moore continued to serve as Berliner's primary engineer and inventor for the gyro motor.

Among the engine types first manufactured in Girard Street was a 7-cylinder, Gnome engine, characterized by its light weight, etc. Construction and design employed the lightest grades of nickel and vandlum steels. Fuel and oil intake modes were improved within the motor as well—a new operational device for the fuel intake valve eliminated the suction once required to charge

[43] "New Aircraft At Washington," *Balto-American*. Baltimore, Maryland, 8 September 1908.
[44] "Helicopter Lifts Operator," *The New York Times*. New York, N.Y., 1 July 1909.
[45] *Electrical World*: Vol. 56. 1910.
[46] "Two Bi-Planes Building," *The Washington Post*, August 30, 1909.

fuel passage through the valve into the cylinder. Previous engine types required immediate high compression of the plane, resulting in uncomfortable and immediate take-off. The improved motor allowed the aircraft to move from low to high compression. Other improvements led to steadier and more efficient mechanical operations. The 7-cylnder, Gnome engine appeared on the market after the spring of 1911—the price was roughly $2,500, which included a propeller and mountings.

Under Patent No. 1,020,819: Piston for Expansion Engines, Robert S. Moore, recorded as assignor to Gyro Motor Company, Washington, D.C. filed an application for Letters Patent on September 7, 1911. There had been an improvement that entailed annular groove cut in the head close to the edge. The public test of Berliner's new engine was held March 27, 1912 with a 90-mile cross-country flight piloted by Aviator Peck in a "Gyro motored biplane"— officially the Gyro Engine Columbia Biplane. The aircraft flew for a record 2 hours, 18 minutes, and ascended 400 feet per minute. Paul Peck, "Licensed Pilot, No. 57," resided at 918 M Street NW in Washington, D.C.

Not surprisingly, the U.S. Army was one of the first major customers for the Gyro Engine. The Gyro Motor Company guaranteed a product that would climb 2,000 feet in 10 minutes, remaining in flight for at least two hours. The company went international in July of 1911 when its design was licensed to a German company for manufacture—this was augmented by German military testing and approval. Peck went on to beat his own record on May 27, 1912, flying a Gyro-engined biplane from Washington, D.C. to New York in 4 hours, 33 minutes, and 15 seconds, beating the previous record of Howard Gill, 4:16:32 set October 19, 1911. Records were quickly broken, as this was a period of great strides in aviation. Peck, tragically, was killed testing a speed biplane at Cicero, Illinois on September 11, 1912. Only 22 at death, he was already a widower with one daughter

The Gyro Engine as it came to be called was noted for its endurance rating, which by 1912 was at 4 hours, 25 minutes at a rate of 60 mph. While still primarily interested in vertical flight, Berliner's attention to his earlier design for a Gyrocopter was put on hold as to focus on the demand related to the Gyro Engine. By the mid-teens, the Gyro Engine had become a preferred principal choice for biplanes.

> The rotary-cylinder combustion engine is especially intended for the aeroplane. It dispenses with the fly-wheel used on the ordinary gas engine. By the reaction of the pistons working in the cyclinders, whereby the latter receive a rotary motion about a central shaft, the whole motor is revolved…The valve of this form of motor is apparent, the speaker said, in that it can be constructed so that a minimum of weight, a greater speed and a proportionate savings of oil will be obtained.[47]

Berliner reported on the "Advantages of the Revolving Cylinder" to the Franklin Institute of Philadelphia, Pennsylvania on October 15, 1913—the organization published his talk in their

[47] "Berliner Takes On Aeroplane Engine." *Philadelphia Press*. Philadelphia, Pa., 16 October 1913.

journal shortly afterwards. Around this time Berliner criticized the Federal government and especially the military in being dramatically behind in flight technologies as compared to other countries.[48]

"Revolving Cylinder Motors" for aircraft were dramatically improved by Berliner and the Gyro Motor Company, so much so that the progress of the innovations is almost difficult to follow. By 1913, the Gyro Motor of 80 H.P. had been developed at 770-74 Girard, which Berliner reported upon before The Aeronautical Society on November 20, 1913.[49]

In October 1914, Moore developed another improved Gyro motor. Conducting all experiments and tests under Berliner's direction, Moore found that the increase of stroke from 5 ½ inches to 6 inches increased the power of the seven cylinder motor to 92 horsepower. This also led to an unusual economical savings in fuel. And, in turn, this was the advent of the 90 horsepower Gyro Motor—weighing only 215 pounds.[50] This was quite an improvement from the Adams-Farwell engine of 1907, which was roughly 100 pounds and only 35 horsepower. The 90 H.P. Duplex Gyro was employed in a biplane test on November 1, 1914 at College Park, Maryland. De Lloyd Thompson flew a Day tractor biplane, which climbed 2800 feet in three minutes.

In 1914, Emile Berliner suffered another nervous breakdown and, as a result, his flight-related innovations were seemingly on permanent hold. Sanders, took over the operations of the Gyro Motor Company and Moore stayed on as the Chief Laboratory Assistant.[51] In 1916, Moore received Letter Patent for Gas Engines, Internal Combustion Engine, Patent No. 1,209,743, which he had applied for earlier. He resigned from the Gyro Motor Company by January 1916.[52]

Like many successful Americans, Berliner had worked to increase his means by investing in real estate. It was said in many publications of the day that Berliner believed in the eminence of Washington, D.C. and that, because of this, he invested in its property. Part of his holdings included land in the neighborhood of Brightwood, near the juncture of Georgia Avenue and Military Road. This land was sold, in part, by 1916 and in 1917 for the purpose of residential development in that part of the District of Columbia. As a result his testing grounds and laboratory space was limited to 1458 Columbia Road and 770-74 Girard.

Henry Berliner, the second youngest of the Berliner brood, returned to Washington, a graduate of the Massachusetts Institute of Technology in the summer of 1919, at which time he became an official employee of his father. While Sanders had been operating the Gyro Motor Company at 770-74 Girard Street, as well as the Standard Material Company, much of the Berliner-related innovations took place at the Laboratory at 1458 Columbia Road. However, in 1906, Sanders had removed completely to Girard Street to escape a tumultuous relationship between himself and Herbert Berliner. This did not change over time and Sanders continued to use 770-74 Girard as laboratory and factory. Henry Berliner joined Sanders in the use of the property for various

[48] Weak In Military Flying. Philadelphia Ledger. Philadelphia, Pa., 16 October 1913.
[49] Berliner, Emile. "Revolving Cylinder Motors," *Aeronautics*. November 1913.
[50] The New 90 H.P. Duplex Gyro. Flying. December 1914.
[51] Craig, Donald A, "The Machine That Goes Straight Up," *The New York Herald*. New York, New York, 9 July 1922.
[52] R.S. Moore Resigns from the Gyro Motor Co. *Aerial Age.* , Vol. 2, No. 20 (Jan. 31, 1916), New York, p. 472.

improvements to the aircraft-related experiments that were conducted once he was employed by his father.

Also by the summer of 1919, Emile Berliner was again recording the progress of the aircraft experiments and again advising his various employees, which included his son Henry who was working furiously to develop what had come to be called the Berliner Helicopter. Between the time that Henry was asked to return to Washington, D.C. and early 1920, Emile Berliner had managed to procure funding for the Gyrocopter experiments and innovations from Navy Department, specifically the Bureau of Steam Engineering in Washington, D.C.[53]

During this period, Berliner kept notes in his scrapbook, "Yesterday saw Henry lift Gyrocopter and himself off the ground and in addition strained two springscales anchored to the ground up to about 175 pounds. Fay & others were present."[54] Photographs from this period of the Gyrocopter and its engine accompanying these notes show the building at 770-74 Girard Street. One image depicts the motor set-up for tests inside the building. Two other images show the helicopter specimen assembled with its engine on the outside of the building in the alleyway between Fairmont and Girard Streets, NW. Additional photographs taken of the entire aircraft assembled at College Park, Maryland are dated January 10, 1920.

The device shown in the images was the improved Gyrocopter of Emile Berliner, and renamed Berliner Helicopter by Henry A. Berliner.

> I spent several months in constructing a scientific testing apparatus and with which I tried various types of small lifting propellers, singly or in group, and I finally calculated and designed the first helicopter apparatus that proved successful. The machine weighed 570 pounds, or sixty pounds a square foot.
>
> The head resistance of a gyrocopter is small and great speed forward may be expected from it. My father [Emil Berliner] always intended that the gyrocopter should be provided with floats and that at first it should be a water craft, flying low near rivers, lakes and ocean, so that it could descend quickly to safety in case of accident. Future development may result in some means for coming down on land from great heights as safely as an airplane can.[55]

Both Emil and Henry Berliner had ideas for the Gyrocopter that would culminate into the Berliner Helicopter. The main idea was the rapid nature of landing and take-off for emergency purposes.[56]

> The machine weighs 520 pounds, the revolving cylinder motor being eighty horsepower La Rhone. The two propellers are thirteen feet in diameter and ten

[53] Miller, Frank. Letter to Emile Berliner From the Navy Department's Bureau of Steam Engineering. Washington, D.C., 6 June 1920.
[54] Berliner Scrapbook
[55] "Says He Has Craft To Fly Vertically," *The New York Times*. New York, New York, 8 March 1920.
[56] "Propeller Lifts Weights In Air," *The Washington Post*. Washington, D.C., 14 March 1920.

> inches wide. The total lifting power of the machine is nearly the 900 pounds of sixty pounds per square foot of effective lifting surface, as airplane has an average lift of about eight pounds per square foot.[57]

On March 8, 1920, *The Evening Star* showed a photograph of Henry Berliner's successful lift-off accompanying an article on the subject. The same photo was illustrated in the *New York Tribune* on March 28, 1920 and again in the *Washington Post* on April 11, 1920. All of these publications along with *Scientific American* recognized that Emile Berliner had invented the most successful helicopter to-date, laying the groundwork for the later successful aircraft.[58]

Having started in the Spring of 1920, Henry Berliner was highly active in his helicopter experiments and innovations with his father as primary advisor and financier. In May 1920, photographs were taken of Emil Berliner with the copter at Corby's Field in the Washington, D.C. area. On May 11, 1920 the Berliners took the improved "Gyrocopter" to the airfield at College Park, which was suited with two 14' by 12" propellers. The next day Emile Berliner and Max Levy were photographed with the aircraft at College Park, and on May 14 Henry was photographed with the improved Gyrocopter.[59]

The experiments and tests that took place in the Spring of 1920 were observed and possibly subsidized, at least in part, by the Navy Department's Bureau of Steam Engineering. In fact, the Navy Department observed the progress through its representatives who joined the Berliners throughout their tests. A report on the progress of the Berliner Gyrocopter was issued in June 1920:

> It is possible at this time to make a preliminary report on the Berliner Gyrocopter, although considerable experimental development remains to be done on stabilizing surfaces, etc. Mr. Emile Berliner, famous for his inventions in the Transmission and reproduction of sound, has been working the problem of the helicopter for more than 15 years. The first lightweight rotating cylinder motor was built for Mr. Berliner to power an early gyrocopter about 1907, and is at present on exhibition in the U.S. National Museum, in Washington. In July 1908 a gyrocopter under test developed a lift of 340 pounds. This machine used virtually a propeller of such diameter and blade area that a very heavy unit surface loading was developed. The experiments were continued until the summer of 1914 and then laid aside on account of Mr. Berliner's health.
>
> In the summer of 1919, Mr. Berliner's son Henry an M.I.T. graduate who had served in the Army Air Service, took up the gyrocopter experimentation at this father's request, and in a laboratory at their home in Washington [770-74 Girard Street, NW], erected a testing machine on which tests of various model propellers

[57] "H.A. Berliner Invents First Successful Helicopter Plane," *The Evening Star*, 8 March 1920.
[58] Gaulois, George. "A Man-Sized Helicopter That Leaves the Ground with Full Load," *Scientific American*. 27 March 1920.
[59] See Berliner, Emile. Scrapbook Gyro. Entries for 11, 12 and 14 May 1920.

> were conducted. From such data he designed the present machine, which was constructed in early winter and is now being tested at College Park, Md.[60]

Assembly and tests took place through early June. On May 9 the Berliners were at College Park early in the morning for more tests, this time with pointer 13' propellers. An easy lift with the 80 H.P. engine was reported. Tests occurred the next two days with 14' propellers. Emile Berliner retreated to New Jersey for part of the summer, which included Henry for a period and had returned to the experiments by August 31 through the late Fall of 1920. A successful lift took place on the morning of November 15, 1920 with one double acting as lifting propeller. Needed improvements were cited by Emile Berliner. The efforts continued through the Spring of 1921 and, again, photographic evidence of propeller and flight tests exist from April and May 1921.[61]

On June 8, 1912, a successful flight was achieved using double tilting propellers at the top and rear of the aircraft. The height of flight was roughly 3 to 4 feet.[62] On June 20, 1921, the lateral control rudders were removed from the craft (decreasing weight by 60 to 65 pounds) and were raised by means of controllable tilting propellers in the rear. New lateral controls were employed on June 30, which proved efficient.[63] Between July 20-22, 1920, Lt. Patterson and Noel White inspected the Gyrocopter progress, which led to the observance of several successful flights—one of which took place with Patterson in the seat rather than Henry Berliner. Images exist within the Berliner scrapbook from that period. The experiments with the Gyrocopter were continued through the fall of 1921 and, on October 10 and 12, Commander Hunsaker, of the Bureau of Aeronautics, observed the final experiments with the 1919 model of the Gyrocopter.

Between the close of 1921 and the Spring of 1922, Henry Berliner built a new aircraft for test purposes, which was completed by March. The new model resembled a small airplane, unlike the previous 1919 model, which appeared more like a smaller version of the practical helicopter later known. Emile Berliner noted in his scrapbook log that the 1922 model was "# 2". Tests of the new model began in late March and were noted as taking place on March 31, April 1, April 3, April 5, and through June. On June 16, 1922, Commander Hunsaker returned to College Park to observe flight tests with Berliner's new model: "From every standpoint, it is declared, the machine proved a success."[64]

A short film exists of that day and was long regarded by the Navy Department as the first successful flight of a helicopter in the United States. Unlike previous experiments, the Berliner Helicopter rose vertically from the ground and then flew forward:[65]

> In the first official flight during the past week in the presence of U.S. naval observers, the helicopter rose straight from the ground to a height of 10 feet and flew for a considerable distance.[66]

[60] Bureau of Steam Engineering. Stencil No. A-332, The Berliner Gyrocopter. Washington, D.C., June 1920.
[61] Le Premier Vol En Helicoptere: L'helicoptere Berliner. *La Nature*. France, 7 May 1921.
[62] Berliner, Emile. Scrapbook Gyro. June 1921.
[63] Berliner, Emile. Scrapbook Gryo. June 1921.
[64] Hunsaker Views Helicopter Tests. *The Evening Star*. Washington, D.C., 16 June 1922.
[65] "Tested For Charles MaCalaster, Helicopter Makes Successful Flight." *The Washington Times*. Washington, D.C., 17 June 1922.

Aviation magazine confirmed flight in its June 26, 1922 weekly issue with a photograph of the Berliner Helicopter, being operated by Henry Berliner, on its cover:

> The report, authenticated by photographs which dispel any doubt, that the latest Berliner helicopter has actually flown in a horizontal plane, will come as cheering news to those whose faith in the ultimate success of the direct lift machine has not been dimmed by arduousness of the task.
>
> As we said some time ago, several helicopters have lifted off the ground and have hovered, but an authentic instance of controlled horizontal flight was yet lacking. Owing to the methodic efforts of Emile Berliner, the inventor, and of his son Henry, who tests the elder Berliner's machines in flight, we have come considerably nearer the solution of the helicopter problem.[67]

Achieving not only the vertical lift off, but also the controlled forward flight, the Berliner Helicopter flight of June 16, 1922 was a landmark in the history of vertical flight. This created a national frenzy and the event was published in papers and aired nationwide:

> The machine looks like an air plane without wings. The fuselage and rudder are the same, and a Le Rhone 110 horse power rotary motor is mounted forward, as in the airplane.[68]74

Both Emile and Henry Berliner received dozens and dozens of cards and letters, congratulating the two on the successful flight. They had officially made history and, at the time, great progress in vertical flight.

[66] "American Helicopter Makes Its First Official Flight," *St. Louis Post-Dispatch*. St. Louis, MO, 19 June 1922.
[67] "The Berliner Helicopter," *Aviation*. 26 July 1922.
[68] Craig, Donald A. "The Machine That Goes Up Straight," *The New York Herald*. New York, New York, 9 July 1922.

9. Major Bibliographical References

Bibliography (Cite the books, articles, and other sources used in preparing this form.)

American Helicopter Makes Its First Official Flight. *St. Louis Post-Dispatch*. St. Louis, MO, 19 June 1922.

Baist's Real Estate Atlas of Surveys of Washington, District of Columbia, 1907, 1913, 1919

The Berliner Aeroplane. *Scientific American*. 26 September 1903.

Berliner, Emile. Letter to the Smithsonian Institution. Within the Smithsonian's Collections at Washington, D.C. Washington, D.C., 7 May 1917.

Berliner, Emile. "Revolving Cylinder Motors," *Aeronautics*. November 1913.

Berliner, Emile. Scrapbook Gryo. June 1921.

Berliner, Emile. Scrapbook: Gyro. Emile Berliner Collection, Smithsonian Institute, National Air and Space Museum. Washington, D.C., 1902-1928.

Berliner, Emile. "The Development of the Talking Machine," Read before The Franklin Institute, of Philadelphia, May 21, 1913.

Berliner, Emile. "The Loose Contact Transmitter," Address made before The Telephone Society, of Washington, D.C., December 1, 1910.

The Berliner Helicopter. *Aviation*. 26 July 1922.

Berliner Has A Bird. *The Evening Star*. Washington, D.C., 8 September 1908.

Berliner Takes On Aeroplane Engine. *Philadelphia Press*. Philadelphia, Pa., 16 October 1913.

Boyer & Smith. Application for Permit to Build, No. 2891. Inspector of Buildings. Washington, D.C. 30 April 1906.

Bureau of Steam Engineering. Stencil No. A-332, The Berliner Gyrocopter. Washington, D.C., June 1920.

Clarke, Nell Ray. "He Caught the World by the Ear," *Popular Science Monthly*. Washington, D.C., August 1926.

Circuit Court of the United States: District of Massachusetts. No. 3106: United States of America, Complainant, v. American Bell Telephone Company

Craig, Donald A. "The Machine That Goes Up Straight," *The New York Herald*. New York, New York, 9 July 1922.

Derby, George., White, James Terry. *The National Cyclopedia of American Biography: Volume D.* New York, J.T. White & company, 1930.

District of Columbia City Directory. Washington, D.C., 1876.

Dittmar, G., Patent Solicitor and Mechanical Expert. Letter to Joseph Sanders.Washington, D.C., 29 May 1906.

Electrical World: Vol. 56. 1910.

Gaulois, George. "A Man-Sized Helicopter That Leaves the Ground with Full Load," *Scientific American*. 27 March 1920.

"H.A. Berliner Invents First Successful Helicopter Plane," *The Evening Star*, 8 March 1920.

Harvey, Frank L. Application for Permit to Build, No. 935. Inspector of Buildings. Washington, D.C. 30 April 1906.

"Helicopter Lifts Operator," *The New York Times*. New York, N.Y., 1 July 1909.

Hoffman, Frank W., Editor. Encyclopedia of Recorded Sound, Volume 1. 1994

"Hunsaker Views Helicopter Tests," *The Evening Star*. Washington, D.C., 16 June 1922.

"Le Premier Vol En Helicoptere: L'helicoptere Berliner." *La Nature*. France, 7 May 1921.

Miller, Frank. Letter to Emile Berliner From the Navy Department's Bureau of Steam Engineering. Washington, D.C., 6 June 1920.

Moore, R.S. Telegram to E.B. Berliner via The Western Union Telegraph Company. Washington, D.C., 10 July 1908.

Mott, S.D. "Aerodomes," *Scientific American Supplement*, No. 1399. 25 October 1902.

Muffy, Glenn. Letter to Charles D. Walcott, Secretary. Within the Smithsonian's Main Collections, Washington, D.C. Chicago, Illinois, 1 May 1917.

"The New 90 H.P. Duplex Gyro," *Flying*. December 1914.

"New Aircraft At Washington," *Balto-American*. Baltimore, Maryland, 8 September 1908.

Newsom, Iris. "The Berliner Gramophone Companies," Wonderful Inventions: motion pictures, broadcasting, and recorded sound at the Library of Congress. Washington: The Library, 1985.

"Propeller Lifts Weights In Air," *The Washington Post*. Washington, D.C., 14 March 1920.

"R.S. Moore Resigns from the Gyro Motor Co.," *Aerial Age*. , Vol. 2, No. 20 (Jan. 31, 1916), New York, p. 472.

Sanders, J. Composition for Matter for Sound Record Tablets. Patent No. 787,001. Washington, D.C., 11 April 1905.

Sanders, Joseph. Personal Diary (handwritten). Within the Collection of the Library of Congress. Washington, D.C., 17 July 1906.

"Says He Has Craft To Fly Vertically," *The New York Times*. New York, New York, 8 March 1920.

Snow, C.A. Letter to Joseph Sanders. Washington, D.C., 25 January 1907.

"Tested For Charles MaCalaster, Helicopter Makes Successful Flight," *The Washington Times*. Washington, D.C., 17 June 1922.

United States Patent Office. Form 2-191. Petition to the Commissioner of Patents (Serial No. 189,889): Composition of Matter for Sound Record Tablets. Lyons & Bissing: Washington D.C., march 1905.

United States of America. Letters Patent No. 1,179,660, Manufacturing Sound-Record Tablets. Washington, D.C., 18 April 1916.

United States of America. Letters Patent No. 1192567, Methods of Manufacturing Sound-Record Tablets. Washington, D.C., 25 July 1916.

"Washington Man Planning to Fly," *The New York Times*. New York, 4 September 1908.

"Weak In Military Flying," *Philadelphia Ledger*. Philadelphia, Pa., 16 October 1913.

Wile, Frederic William. *Emile Berliner: Maker of the Microphone*. Indianapolis: Bobbs-Merrill Company, 1926.

Note: Aside from the above-referenced, specific citations and sources, this work was compiled and researched primarily through the following major collections that maintain primary and secondary source material on Emile Berliner:

• America's Historical Newspapers. Proquest Online.
• Emile Berliner Collection, 1871-1965 (Emile Berliner and the Birth of the Recording Industry).Motion Picture, Broadcasting and Recorded Sound Division, Library of Congress, Washington, D.C.
• Emile and Henry A. Berliner Collection, 1892-1925. National ERCO Collection. College Park Aviation Museum, College Park, Maryland.

• Henry Berliner/Fred Knaur Collection. College Park Aviation Museum, College Park, Maryland.

• Interviews with Members of the Berliner and Sanders Family, Maryland, Virginia, and Washington, D.C.

• Private Collection (Unnamed Source Within the Sanders Family). Bethesda, Maryland.

Previous documentation on file (NPS):

____ preliminary determination of individual listing (36 CFR 67) has been requested
____ previously listed in the National Register
____ previously determined eligible by the National Register
____ designated a National Historic Landmark
____ recorded by Historic American Buildings Survey #_____
____ recorded by Historic American Engineering Record # _____
____ recorded by Historic American Landscape Survey # _____

Primary location of additional data:

____ State Historic Preservation Office
____ Other State agency
____ Federal agency
____ Local government
____ University
____ Other
Name of repository: _____

Historic Resources Survey Number (if assigned): _____

10. Geographical Data

Acreage of Property Less than one acre (14,250 square feet)

Use either the UTM system or latitude/longitude coordinates

Latitude/Longitude Coordinates
Datum if other than WGS84:_____
(enter coordinates to 6 decimal places)

1. Latitude: 38.925663 Longitude: -77.025002
2. Latitude: Longitude:
3. Latitude: Longitude:
4. Latitude: Longitude:

Or
UTM References
Datum (indicated on USGS map):

☐ NAD 1927 or ☐ NAD 1983

1. Zone:	Easting:	Northing:
2. Zone:	Easting:	Northing:
3. Zone:	Easting:	Northing:
4. Zone:	Easting :	Northing:

Verbal Boundary Description (Describe the boundaries of the property.)
The Standard Material Company/Gyro Motor Company building at 770-774 Girard Street NW occupies Lot 883 in Square 2885.

Boundary Justification (Explain why the boundaries were selected.)
The square and lot have been associated with the property since construction of the building in 1902 and its major addition in 1910-11.

---

11. Form Prepared By

name/title: Oscar Beisert
organization: Off Boundary Preservation Brigade
street & number: 764 Fairmont Street NW
city or town: Washington, D.C. state: _____ zip code: 20001
e-mail_____
telephone: 717 602-5002
date: 9/24/2013

Additional Documentation

Submit the following items with the completed form:

- **Maps:** A **USGS map** or equivalent (7.5 or 15 minute series) indicating the property's location.
- **Sketch map** for historic districts and properties having large acreage or numerous resources. Key all photographs to this map.
- **Additional items:** (Check with the SHPO, TPO, or FPO for any additional items.)

Photographs

Submit clear and descriptive photographs. The size of each image must be 1600x1200 pixels (minimum), 3000x2000 preferred, at 300 ppi (pixels per inch) or larger. Key all photographs to the sketch map. Each photograph must be numbered and that number must correspond to the photograph number on the photo log. For simplicity, the name of the photographer, photo date, etc. may be listed once on the photograph log and doesn't need to be labeled on every photograph.

Photo Log

Name of Property: Standard Material/Gyro Motor Company building
City or Vicinity: Washington, D.C.
County: State:
Photographer: Kim Williams
Date Photographed: June 2014

Description of Photograph(s) and number, include description of view indicating direction of camera:

View looking southwest showing north elevation of 1902 eastern wing and 1910-11 western wing.
1of 19

View looking southeast showing north elevation of 1902 eastern wing and 1910-11 western wing.
2 of 19

View looking southwest showing north elevation of 1910-11 western wing.
3 of 19

View looking northeast from alley behind 770-774 Girard Street showing south and west elevations of 1910-11 wing.
4 of 19

View looking easterly along alley behind 770-774 Girard Street, showing 1910-11 wing and 1945 addition.
5 of 19

View looking westerly along alley at rear of 770-774 Girard Street showing south elevation of 1910-11 western wing.
6 of 19

View looking westerly along alley showing 1945 addition.
7 of 19

View looking north showing south elevation of 1945 addition.
8 of 19

Detail of windows on south elevation of 1910-11 western wing.
9 of 19

View of interior of 1902 wing, first floor looking east. Boarded up windows on south side of room open onto 1945 addition.
10 of 19

View of interior of 1902 wing, second floor looking west towards 1910-11 wing. Note raised roofline and partially filled-in windows on south wall.
11 of 19

View of interior of 1902 wing, second floor looking east.
12 of 19

View of 1902 wing from south side showing exterior wall of building now enclosed in 1945 addition.
13 of 19

View of 1910-11 wing, first floor looking south towards double door on western end
14 of 19

View of 1910-11 wing, first floor looking southeast showing non-historic stair (left) to second floor and door (right) opening into 1945 rear addition.
15 of 19

View of 1910-11 wing, second floor looking east to 1910-11 wing.
18 of 19

View of 1910-11 wing, second floor looking at southeast corner of room
17 of 19

View looking east showing interior of 1945 addition
18 of 19

View of western end of north elevation showing altered opening from large opening with block and tackle to smaller single window.
19 of 19

Paperwork Reduction Act Statement: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C.460 et seq.).

Estimated Burden Statement: Public reporting burden for this form is estimated to average 100 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Office of Planning and Performance Management. U.S. Dept. of the Interior, 1849 C. Street, NW, Washington, DC.

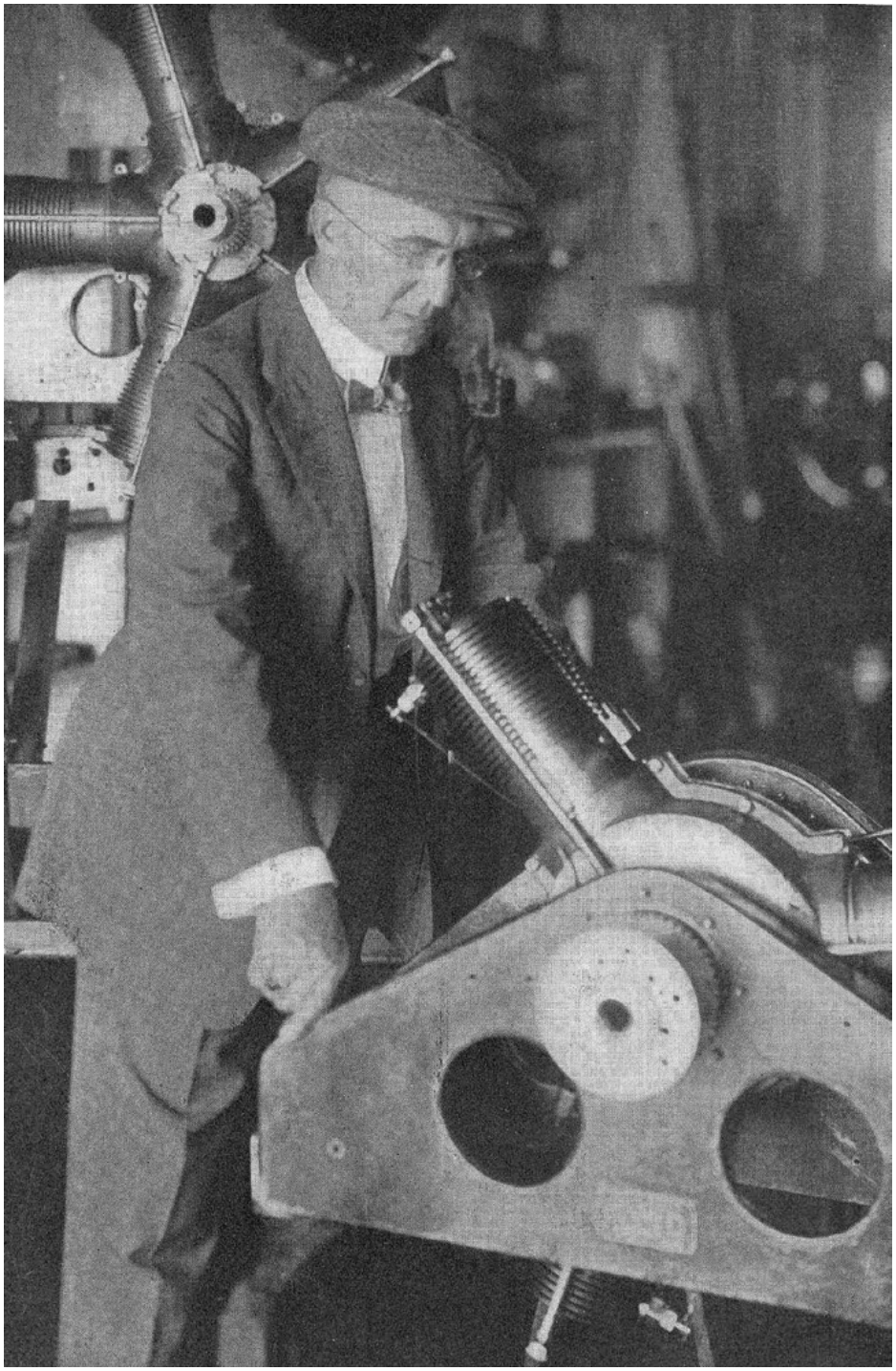
United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Standard Material/Gyro Motor Company building
Name of Property
Washington, D.C.
County and State

Name of multiple listing (if applicable)

Section number Maps and Images Page 1



Emile Berliner and the "Gyro" Engine in the interior of the Standard Material/Gyro Motor at 770-774 Girard Street

United States Department of the Interior
National Park Service

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Standard Material/Gyro Motor Company building
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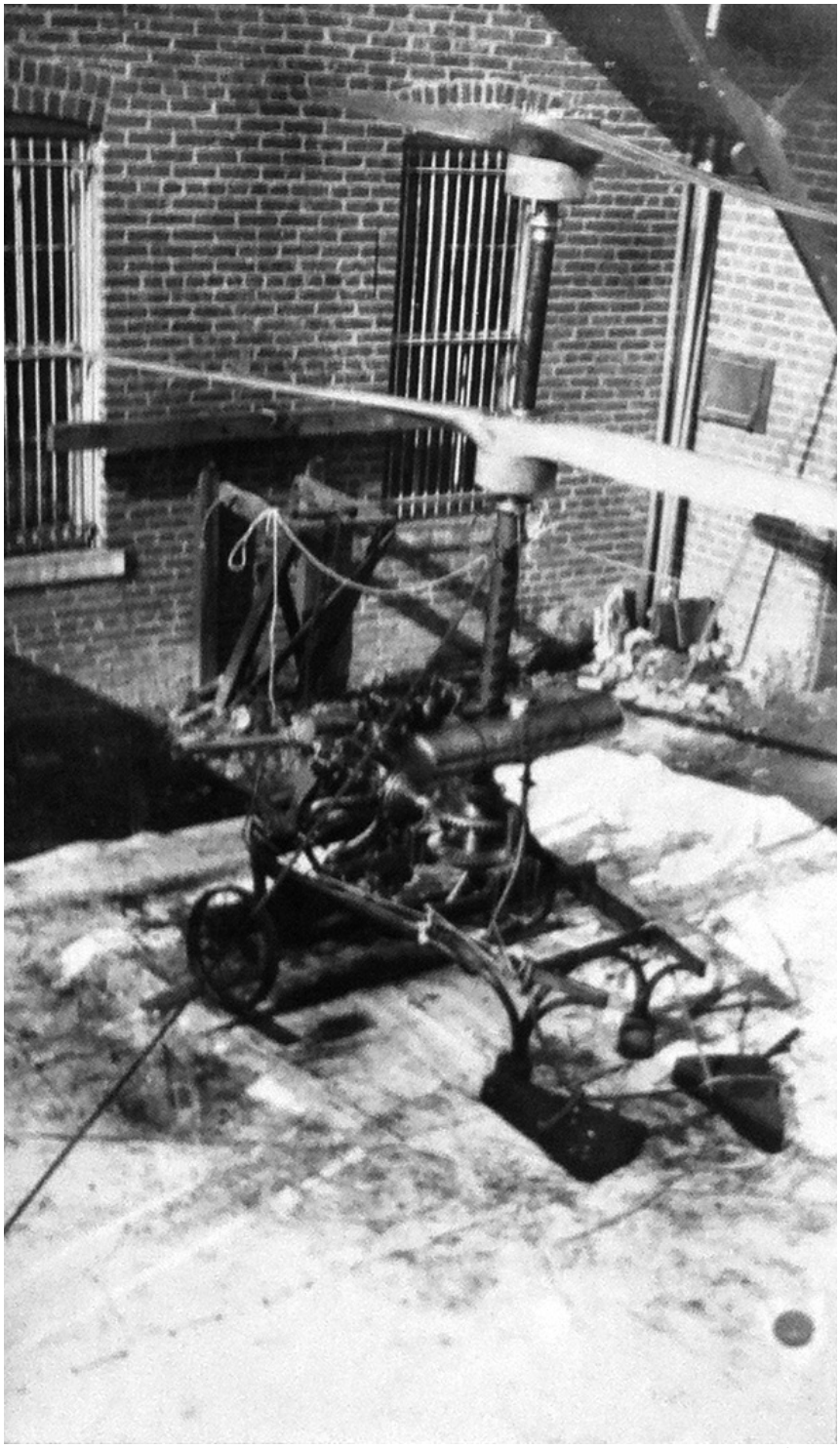
Section number Maps and Images Page 2



Berliner Gyrocopter, shown circa 1919, in the alleyway at the rear of 770-774 Girard Street, prior to testing it at College Park, Maryland.

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Emile Berliner with the Berliner Gyrocopter, circa 1913.

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National Park Service

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The Berliner house at 1458 Columbia Road, NW, circa 1890 (demolished circa 1926)

United States Department of the Interior
National Park Service

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Standard Material/Gyro Motor Company building
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Washington, D.C.
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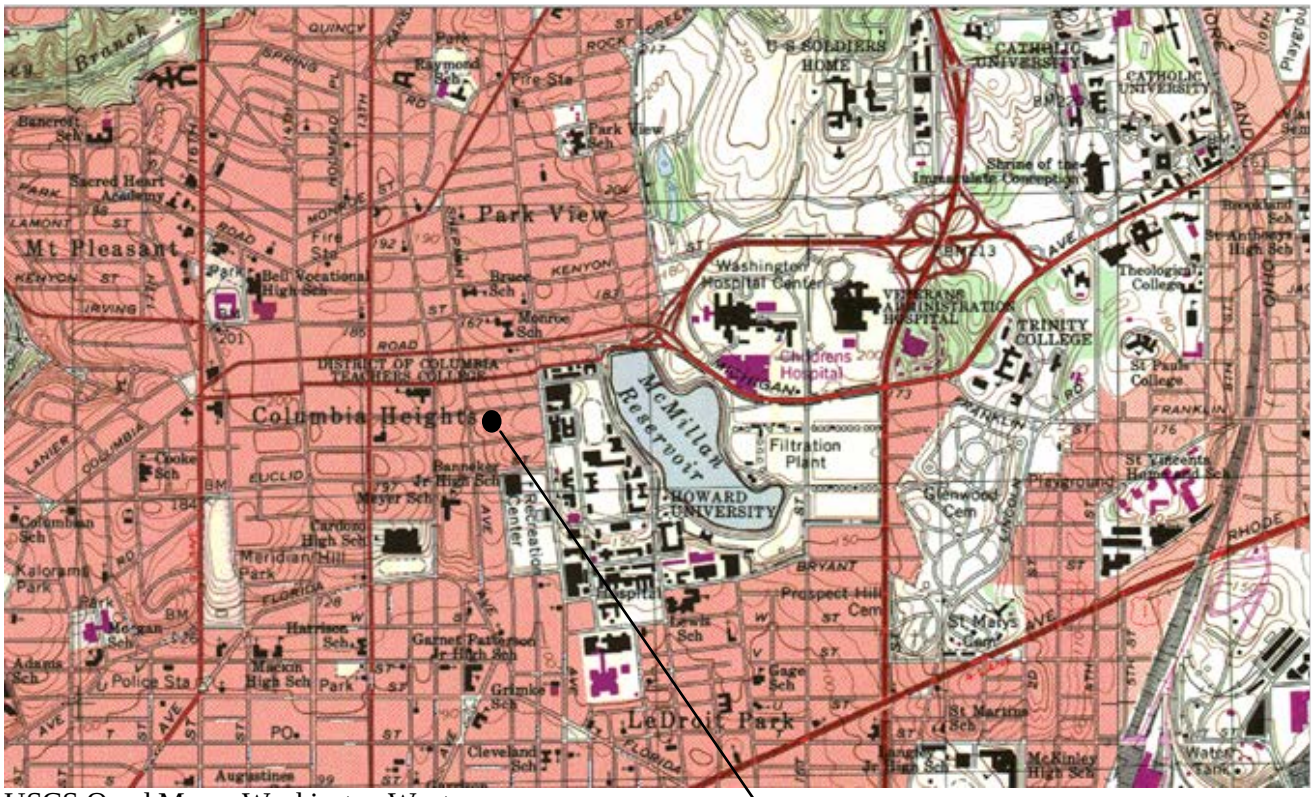
Section number Maps and Images Page 5



USGS Quad Map—Washington West

Standard Material/Gyro Motor Company building
770-774 Girard Street, NW
Washington, D.C.

United States Department of the Interior
National Park Service

National Register of Historic Places
Continuation Sheet

Standard Material/Gyro Motor Company building
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Washington, D.C.
County and State

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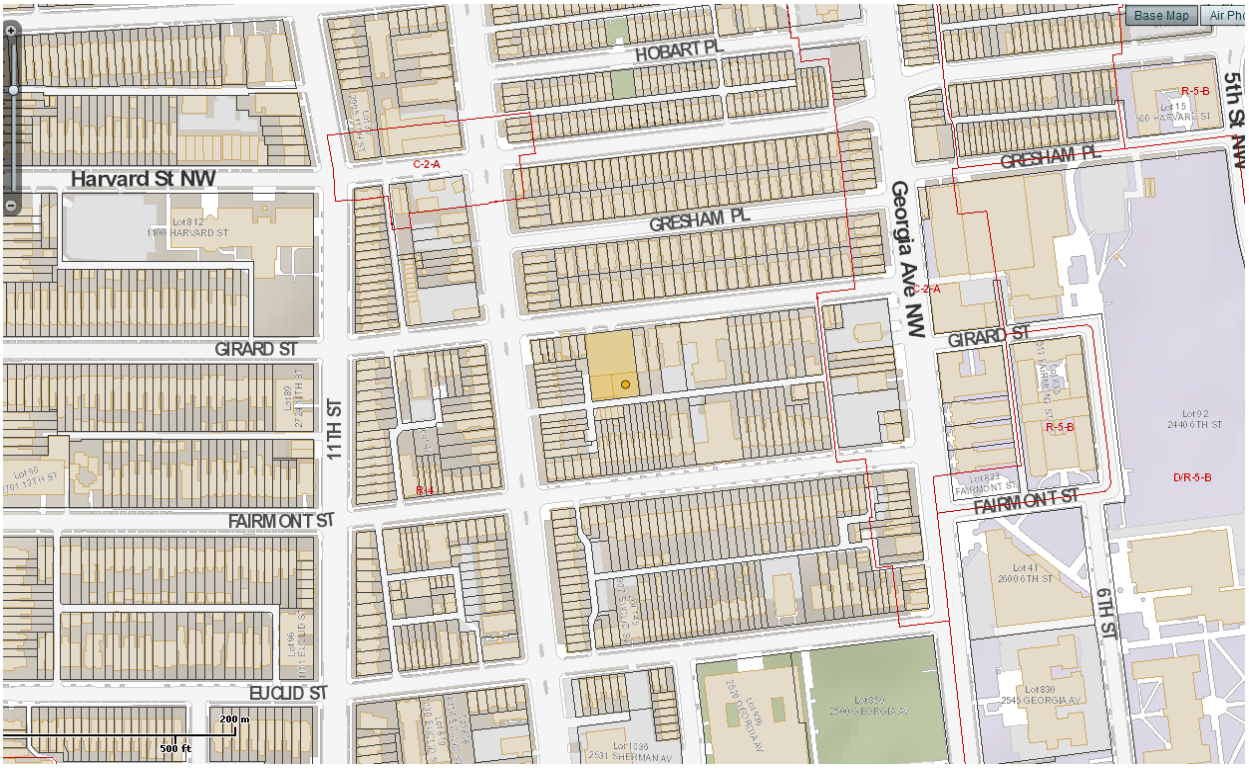
Section number Maps and Images Page 6



Site Map showing Standard Material/Gyro Motor Company site

United States Department of the Interior
National Park Service

National Register of Historic Places
Continuation Sheet

Standard Material/Gyro Motor Company building
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Section number Maps and Images Page 7

Site plan of Standard Material/Gyro Motor Company building showing National Register Boundaries

United States Department of the Interior
National Park Service

National Register of Historic Places
Continuation Sheet

Standard Material/Gyro Motor Company building
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Washington, D.C.
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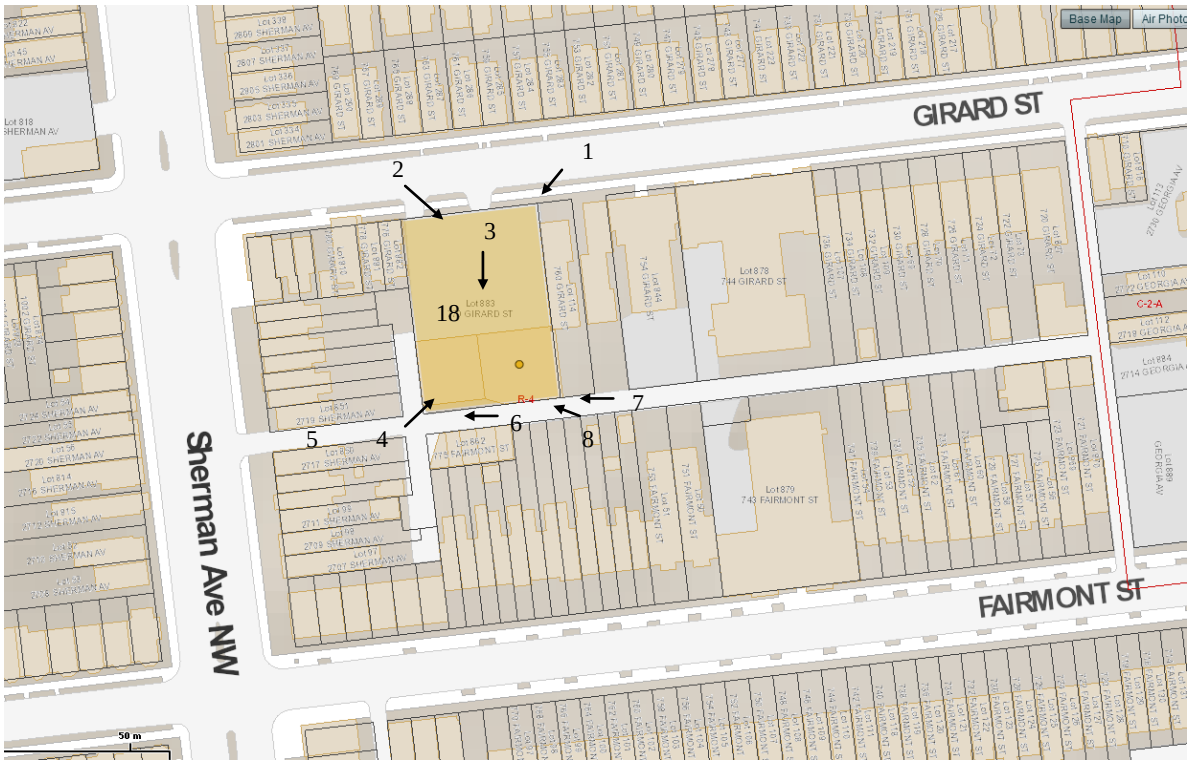
Name of multiple listing (if applicable)

Section number Maps and Images Page 8



Key to Photographs

United States Department of the Interior
National Park Service

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Standard Material/Gyro Motor Company building
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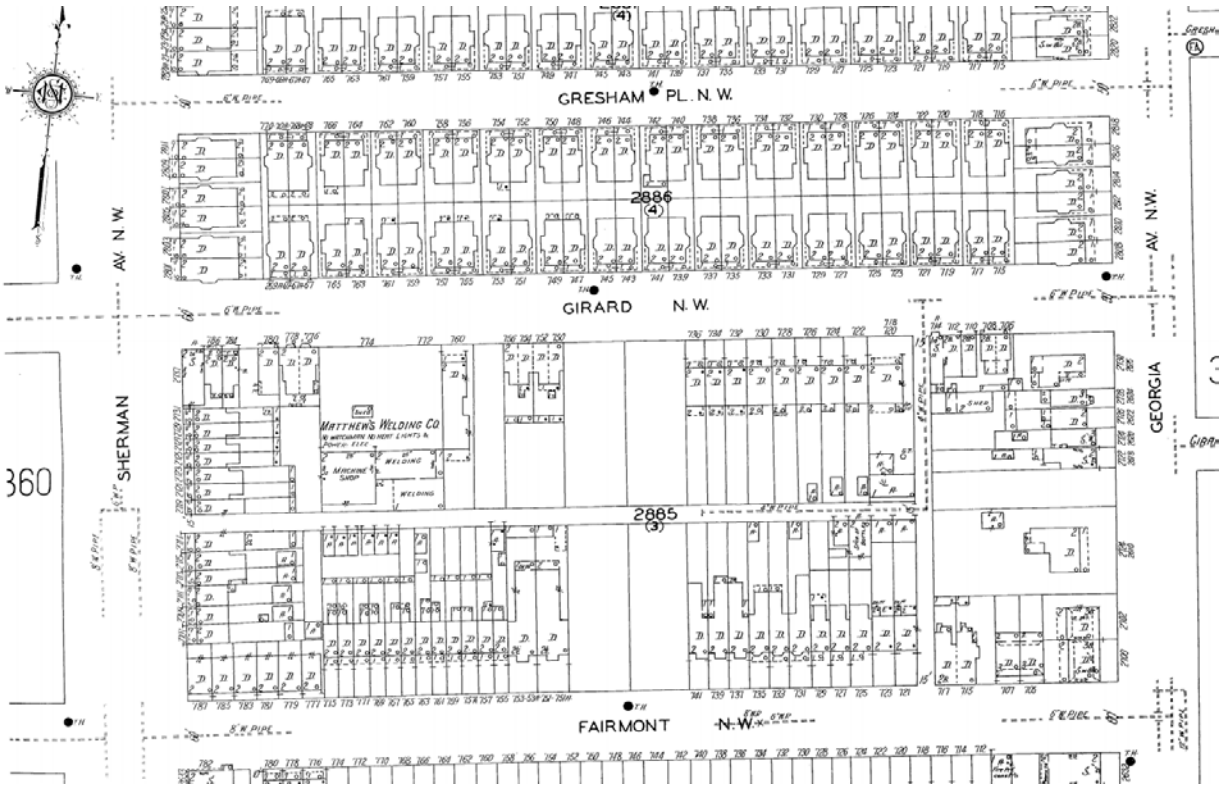
Name of multiple listing (if applicable)

Section number Maps and Images Page 9



Sanborn Fire Insurance Map, 1959 (updated)


THE CRAFTSMEN GR
HISTORIC ARCHITECTURAL MILL
est. 1989
Washington, DC
thecraftsmengroup.com

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES
EVALUATION/RETURN SHEET

REQUESTED ACTION: NOMINATION

PROPERTY NAME: Standard Material Company--Gyro Motor Company

MULTIPLE NAME:

STATE & COUNTY: DISTRICT OF COLUMBIA, District of Columbia

DATE RECEIVED: 8/15/14 DATE OF PENDING LIST: 9/08/14
DATE OF 16TH DAY: 9/23/14 DATE OF 45TH DAY: 10/01/14
DATE OF WEEKLY LIST:

REFERENCE NUMBER: 14000799

REASONS FOR REVIEW:

APPEAL:	N	DATA PROBLEM:	N	LANDSCAPE:	N	LESS THAN 50 YEARS:	N
OTHER:	N	PDIL:	N	PERIOD:	N	PROGRAM UNAPPROVED:	N
REQUEST:	N	SAMPLE:	N	SLR DRAFT:	N	NATIONAL:	Y

COMMENT WAIVER: N

✓ ACCEPT ___ RETURN ___ REJECT 9/30/2014 DATE

ABSTRACT/SUMMARY COMMENTS:

RECOM./CRITERIA Accept A & B

REVIEWER Patrick Andrus DISCIPLINE Historian

TELEPHONE _____ DATE 9/30/2014

DOCUMENTATION see attached comments Y/N see attached SLR Y/N

If a nomination is returned to the nominating authority, the nomination is no longer under consideration by the NPS.

GOVERNMENT OF THE DISTRICT OF COLUMBIA
HISTORIC PRESERVATION OFFICE

MEMO

DATE: August 8, 2014

TO: Patrick Andrus

FROM: Kim Williams

RE: Transmittal Letter for Standard Material/Gyro Motor Company National Register nomination

The enclosed disk (Disk 1 of 2) contains the true and correct copy of the nomination for the STANDARD MATERIAL/GYRO MOTOR COMPANY to the National Register of Historic Places.

In addition, the enclosed Disk 2 (of 2) contains the NR photos as per the NR photo requirements.