287920

Disc of a green-colored wax compound in a brass tray, containing a vertically cut phonogram with a groove pitch approximately 1.5 mm per rotation.

The distinctive features of this disc best match work Chichester Bell did in 1883-85, with 1884 seeming most likely based on the information and arguments presented below. Unfortunately, his notes for this period rarely describe individual discs in much detail, and they are available to me only in the form of a typed copy at the Library of Congress that doesn't include the diagrams. However, the component features can be documented as follows:

1. The brass tray

In a set of notes made in December 1883, Chichester Bell described some instruments he'd had built that April by S. Herbert Harding and J. S. Harding for making "Edisonian" (vertical-cut) recordings on discs. Of interest here is his description of the discs he was then using:

> **{CBN 6:4}** The discs on which I took records with these instruments were of two kinds, glass and brass. The glass discs were circular sheets either of window glass or of plate glass.... They were drilled in one workshop with a hole in the centre **{CBN 6:5}** so that by means of a washer and nut they could be fixed on the end of the axis A of the recording instruments. The brass discs were also drilled with a hole in the centre (Fig. 2) which also accurately fitted the end of the axis, to thich [sic] they could be attached by the nut (without the washer). They were also turned out to a slight depth between the central raised part R and the circumference C, so as to form a shallow circular trough. When warmed over a lamp they could be filled with melted paraffin-wax etc.

The description of the form of the brass tray given here matches 287920—note the drilled center hole, the raised center area, and the raised circumference lip. This tray was probably used repeatedly for different experiments, with the "melted paraffin-wax etc." being removed and replaced each time. Chichester Bell's subsequent description of the alternative glass disc format (with plaster of paris rings at the edges of the area to be filled with wax composition) matches NMAH 287688, from which most of the wax has been scraped:

287688

That artifact too hints at a practice of scraping/melting off and reusing plates in these experiments. An unfortunate result is that we probably don't have many of Chichester Bell's recordings from 1883. Indeed, no recordings actually bearing a written date in 1883 have turned up in the NMAH collection.

2. The green wax compound

Also in December 1883, Chichester Bell wrote:

> **{CBN 6:6}** I made quite a considerable number of records on the brass discs and glass discs...coated with various substances. The principal ones I tried were paraffin-wax, tallow, wax, cocoa fat, and mixtures of these substances. It seemed to me that the old paraffin wax mixture which we used was too stiff, and I therefore sought for some softer mixture which might cut equally well.... **{CBN 6:7}** The substance I finally settled upon as the most suitable for making records when consideral [sic] depth of record is required, consists of our old paraffin-wax mixture (2 parts paraffin, 1 part wax) mixed with one-eighth (1/8th) of its weight of cocoa fat (oil of theobroma). This mixture seems to cut as well as the paraffin-wax, and is much softer. In all air methods of reproducing it has decided advantages.... In reproducing from records made in this mixture by air methods, to be described farther on, I noticed that usually a ~~[...]~~ hissing noise accompanied the voice sounds. On inspecting the surface of the record, it seemed to be slightly granular under a powerful glass, and it occurred to me that the granular surface might be the cause of the hissing noise; and that it might be got rid of by slightly heating the surface to incipient fusion. Thus [sic] I accomplis[h]ed by fastening an ebonite handle, made for the purpose, on to the **{CBN 6:9[1]}** centre of the disc, and holding the disc at a suitable height obliquely above a Bunsen lamp with rose burner, at the same time rotating it rapidly.
>
> A little practice enabled me to hit off the point at which the surface of the composition was just fused, without the vibrations being impaired This point is known to be reached when the surface begins to glisten.
>
> On reproducing from paraffin-wax-cocoa records treated in this way, I found to my surprise not only that the hissing had almost entirely disappeared, but that the loudness and distinctness of the articulation obtained by any method of air reproduction was vastly increased, especially the loudness. After this observation I treated all my records in the same way.

The "treatment" described here was likely applied to 287920. On 25 March 1884, Chichester Bell wrote further of experiments with playback using small, high-pressure air jets:

> **{CBN 6:22}**Within the last week I have made many experiments on methods of reproduction from paraffin-wax-cocoa records, chiefly by means of air. My object has been especially to secure loudness in the reproduction. **{CBN 6:23}** I took a record which I had had lying by now for a very long time. Its surface appeared a little roughened, but I found that by heating it in the way shown on page 15,[2] it was completely restored. The record was Edisonian.... I find that it is not easy, especially in poor light, to adjust the above hearing apparatus, as the record groove[s] are not easily visible. I therefore propose to colour the surface of the recording mixture before using it. As a solid powder rubbed into it might be injurious unless very fine, I shall try colouring it with some solution (Fuchsine?)

[1] Due to a mistake in page numbering, there is no page 6:8.

[2] Page numbers refer to the original pagination and not to the typed copy. "Page 15" probably refers to the text copied onto 6:7 and 6:9, quoted above.

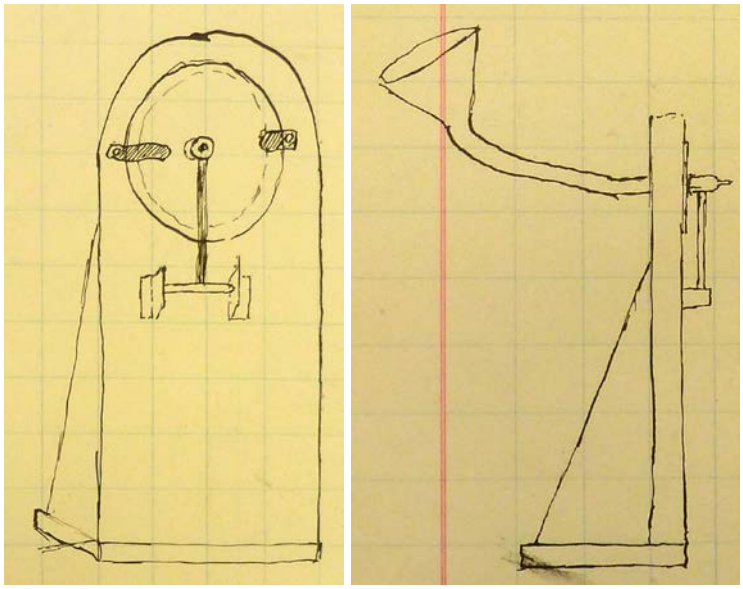
The idea of *coloring* the wax composition doesn't arise again in Chichester Bell's notes, as far as I've seen. However, the composition of 287920 is a brilliant green—wholly unlike anything else in the NMAH Volta collection. This green color is also more consistent than we would expect if it were due to discoloration from copper impurities in the brass or something of that sort. Hence I hypothesize that the wax was colored *intentionally*—not using Fuchsine, which would have given a magenta color, but with some other substance. This in turn would imply it was recorded after 25 March 1884, when Chichester Bell first came up with this idea.

The next explicit reference I find to recording in a (filtered) wax composition on a brass disc concerns a phonogram Chichester Bell made on 16 November 1884 of an Ingersoll speech. However, the text obviously doesn't match 287920. There are other references in this period to recordings in wax composition on glass.

By early 1885, however, wax composition records were being made on thin cardboard, and a number of these can be found in the NMAH collection. If cheap and expendable cardboard was found to be suitable for such experiments, it's unlikely the older brass and glass supports would have continued in use after this point, given the hassle of scraping/melting old recordings from them in order to make room for new ones.

3. The vertical cut

During the experiments of 1883 described above, Chichester Bell employed a recording assembly built and used by Tainter some time before, augmented with a new wooden stand (CBN 6:5):



Working sketches of a mouthpiece, membrane, and stylus assembly, drawn by Chichester Bell, dated 5 April 1883. This may depict the walnut stand for Tainter's old recorder, as described in CBN 6:5 and used for recording on wax compositions in brass trays similar to 287920. (LC)

For the Ingersoll speech of 16 November 1884, he used a new cutting stylus "with rounded point...and sharpened both on the end and laterally" (CBN 7:3-5). Various other arrangements are described as

well. An image of the groove profile might allow for identification with some particular period of development, but I'm not optimistic. I can investigate this further if needed, but to all appearances this aspect of the recording is relatively straightforward.

Conclusions

With all the above in mind, I conclude that the recording on 287920 *probably* dates from between 25 March 1884 (when the idea of coloring the wax composition for enhanced visibility in air jet playback experiments was noted) and early 1885 (by which time brass and glass backings for wax composition phonograms seem to have been superseded by cheaper thin cardboard backings). Furthermore, the voice is *probably* that of Chichester Bell, since he's the member of the Volta Laboratory Association known to have worked with objects most similar to this one, and he routinely writes about making his own test recordings. The rotational speed during recording was probably uneven, since Chichester Bell refers to "a perfectly uniform speed of record" as a future goal (CBN 6:37) and to manual rotation as a current reality (CBN 7:4-5) in his notes of this period.