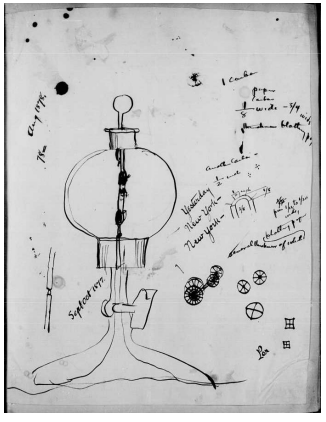
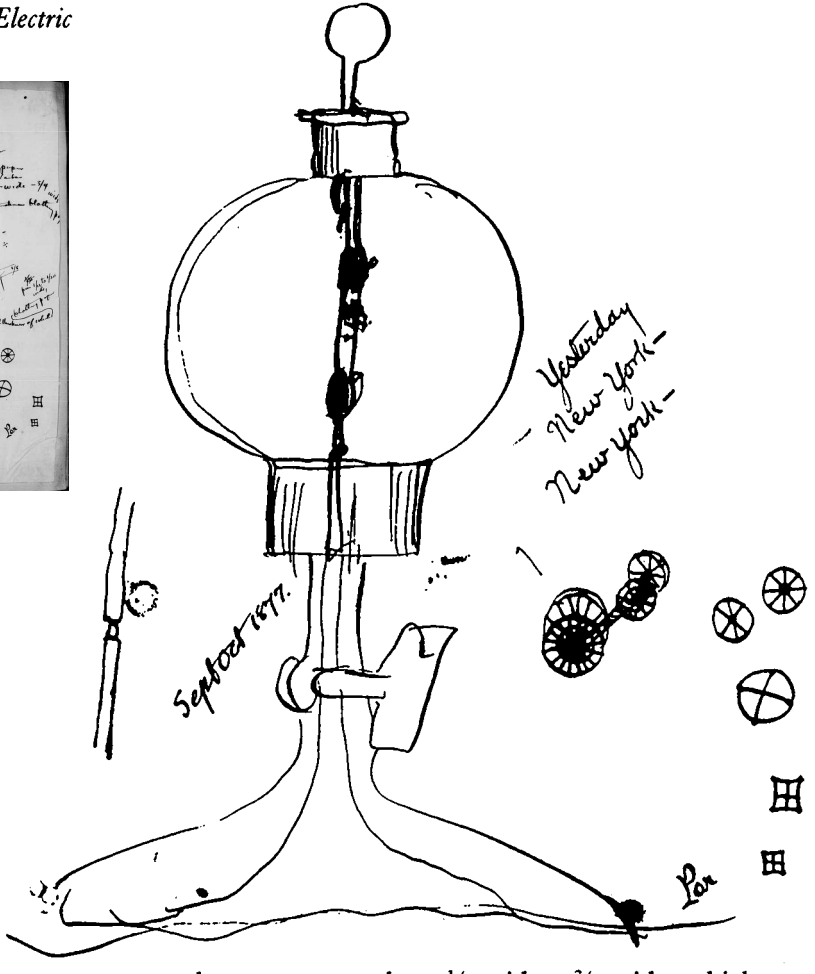
[Menlo Park, c. September 10, 1877][2]

Technical Note: Electric Lighting[1]





1 carbon paper carbon ⅛ wide—¾ wide thickness blotting pap[3a]

Another Carbon—½ inch[a]

~~1/15~~ from 1/12 to 1/20 wide. Several thicknesses of white[b] blotting paper

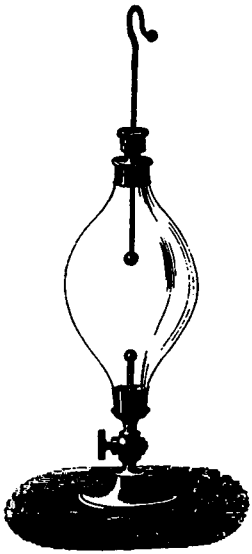
X, NjWOE, Lab., Cat. 1146 (*TAEM* 6:627). This document is photographically reproduced in Friedel and Israel 1986, 95. [a]Edge of page cut off. [b]"Several . . . white" interlined below.

1. See headnote, p. 540.

2. The dates "Sept Oct 1877" and "Aug 1878" appear on this page. Both Edison and Charles Batchelor testified about an electric light introduced in *Sawyer and Man v. Edison* as "Edison's Exhibit First Incandescent Lamp," which appears to be the one drawn here. Although Edison dated this lamp as September or October 1877 and Charles Batchelor thought it was summer or fall, Batchelor also remembered that Edison had been experimenting for "about a day on electric lighting previous to his telling me to put this carbon in the globe." If Batchelor's memory is correct then this lamp was likely made soon after Doc. 1044. Both Edison and Batchelor testified that incandescent lamp experiments using carbon predated those using boron and silicon, and Stephen Field saw experiments around 19 September involving silicon crystals brought to incandescence. Field's testimony, pp. 183–84, *Sawyer and Man v. Edison* (*TAEM* 46:244–45); testimony of Edison and Batchelor, pp. 3018, 3020–21, 3148–49, 3151, *Sawyer and Man v. Edison (U.S.)* (*TAEM* 48:16, 17, 81, 82).

In his testimony Batchelor described how the lamp was made from a Gassiot tube that had been in the laboratory since 1875. He explained that

> It was a difficult and tedious process to put the carbon in there, but I did it by unscrewing the ball from the top of the rod and also unscrewing the globe from the holder above the cock; also unscrewing the cock from the base; also unscrewing the packing cap. When these are all apart the top rod can be left in the part having the cock. The carbon was now screwed to the clamp of the bottom rod whilst lying on the table. The other clamp was then screwed to the other end of the carbon, and all three together lifted and turned, so that the part having the cock would be topmost. The lamp was also turned upside down, and the rods and carbons carefully dropped through it. The top rod was then held until the packing and packing cap were put on, when the whole was screwed together again, and the ball replaced. The binding posts were put on the lamp to hold the connections from the battery. . . .
>
> After putting the carbon into the lamp the lamp was placed on the plate of an ordinary air-pump and the bulb exhausted as well as we could do it with that pump. The current of electricity was then applied to the carbon, and heated the same for some short time. [Pp. 3149–50 (*TAEM* 48:81–82)]



An electric egg.

Edison described the vacuum lamp experiment as follows:

> The apparatus originally was one for illustrating Geissler tube action in vacuo. The base of the apparatus fitted over the hole in the platen of the air pump. It was then exhausted and the cock turned to preserve the vacuum in the globe of this lamp. We did not succeed in getting a higher vacuum than 2½ millimeters on the mercury gauge, and we could not make the carbons burn more than a few minutes at a time. Some of the carbons were brought up to brilliant incandescence, and probably gave thirty or forty candles of light. The carbons were brought up to various degrees of incandescence. [P. 3018 (*TAEM* 48:16)]

The lamp appears to be what was commonly known as an "electric egg," used to study electric discharge in rarefied gases (Guillemin 1873, 637). Atkinson 1886 (887) shows such lamps and notes that the stratification of the electric light resulting from the discharge of a Ruhmkorff coil through rarefied gases was initially investigated by John Peter Gassiot using "sealed glass tubes first constructed by Geissler, of Bonn, and generally known as *Geissler's tubes.*"

3. Batchelor remembered that Edison originally requested that he use hard carbon, but he found it difficult to make a piece small enough to fit in the tube. Edison then suggested using carbonized paper, which was a common material in the laboratory. Batchelor did not remember what kind of paper he used except that the carbon sheet was "thin compared with others we had, . . . about seven or eight thousandths." He thought the other dimensions were ¾ inch long by about 1/16 inch wide. Batchelor's testimony, p. 3149, *Sawyer and Man v. Edison (U.S.)* (*TAEM* 48:81–82).

Edison recalled that

> The carbons were made of sheet paper, of various widths and thickness. I think they were made of Bristol board. They were from three-sixteenths to a sixteenth wide, and probably from eight to fifteen thousandths thick. I believe they were carbonized in tubes made of gas pipe. I cannot remember whether they were prepared at the time or were on hand; we had an immense collection of carbonized paper and wood on hand, which we used in our telephonic experiments, in 1877. [Edison's testimony, p. 3018, ibid. (*TAEM* 48:16)]

4. Figure labels are (clockwise from top) "½ inch," "⅛," and "⅜."