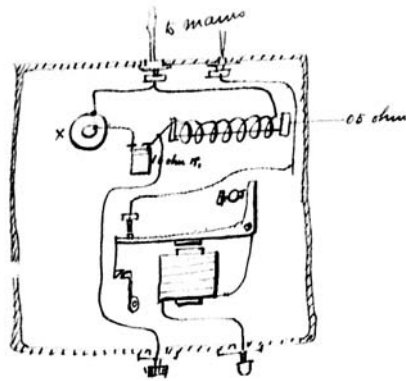
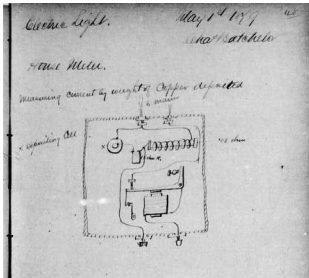


Notebook Entry:  
Electric Lighting

Electric Light.  
House Meter.  
Measuring current by weight of copper deposited<sup>1</sup>



X Depositing Cell

Chas Batchelor

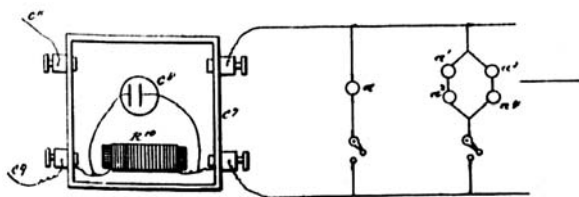
X, NjWOE, Batchelor, Cat. 1304:48 (*TAEM* 91:47; *TAED* MBN004:45). Written by Charles Batchelor.

1. Charles Batchelor's drawing is the first extant 1879 design of a complete meter, though there are some drawings from 2 February of an electrolytic cell for a meter. The design drawn by Batchelor is similar in principle to one Edison had conceived in December 1878 (see Doc. 1622). Edison himself made similar drawings on 4 May and John Kruesi entered an order to make the meter on 8 May; the measured drawings date from the next day. There are no dated records of tests of this meter until the end of July. These tests continued until mid-September and then resumed briefly in mid-November. N-79-03-25:117, 120-21; Cat. 1146; N-79-04-03:101-16, 167-70, 197-205; all Lab. (*TAEM* 32:197, 199; 6:639-40, 643, 645; 31:392-400, 422-24, 437-42; *TAED* N034: 58, 60; NM014:17-18, 21, 23; N025:53-61, 84-86, 98-104); Cat. 1308: 143 (Order No. 151), Batchelor (*TAEM* 90:738; *TAED* MBN003:45).

Edison had included this basic design in a February 1879 U.S. patent application but the description and claims related to the meter as well as part of a drawing showing the meter were deleted before the patent issued (Pat. App. 227,227). He did include the same description and the full drawing of the meter in a final British specification filed in April 1879 (Brit. Pat. 4,226 [1878], Batchelor [*TAEM* 92:107; *TAED* MBP013A]). According to that specification, the apparatus consisted of a box containing a "coil of very large wire, whose resistance is proportioned to the number of burners used in the house. This resistance is but the fractional part of the resistance of a single lamp." The actual measuring device was an electrolytic cell

which contains a solution of copper, [and] has two electrodes of copper, one of which is very thick, while the other is very thin.

*The meter box shown in Edison's British Patent 4,226 (1878) appears at left in the drawing; the resistance coil is  $R10$  and the electrolytic cell is  $C8$ .*



The small portion of the current which passes through the cell carries over copper and deposits it upon the thin plate. If one lamp is placed in connection, it draws current from the main, and a proportionate quantity passing through the cell effects a deposit upon the thin plate; if another lamp is connected, double the quantity is deposited, and so on. At the end of any period, say one month, the plate is taken by the inspector to the central office and accurately weighed. As the deposit of copper upon the thin plate will be proportioned to the total amount of current passing into the house, the same becomes a correct measure or standard for the charge for the electricity supplied. [Brit. Pat. 4,226 (1878)]

In a variation Edison described in the U.S. application, one plate could be suspended from a spring balance and its weight read from an external dial “but this requires delicate mechanism in every house, which is rendered unnecessary by weighing the plates” (see Doc. 1622 for this design). The May design includes a feature that was not included in either the U.S. or British applications. This was a circuit breaker (the magnet and lever shown at bottom in Batchelor’s drawing) that would interrupt the circuit in case of an unusually heavy current, such as that caused by a short circuit.