

## DYNAMO DESIGN Doc. 1653

In December 1878, Edison and his assistants had begun sustained research into the operating principles of contemporary dynamo-electric generators and started to design new machines incorporating what they had learned. Drawing on this research, which continued during the first week of January, Edison designed his first experimental generator intended

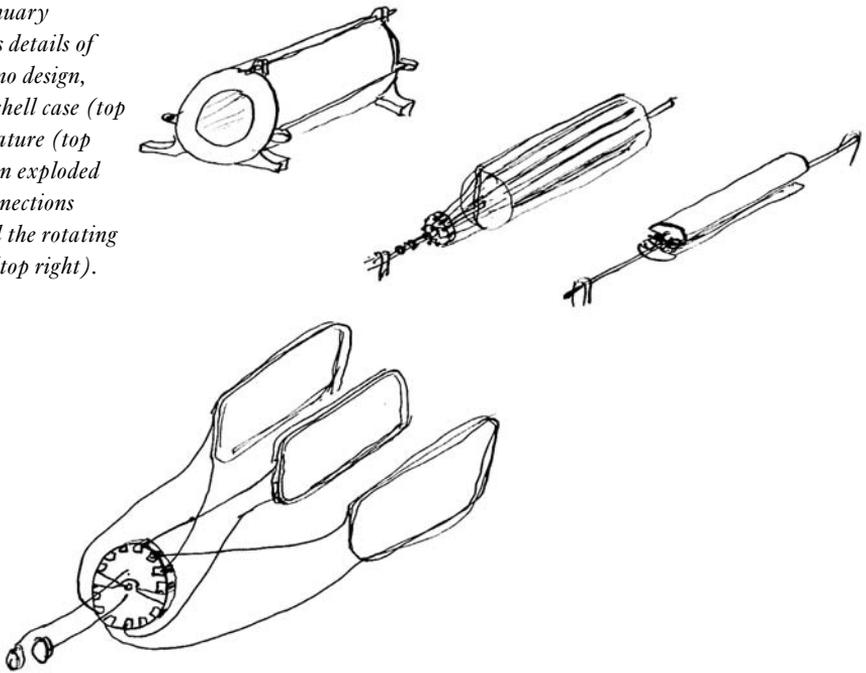
*January–March 1879*

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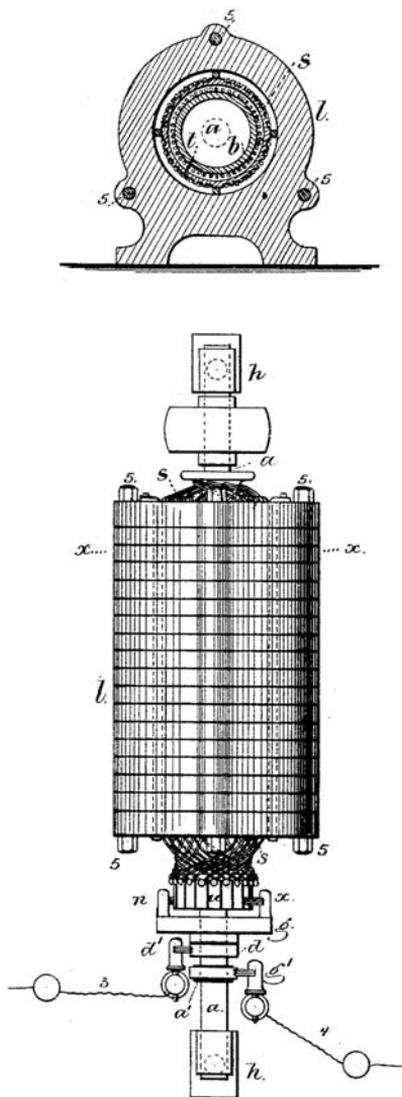
specifically to meet the requirements of his projected electric light and power system. He sought to produce an economical machine that would provide as much energy as possible by completely containing the magnetic field so that all of it could be used to generate electricity.<sup>1</sup>

On 30 December (Doc. 1646), Batchelor had described a modified Siemens generator in which the stationary inner iron core was wired to become an electromagnet that supplemented the power of the external field magnets; the hollow armature rotated between that core and the field magnets. In notes written on 1 January, Batchelor described a design for commutator springs that seems to specify the same sort of moving armature and commutator. (Edison's drawing of 4 January shows the attachment of the coils to the commutator.) In the drawings of the present document, the external field magnets are gone, replaced by an iron shell, and it is not clear which components move. Judging by commutator drawings from later in the first week of the year, the dynamo design had shifted to one having a stationary armature and commutator with a moving internal field magnet and commutator springs. When the field magnet rotated inside the armature drum, the springs rotated around the commutator, allowing current to flow from the armature coils to a circuit outside the machine. By having only the small-

*Edison's 4 January drawing shows details of his first dynamo design, including the shell case (top left), the armature (top center) with an exploded view of its connections (bottom), and the rotating field magnet (top right).*



Drawings from U.S.  
 Patent 264,643 show the  
 design of this dynamo.



est part of the generator—in this case, the field magnet—move, minimum work was required to provide the highest rotational speed.<sup>2</sup>

During the first week of January, Charles Batchelor specified the dynamo's dimensions and windings and prepared some measured drawings for it. Designed to fit on a base eighteen and one-quarter inches wide by thirty-six and one-eighth inches long, the machine was to be a little over a foot and a half high with a diameter of twelve inches and an armature five inches across. There are several measured drawings of com-

mutator designs from the week following this document, and the machine was completed in mid-February (see Doc. 1682).<sup>3</sup>

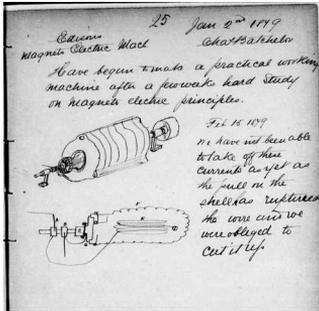
1. Docs. 1621, 1627, and 1641; Vol. 16:320–25, 328–46, 348–50; N-78-12-11:71–126; N-78-12-16:232–47; all Lab. (*TAEM* 4:752–57, 760–79, 781–83; 29:714–39, 1180–87; *TAED* NV16:274–79, 282–301, 303–5; No07:36–61; No10:106–13).

2. N-79-01-01:25, 45, 50–51, 55; Vol. 16:349; all Lab. (*TAEM* 30:270, 280, 283, 285; 4:782; *TAED* No13:11, 21, 24, 26; NV16:304).

3. N-79-01-01:25–59; Unbound Notes and Drawings (1879); Over-size Notes and Drawings: Machine Shop Drawings (1879–1880); Cat. 1146; all Lab. (*TAEM* 30:270–87, 44:974–5, 45:44, 6:638; *TAED* No13:11–28, NS79:2–3, NS7986C:1–2, NMO14:16).

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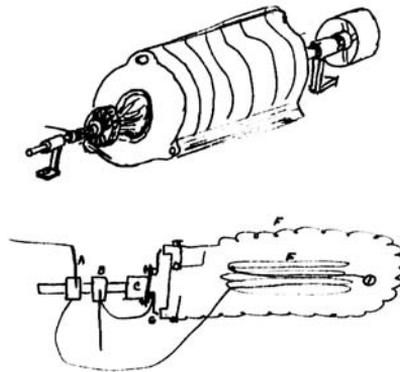
*Notebook Entry:  
Electric Lighting*



[Menlo Park,] Jan 2nd 1879

Edisons Magneto Electric Mach.

Have begun to make a practical working machine after a few weeks hard study on magneto electric principles.<sup>1</sup>



Chas Batchelor

ADDENDUM<sup>a</sup>

[Menlo Park,] Feb 15 1879

We have not been able to take off these currents as yet as the pull on the shell has ruptured the wire and we were obliged to cut it up

X, NjWOE, Batchelor, Cat. 1304:25 (*TAEM* 91:27; *TAED* MBNo04:25). Written by Charles Batchelor. <sup>a</sup>Addendum is an X, written by Batchelor.

1. See headnote above.