Ask the Historian

The Origins of the Meker and Tirrill Burners

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Question

What are the origins of the Meker and Tirrill laboratory burners?

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Answer

Aside from the original Bunsen burner itself, whose origins were traced in an earlier installment of this column, the Meker and Tirrill burners are perhaps the best known varieties of laboratory gas burners still found in the modern American chemical laboratory (1). The Meker burner (figure 1) was first proposed by the French chemist, M. G. Meker, in 1905 (2). It was based on the observation that the region of maximum temperature in the standard Bunsen burner flame is restricted to a small area centered above the outer tip of the flame. In the Meker burner the grid breaks the flame into an array of smaller flames, each with its own maximum temperature zone. These act collectively to produce a much larger area of maximum temperature, as well as a net overall increase in temperature - features which Meker demonstrated using comparative heating curves which showed that his design could reach temperatures of 1180 °C as compared to an average of about 935 °C for the more traditional Bunsen burner. A further modification of the burner, employing compressed air, was able to reach a temperature of 1500 °C. By 1912 the various forms of Meker's burner had become a standard feature of laboratory supply catalogs, whether American, British or European (3).

The most characteristic feature of the Tirrill burner - a needle valve for gas regulation located in the base of the burner - was first proposed by the American chemist, Francis Preston Venable, in 1887 (4). In Venable's original design (figure 2) the thumb nut controlling this valve was located in a hollow in the bottom of the cast-iron base of the burner and the air supply was regulated by a metal collar turned by means of a small knob. In the Tirrill modification of Venable's

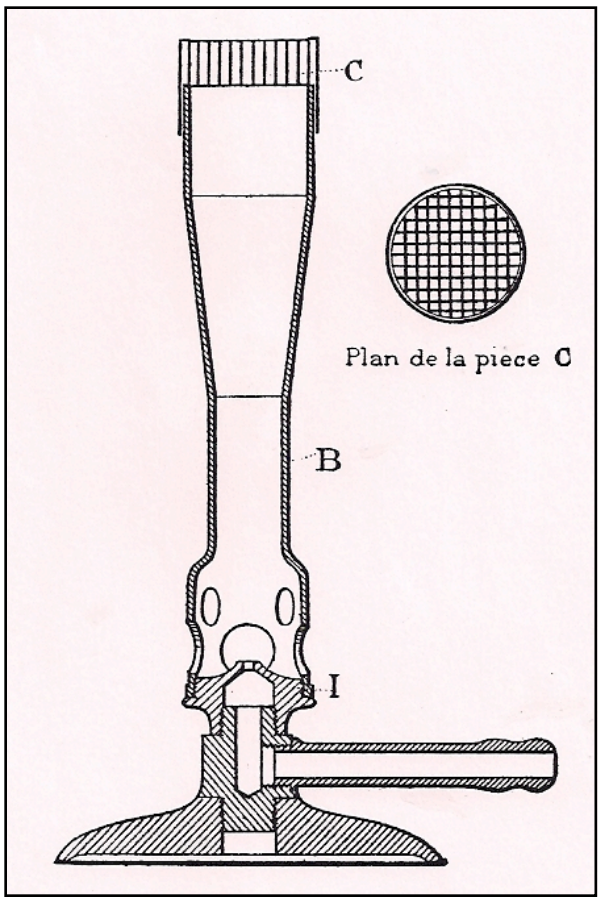

Figure 1. A cross-section of Meker's original burner (2).

burner the thumb nut was made more accessible by stripping away most of the solid base so as to leave only an open vertical half circle fused to a horizontal hexagonal or circular frame, and the air was regulated by screwing the burner barrel up and down on a threaded mount so as to partially unblock or block a series of circular air holes located in its base. The 1904 catalog of the Henry Heil Co. continued to attribute this modification to Venable, but starting around 1910 laboratory supply catalogs began to uniformly identify this variation as a either a Tyrell, Tirill or Tirrill burner (5).

Unfortunately we have been unable to identify either Tirrill (let alone the correct spelling of the name)

or the exact date of this modification, though we did find several patents relating to the design of gas lighting fixtures and commercial heating devices issued under this name or variants thereof, strongly suggesting that Tirrill was the name of the company which manufactured the burner. This is further supported by the fact that a second variation of Venable's burner employing essentially the same open base and threaded air control, but manufactured by the Boyce Company, also appears in supply catalogs starting around 1904 and that both the Boyce and Tirrill burners are found only in American supply catalogs (6). This is because in the late 19th and early 20th century laboratory burners appear to have been manufactured as a side line by the same companies that manufactured gas lighting fixtures and heaters and many of the burners found in American versus British versus German laboratory supply catalogs are in fact quite unique to the country in question.

Literature Cited

1. W. B. Jensen, "The Origin of the Bunsen Burner," *J. Chem. Educ.* **2005**, *82*, 518.
2. M. G. Meker, "Nouveaux brùleurs de laboratoire et leur adaption à l'obtention de températures élevées," *Bull. soc. chim.* **1905**, *33*, 210-215.
3. The earliest catalog in the Oesper Collections listing Meker's burner is *Catalogue of General Chemical Apparatus and Laboratory Accessories*, A. Gallenkamp & Co., Ltd: London, 1911-1912, pp. 56-58.
4. F. P. Venable, "A New Form of Bunsen Burner," *J. Anal. Chem.* **1887**, *1*, 310-312.
5. *Illustrated Price-List and Catalog of Chemical Apparatus*, Henry Heil Chemical Co: St Louis, MO, 1904, p. 176, Item 3839/2.
6. An example of yet a third variation of the Venable burner involving an open tripod base is on display in the Oesper Museum and is identified by the 1920 catalog for Eimer and Amend as a "Detroit Burner."

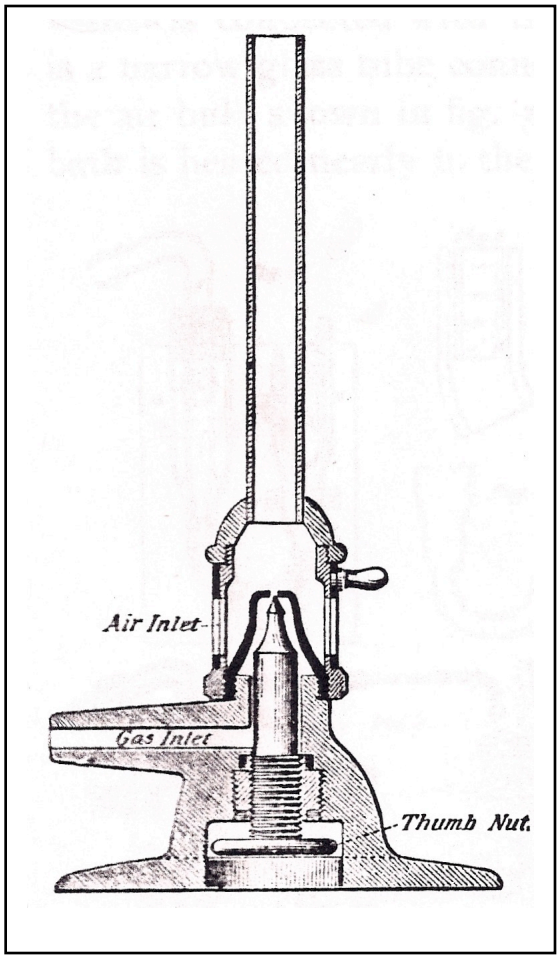

Figure 2. A cross-section of Venable's original burner (4).

Do you have a question about the historical origins of a symbol, name, concept or experimental procedure used in your teaching? Address them to Dr. William B. Jensen, Oesper Collections in the History of Chemistry, Department of Chemistry, University of Cincinnati, Cincinnati, OH 45221-0172 or e-mail them to jensenwb@ucmail.uc.edu