Notes from the Oesper Collections

From Alcohol Proof to Galileo

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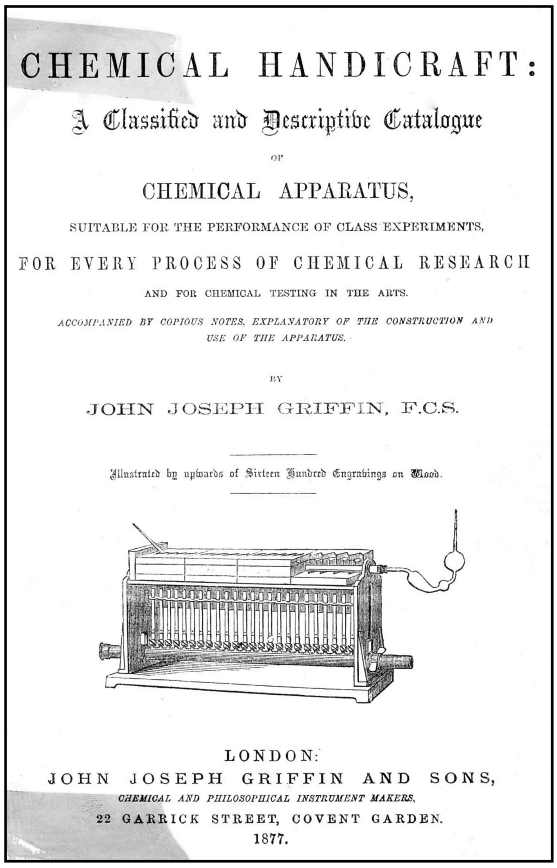
The Oesper Collections contain a collection of roughly 150 laboratory supply catalogs spanning the period 1850 to 2000 which are used to help identify and document the various pieces of apparatus found in its museum collections. One of the most interesting of these is the 1877 catalog for the firm of John J. Griffin and Sons (figure 1), located at the time on Garrick Street in Covent Garden, London (1). Founded in 1852, the firm remained in business well into the early decades of the 20th century.

While recently glancing through this catalog in an attempt to characterize some of our antique apparatus for volumetric analysis, my eye briefly caught an item in passing with the intriguing title of "Spirit Bubbles or


CHEMICAL HANDICRAFT:

A Classified and Descriptive Catalogue

OF

CHEMICAL APPARATUS,

SUITABLE FOR THE PERFORMANCE OF CLASS EXPERIMENTS,

FOR EVERY PROCESS OF CHEMICAL RESEARCH

AND FOR CHEMICAL TESTING IN THE ARTS.

ACCOMPANIED BY COPIOUS NOTES, EXPLANATORY OF THE CONSTRUCTION AND USE OF THE APPARATUS.

BY

JOHN JOSEPH GRIFFIN, F.C.S.

Illustrated by upwards of Sixteen Hundred Engravings on Wood.

LONDON:
JOHN JOSEPH GRIFFIN AND SONS,
CHEMICAL AND PHILOSOPHICAL INSTRUMENT MAKERS,
22 GARRICK STREET, COVENT GARDEN.
1877.

Figure 1. Title page of the 1877 catalog for the John J. Griffin and Sons laboratory supply house.

Figure 2. A surviving set of "spirit bubbles: for testing the proof of alcoholic beverages.

Beads" (2). Though the name would seem to suggest something connected with seances and spiritualism, it actually refers to spirits of an alcoholic nature and to the determination of alcohol proof (3). The item in question consisted of a set of numbered glass balls of varying density (figure 2) which could be dropped into a sample of a distilled liquor or "spirits," such as whiskey or brandy, to determine if it had the proof or concentration required by law, and was based on the fact that the densities of water/alcohol solutions vary with concentration, becoming smaller as the alcohol content or proof increases.

The glass balls formed a series of gradually increasing density and, by observing the ball with the greatest density that remained floating, one could approximate, with the help of an accompanying table, whether the sample conformed to the legally required proof or, if not, by what percentage it either exceeded or fell short of that standard. Griffin and Sons sold the balls in sets of 12, 18, or 24 housed in a round Japanned box, and also offered them in colored glass, if desired, so as to increase visibility.

This use of floating glass balls to approximate the

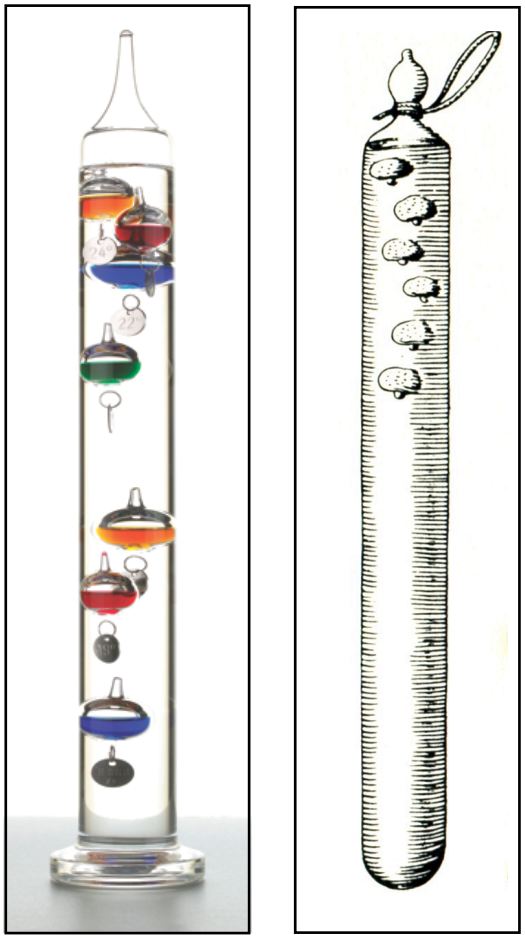


Figure 3. *Left:* A modern-day version of the so-called Galileo thermometer. *Right:* The original version as depicted in the 1687 edition of the *Saggi di naturali esperienze* of the *Accademia del Cimento*.

densities of liquids is perhaps most familiar to readers via a device known as a "Galileo thermometer," sold in most novelty shops (figure 3, left). This consists of a sealed cylinder filled with a colorless liquid and containing a collection of glass balls of varying density, each labelled with the temperature at which its density is equal to that of the surrounding liquid. As the temperature decreases, the density of the liquid increases and more and more of the balls float and vice versa as the temperature increases. Among the balls that are floating, that with the smallest temperature value corresponds to the temperature of the liquid, and presumably of the surrounding room. In short, while spirit bubbles depend on the variation of density with concentration, the so-called Galileo thermometer depends on its variation with temperature.

Unhappily, as suggested by my use of the qualifier "so-called," Galileo had nothing whatsoever to do with the invention of this device, despite the pervasive modern-day use of his name to advertise it. It first makes an appearance in 1667 in the publications of the Italian *Accademia del Cimento* (figure 3, right) and, in the history of science literature at least, is named after Ferdinand II of Tuscany, who was one of the society's royal sponsors (4).

The term "spirit bubble" has now joined my list of favorite British nicknames for scientific apparatus, though top prize still goes to the descriptor "stink closet" as a synonym for a typical laboratory hood.

References and Notes

1. *Chemical Handicraft: A Classified and Descriptive Catalogue of Chemical Apparatus,* Griffin and Sons: London, 1877.

2. Reference 1, pp. 53-54.

3. W. B. Jensen, "The Origins of Alcohol Proof," *J. Chem. Educ.*, **2004**, *81*, 1258.

4. W. E. Knowles Middleton, *The Experimenters; A Study of the Accademia del Cimento*, Johns Hopkins: Baltimore, MD, 1971, pp. 94, 98-99.