
Hard Candy: Cooking

This paper will look at the history of hard candy cooking as a lesson in engineering progress, in which market demand for increasing hard candy tonnage of consistent quality created the equipment necessary to produce it. An examination of various sources tells us that this evolution was not a simple progression of one method to another; much of the development in cooking methods made over the years overlapped the time frame in which simpler methods were popular. We will discuss open fire cooking, batch vacuum cooking, continuous batch, and true continuous cooking in a coil-type unit. We will attempt to examine the improvements brought by each method over its predecessors and explore the disadvantages of each method. We will then conclude with some observations on cooking process control.

Hard candy has been defined as a super-saturated solution of sucrose existing below its melting point in the form of a glass. Cooking of hard candy has been directed toward the creation of this glass state, while

boiling away as much moisture as the method allowed.

OPEN FIRE COOKING

Prior to the beginning of this century, the exclusive method for production of hard candy was open fire cooking in which a gas or coke-based fire was used to heat a kettle containing sugar and water, with honey, or more commonly, cream of tartar, used to provide a batch “doctor” preventing sugar re-crystallization as the syrup would cool. The cream of tartar was added at the syrup boiling point, at a ratio of about one ounce to thirty pounds of syrup. Typical final cooking temperatures were in the 300°F–310°F range. Upon reaching final cooking temperature, batches were usually poured onto lubricated slabs with flavors and citric acid folded in as needed. The cooling mass was then kneaded, cut into sections, and fed into cutting machines or drop rollers.

The open fire method had several inherent problems. The first was low output. An operator could typically produce no more than two batches per hour of approximately 50–80 pounds each. Of greater impact were product quality problems. The high cook temperature needed to atmospherically boil away moisture tended to discolor the sugar syrup, making it difficult to produce batches of uniform appearance, and the boiling time inverted some of the sugar. The operator had to show great care in washing sugar crystals formed during the cook process

down from the sides of the kettle since failure to do this would result in the promotion of dry graining in the product. The cream of tartar method of batch “doctoring” was notorious for producing a product of inconsistent dextrose equivalent often resulting in an unacceptably hygroscopic candy. Lastly, candies produced in this method were subject to cold flow, melting due to its high residual (greater than three percent) moisture content.

Despite its drawbacks this was the only method of hard candy manufacture before the first decade of the twentieth century.

BATCH VACUUM COOKING

Early in the twentieth century, a cooker was devised utilizing the principle of vacuum boiling to counter some inconsistent results and low production output of open fire cooking. This unit was called the Simplex and was manufactured by the Vacuum Racine Company of Wisconsin.

The operation of the Simplex cooker first involved open boiling of syrup to 280°F then closing a dome over the kettle and, utilizing a vacuum pump, boiling and removing moisture from the mass by employing a partial vacuum on the candy for 5 to 10 minutes. The diagram in Figure 1 shows the three types of Simplex cookers used over time, an evolution that eventually allowed the candy to be cooked under vacuum. The Simplex was also used for cooking other types of confectionery—fondants for example—and, before the use of the higher dome, foaming ingredients would be lost through the vacuum pipe.

The Simplex produced products having greater clarity and less sugar inversion than the open fire method. With its development, pure sugar formulations were replaced by blends of sugar, water, and “doctor syrups;” specifically corn syrup to control the sugar crystallization,

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