AN ENCYCLOPEDIA
of
CANDY AND ICE-CREAM MAKING

by

SIMON I. LEON
Candymaker
Consultant to the Confectionery Industries

edited by

S. Joseph Leon

1959

CHEMICAL PUBLISHING CO., INC.
212 Fifth Avenue, New York, N. Y.

An Encyclopedia of Candy and Ice-Cream Making

© 2011 by Chemical Publishing Co., Inc. All rights reserved. This book is protected by copyright. No part of it may be reproduced, stored in a retrieval system or transmitted in any form or by any means; electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the publisher.

ISBN: 978-0-8206-0011-6

Chemical Publishing Company:
www.chemical-publishing.com
www.chemicalpublishing.net

First edition:

Chemical Publishing Company, Inc. - New York 1959

Second Impression:

Chemical Publishing Company, Inc. - 2011

Printed in the United States of America

PREFACE

Who is the master confectioner?

He is the man who is an expert in his trade, who knows his business from A to Z, and can teach others to become proficient in this field.

The author of this book began as a candymaker in early youth and has devoted his entire life to candymaking. He has written this book so that others may benefit from fifty-two years of experience and hard work.

Many good candy books have been published, but as a rule they do not cover the retail and smaller wholesale manufacturing field completely. For example: A certain formula, though it may be the best, calls for steam or vacuum cooking. This will not suit the candymaker who uses open-fire cooking. Here is only one example in a hundred where a formula that is suitable for the large candy factory will not give good results in the medium shop.

The large candy manufacturer has his highly paid executive to take care of all his problems, but the smaller manufacturer has his hands full with making and selling his products. He is only too likely to neglect the candymaking end. That is why this book should be of particular interest to the retail and medium-wholesale candymaker. The man who must know his business from A to Z should find this work a treasury of candymaking.

The author is not an historian, but reviewing his career, he finds that he has lived through revolutionary changes in confectionery manufacturing. In Lublin, Poland, in the year 1906, he

made his first batch of hard candy. There were six small candy shops in town making mostly hard candy and fruit-filled, wrapped caramels. Two of them also made a few molded solid chocolate bars. All the work was done by hand. Coke or coal was used for fuel in cooking the batches. There were no thermometers. The cold-water test was the standard method for cooking batches and many of them were either burned or cooked too low. Sticky hard candy was the problem of the day. There were no batch warmers for spinning hard candy. In order to keep the batch warm, one had to warm up the pouring slab.

Candy was made in Eastern Europe in this primitive fashion. There were boom seasons and off seasons, but surprisingly enough, candy was popular the year round.

In 1910, the author reached metropolitan Warsaw. He found hundreds of small candy shops scattered throughout the city and its suburbs. Thousands of pounds of candy were produced daily in the same primitive way. Most of the hard candy, solid and filled goods, were hand-wrapped by young girls. But even then, there were the first pioneers—two or three more or less mechanized candy factories complete with smoke stack and factory whistle. There were two modern, medium-sized chocolate shops—Warshawianka and Viktor—which produced a quality product that competed successfully with Swiss chocolate. A number of shops specialized in caramels cupped and packed in wooden fiber boxes. About three or four chocolate shops made chocolate coatings from the bean on and sold them to small candy shops throughout Poland. But on the whole, improvements in ingredients, equipment, and production methods were few.

To move from this milieu into the United States was like exchanging a covered wagon for a transatlantic plane. In New York City, before the First World War, the author found modern six-story plants which employed more than 300 workmen. All machinery was automatic, and most of the basic raw material shot the chutes from the top floor directly into the cooking kettles. The large-scale production methods were impressive, but the quality of the product left much to be desired. Many large plants in America produced for the five and dime chain and variety stores. Not only hard candy, but also crystallized creams, jellies, gums, and fudge retailed for 20 cents a pound, and fancy-package chocolates went for 30 cents. This was possible because the cost of raw

materials and ingredients was low, labor was cheap, and working hours were long. The speed-up reigned. Sanitary conditions were only too likely to be neglected. Since large orders went to the lowest bidder, prices were figured on cost of labor and material. The way to eliminate the competitor was to beat him at price rather than quality. So a quality product was out of the question. Packaging was cheap and unimaginative; most candies were sold in bulk.

This was the wholesale candy-manufacturing business in America—or a large part of it—before the First World War. Over on the retail manufacturing end, conditions differed. Several large companies with chain stores and many independent confectionery shops offered a quality product at a higher price and were fairly successful.

Recalling the situation as it was in 1914, the confectioner who has lived through these past forty years can only be impressed by the considerable gains the industry has made. New labor-saving equipment, new ingredients, improved packaging, improved sanitary conditions, and higher wages have resulted in an improved product. The lesson of these years is the importance of offering a quality product at a fair price. For the most part, the firms which were able to do this survived the depression. *An Encyclopedia of Candy and Ice-Cream Making* comes out of a conviction that quality and quality again is the answer. It is meant to help the reader keep a clean shop and produce candy that will hold up.

Candy is a sweet food, mild in digestion, pleasant and palatable in taste. The proficient candymaker must first understand what he is making and become familiar with all the raw ingredients that go into his product. He must also be something of an artist, since blending color and flavor is nothing less than an art.

Before he can hope to make good candy, the confectioner must master the technical details. What is candy made from? What makes it plastic and keeps it commercial? What makes it attractive to the eye? What chemical changes does the batch undergo? How to avoid spoilage? Success depends on finding answers to these and other questions.

In this volume, every kind of candy, ice cream, and several allied confections gets specific and detailed treatment. The book contains more than 600 proven formulas.

INTRODUCTION

During the past fifty years, the confectionery industry has accelerated quantity production. From cooking on a coal stove to continuous process cooking, from the hand-operated candy drop roller to the continuous seamless automatic rope-spinning and cutting machine is a long step forward. However, this new labor-saving machinery has not eliminated the demand for the competent, all-around candymaker. On the contrary: Because of a shortage of willing replacements, the all-around confectioner is at a premium in America today.

Before World War I, the young helper usually became a full-fledged candymaker in five or six years. During this period of apprenticeship, he learned how to cook, color, flavor, stripe, and spin hard candy, how to make nut brittles, and how to prepare caramels and fudge. He was not only a good cream man but also made nougat, paste, jellies, and gumdrops. He learned all about chocolate and was usually able to run an efficient chocolate department. In the years that followed, plant expansion, technological improvements, the great economic depression, and World War II sent these all-around men into smaller retail manufacturing shops, where they have become a vanishing breed. Because their demand for all-around candymakers is limited, the larger plants have not felt this shortage, but confectioners who operate smaller and medium-sized establishments are finding it difficult to locate versatile experts. In view of this shortage and the dif-

ficulty in recruiting competent replacements, it is essential that the small and medium-sized operators learn every phase of quality production.

The aspiring confectioner must first learn the raw materials that go into candy. Sugar is the most vital ingredient. There are two kinds of sugar made in America: beet sugar, produced in the western states, and cane sugar, refined in all parts of the country. For confectionery purposes, the standard granulated type of cane sugar is preferred. Unlike beet sugar, it does not foam when boiling and has a pure, snow-white color. When powdered sugar is called for, the fine 6X type is preferred. Powdered sugar is mixed in centers which go into filled hard candies. A partial ingredient in most filled hard-candy centers, it is one of the main ingredients in chocolate straws and other crunchy, filled hard candies. Powdered sugar is also used in making Easter-egg icings and for dusting when making after-dinner and plaited mints.

Corn syrup is the second basic ingredient. It is produced by numerous corn refineries in all parts of America. Although these refineries recommend several brands of corn syrup for confectionery use, the standard 42-degree corn syrup is the most dependable brand and the only one that can be used in making all kinds of candy without creating complications. A high-conversion corn syrup, "enzyme converted," is particularly useful in making jellies and gumdrops.

Invert sugar is a sugar solution brought to high conversion by adding a doctoring agent, such as citric or tartaric acid, to sugar and water. With few exceptions, the formulas in this encyclopedia do not call for invert sugar as an ingredient, since the writer believes that it is safer and more economical to add the doctoring agent directly to the batch and thus insure the inversion of each specific batch, i.e., keep it from graining or crystallizing.

Various milks—evaporated, condensed, skimmed, and powdered—are used in candymaking. Evaporated milk gives the best results in toffee, caramel, and fudge manufacture; it is also preferable for ice cream and sherbets. Eighteen percent and 20 percent sweet creams are used in candymaking; 20 and 40 percent sweet creams go into ice cream. Pure salted dairy butter is used in making quality caramels, fudge, and butter creams. There are two types of fats that the confectioner should be familiar with. The 96-degree refined coconut-butter fat is used for caramels and all

chewing candies and the 76-degree refined coconut-butter fat is used for filled centers and salted nuts.

For all centers and soft candies, pure extract of vanilla and pure fruit flavors or oils give superior results. For hard candies, however, a good imitation flavor may prove better. Flavor manufacturers will furnish confectioners with data on the strength and behavior of their products. Acids are used to support fruit flavors; that is, they bring out a more pronounced flavor. Tartaric acid gives better results when used in making quality hard candies, but for creams and soft candies, citric acid, which is much cheaper, can also be used effectively. Only certified pure-food colors should be used for coloring all kinds of candies. The paste form of color, already mixed, is preferred to the powder. It is used as is for hard candies, but is usually diluted with a little water when mixed into soft-candy batches. The quantities of colors to be used must be left to the confectioner's discretion. He must mobilize whatever artistic skill he has and learn in time to achieve both deep and delicate coloring.

After he has familiarized himself with the basic ingredients, the confectioner must learn the basic procedures.

Cooking is the first method he must master. With the exception of certain types of marshmallows, all candy must be cooked. Despite recent experimentation with cold methods of making candy, there is as yet no satisfactory alternative.

Proper cooking methods are particularly important in making durable hard candy. Cooking may be considered the main project in the hard-candy department.

Open-fire cooking will produce the highest-quality hard candy. This method involves no machinery—just a kettle and stove. The confectioner should use enough water so that all the sugar will be thoroughly dissolved. He should stir the batch constantly until it starts to boil. He should then cover it up for a few minutes and, while the kettle is hot, he should wash down the sides of the batch with a scrubbing brush to prevent graining. The batch should be cooked at 320 to 340°F. If this temperature is exceeded, the batch will be burned. The extremely high temperature gives candy its crispness. After hard candy is cooked, it loses about 5 percent in weight in contrast to creams, jellies, and other soft candies which gain approximately 10 percent in weight after cooking because some of the water remains in the finished product. Hard candy

which gets the open-fire-type cook retains only about 1 percent moisture. It is crisp and, when properly flavored, becomes a memorable eating experience.

A small batch cannot be cooked in a large pan nor can a large batch be cooked in a small pan. In the first case, the batch will scorch and in the second case, the batch will overflow when it starts to boil. Therefore, in open-fire cooking particularly, the right-sized copper pan must be selected. When the sugar, water, and corn syrup are placed in the pan, they should fill no more and no less than three quarters of the pan. The pan should sit about halfway in the inner part of the gas stove. If these precautions are followed, the sides of the pan will not be scorched or burned.

Hard candy may also be cooked by the vacuum methods. There are three kinds of vacuum cooking: open-fire vacuum cooking, steam vacuum cooking, and continuous steam vacuum cooking. As continuous steam vacuum cooking is more suitable for large-scale production and does not concern the smaller or medium-sized confectionery establishment, this encyclopedia will confine itself to the first two methods.

When vacuum cooking is used for hard candy, it is usually cooked about 20° lower than is the case in open-fire cooking. The resulting product is clearer and drier, but has a dull finish. Hard candy cooked by vacuum is more plastic, but it does not have the bite or the crisp quality that the open-fire type cook gives. However, vacuum cooking is faster and, therefore, more popular with the larger factories.

Under vacuum, the temperature needed to extract moisture from a sugar solution is not as high as that needed to produce this result under normal atmospheric pressure. In open-fire cooking without vacuum, the confectioner must cook a hard-candy batch at 300 to 340°F, depending on the amount of corn syrup it contains, in order to evaporate the water in the batch. In open-fire vacuum cooking, the batch is cooked at some 20° lower temperature, i.e., at 280 to 320°F, depending again on the amount of corn syrup it contains. In this method, the batch is first cooked by open fire to approximately 280°F and then finished by vacuum without additional cooking. A dome-shaped vacuum unit equipped with cooking coils is used. The vacuum cooker is clamped to the top of the open-fire cooking pan.

The procedure is as follows: Sugar, water, and corn syrup are cooked together to approximately 280°F. The dome-shaped vacuum cooker is attached to the kettle without delay and the vacuum is started and applied for 7 to 10 minutes. Residual heat in the batch causes continuous evaporation of water from the batch without the application of additional heat. The cooling water of the vacuum pump condenses the resulting vapor, which is removed by the same force. The resulting batch is lighter in color and keeps drier than open-fire-cooked hard candy.

More corn syrup is used in this method than in straight open-fire cooking, because when hard candy is cooked by open fire all the way, the batch is heated to approximately 315°F. This heat converts part of the cooked batch, i.e., numerous sugar particles become scorched and will not crystallize again. The batch has undergone inversion and is secure against graining. But in open-fire vacuum cooking, because the high temperature is not necessary, inversion does not occur. More corn syrup must, therefore, be added to keep the batch from graining.

Steam vacuum cooking is done with a three-in-one unit, the steam vacuum batch cooker. This unit includes an open-type dissolving pan, a vacuum cooker, and a vacuum pump. The procedure is as follows: The sugar, water, and corn syrup are dissolved in a clear solution in the dissolving pan. The solution is then pumped into the vacuum pan. The vacuum pump sets to work and the cooking is completed under vacuum, which differentiates this method from the previous one. The batch is ultimately cooked at 280 to 290°F and then drawn off at the bottom of the vacuum pan into a receiving pan. It is now ready for the slab. The candymaker must be certain that the vacuum remains steady at about 28 inches and does not fall off during the transfer process. If he does this, the cooking will be finished perfectly.

Several basic formulas for hard candy mixtures follow. These formulas will enable the candymaker to act independently and still be accurate. All individual hard candy formulas in this encyclopedia are based on the following.

OPEN-FIRE COOKING: FORMULA A

Sugar	25 lb
Corn Syrup	5 lb
Water	5 qt

The batch is cooked at 320°F.

OPEN-FIRE COOKING: FORMULA B

Sugar	30 lb
Water	6 qt
Cream of Tartar	3 level teaspoonfuls

Regular mixtures are cooked at 330°F.
Barley-sugar mixtures are cooked at 340°F.

OPEN-FIRE VACUUM COOKING: FORMULA A

Sugar	28 lb
Corn Syrup	12 lb
Water	6 qt

The batch is cooked at 280°F.

OPEN-FIRE VACUUM COOKING: FORMULA B

Sugar	40 lb
Water	7½ qt
Cream of Tartar	4 level teaspoonfuls

The batch is cooked at 300°F.

STEAM VACUUM COOKING: FORMULA A

Sugar	200 lb
Corn Syrup	100 lb
Water	40 qt

The batch is cooked at 290°F.

Vacuum cooking is usually associated with hard candy, but in the past few years, vacuum pans have been developed for cooking cream fondant batches, caramels, taffies, and toffies. Only factories geared for large-scale production and marketing low-priced products will be interested in these newly developed methods. The formulas in this encyclopedia call for open-fire cooking of these items.

Candies containing cooking starch as a basic ingredient cannot be cooked on the open fire, but must be cooked by steam. Open-fire cooking will scorch the starch and make a clear white batch

impossible. Gumdrops, certain jellies, and basic batches for marshmallows are in this class.

Steam for cooking is produced in three ways. The larger confectioner may maintain his own engine room in the basement and employ a licensed engineer who operates a boiler that sends steam to all kettles equipped for steam cooking. Some large factory buildings supply steam to tenants who require it and charge for it on a rental basis. The smaller confectioner may be equipped with one or two steam-fitted kettles and a gas engine. The engine is fired until it produces 90 to 100 pounds of steam. This will supply the kettles with enough live steam to cook any sized batch by fast steam cooking.

Steam-fitted kettles have a double jacket. A water pipe brings water to the kettle. An inlet valve fills the space between the two jackets with water; an outlet valve lets the water out when there is an overflow of steam; a steam valve brings the steam to the water between the two jackets. The live steam causes water to boil. The constantly boiling water between the two jackets produces the heat that keeps the batch inside the kettle cooking until it reaches the desired temperature. When the steam does not enter the kettle fast enough, the outlet valve is opened for several minutes to let the dead steam escape. This permits the live steam to enter faster and makes possible speedier and more efficient cooking.

If the gas engine is in good condition, it will produce the required 90 to 100 pounds of steam 30 to 40 minutes after it is first lit. The gas burners under the engine may be turned off about 10 minutes before the last batch is finished cooking. This makes the workroom cooler and more comfortable in hot weather.

Batches which contain cooking starch as a basic ingredient must be stirred while they are cooking to prevent scorching. The best plan is to equip the kettles with automatic stirring paddles. When steam cooking caramels, fudge, and toffies, large amounts of evaporated milk and cream go into the batch. In this case, it is particularly necessary to equip the kettles with proper stirring paddles to prevent scorching. However, since scorching is less probable in steam cooking than in open-fire cooking, it will usually suffice to stir the batch with a long mixing stick.

Soft candies containing cooking starch as a basic ingredient must be steam cooked; all other soft candies can be cooked by

steam or open fire. Steam cooking is labor saving. It makes possible larger batches and speedier production.

Most of the caramels, toffees, and fudge listed in this encyclopedia are made with milk or cream. Whether cooked by steam or open fire, the batch should always be started with enough milk or cream to stir up the sugar well until it dissolves. The balance of the milk or cream should be added to the cooking batch in a slow stream to keep it from curdling. The batch should be finished with a slow cook to prevent scorching.

Lecithin is usually used in making candies than contain butterfat. Caramels, toffies, fudge, and butterscotch are in this class. Lecithin helps the other ingredients assimilate the butterfat. Unless this happens, the butterfat will separate; it will come out on top of the batch and eventually run off as waste. However, caramels and toffies also contain hard fat or coconut butter. Because most hard fats already contain lecithin in their composition, it is usually not necessary to use it in making these particular items. Only when the hard fat in the caramels and toffees does not contain lecithin should it be added to the batch.

Preparing cream centers for chocolate coating is another basic operation. Unless the centers are well prepared, they will be unfit for consumption. The formulas in this encyclopedia call for two types of cream centers for chocolate coating: hand-rolled centers and centers cast in starch.

To make centers cast in starch, the cream of the basic formula is remelted to semiliquid consistency and then flavored and molded in starch impressions. When casting the centers, the starch should be clean and dry. The starch room should be cooled to about 60°F. Whether the centers are hand- or machine-coated, they should be dry and free from lumpy starch when placed on the boards for coating. Otherwise, the chocolate will not cover them well. If the centers are greasy and their moisture content is too high, the chocolates will be streaky or they may ferment.

To make hand-rolled centers, the basic formula varies partially from the running cream formula, i.e., the formula for centers cast in starch. This basic formula, which is the author's own, is fully described in the encyclopedia. Hand-rolled cream centers have several advantages over centers cast in starch. Their production is faster and easier. The cream need not be remelted; after the batch is creamed and sweated down for 10 to 15 minutes and then

kneaded, the cream is cut and rolled directly from the batch either by hand or by a hand-roll machine. This method not only makes the remelting process unnecessary, but it also eliminates casting the centers in starch and cleaning them from starch when they have firmly set. Above all, the quality of chocolates containing hand-rolled centers is superior. The one disadvantage of hand-rolled cream centers is that they cannot be made in fancy shapes, such as are possible with starch-cast centers.

Several precautions should be taken when preparing hand-rolled creams for chocolate coating. When the cream is ready for the cutting and rolling process, it should be of a fair, firm consistency—i.e., neither too hard nor too soft. When the centers are cut and rolled either by hand or by machine, they are still slightly warm. They should not be chocolate-coated until they are completely cooled down. This takes 2 to 3 hours. Centers which are left to be coated the next day should be covered with sheets of wax paper so that they will retain some of their moisture.

One essential precaution: No cream centers, whether hand-rolled or cast in starch, should lie around uncoated longer than 28 hours. If they are made Monday, they must be finished Tuesday. Otherwise their quality is jeopardized.

Selecting the right coating for the various centers calls for thought. The confectioner should use the best-quality chocolate coatings and make certain that they contain lecithin. For lecithin is also essential in chocolate production. It acts as an emulsifier and assures the confectioner that, when the coating is remelted, it will be of the proper consistency for coating the centers. Butter creams, mints, and other full sweet centers go well with a semi-sweet or bittersweet chocolate. Chewy centers, fruit-flavored creams, jellies, pastes, and marshmallows taste best with a dark, sweet coating or with milk chocolate. Fruits, nuts, and cordials should only be coated in the highest quality vanilla sweet or milk chocolate.

Experienced chocolate coaters should do the hand coating. If machine coating is adopted, the best type of enrober should be used—one that has a long enough tunnel and enough cold air to cool the chocolates properly while they travel from the enrober to the packing room. The enrober should also have an attached tempering unit. For without such a unit, there is an element of risk. Some operators think they can temper chocolate by feeling

it. This test works well with hand-dipped chocolates, but it is too risky for machine-coated chocolates. When centers are hand dipped, they stay for some time on the dipping trays. If they do not set immediately, they will set eventually. But in enrobing, even with the longest tunnel available, the chocolates travel no more than 5 minutes from the tunnel to the packing room. They either set in this period or become scrap. Tempering by an automatic and adjustable gage will do the required job, whereas tempering by hand may prove costly guesswork. Only an experienced operator should run the enrobing machine. The temperature of the chocolate coating and packing rooms should always be kept near 60°F.

Chocolates should never be packed in boxes before they have firmly set and cooled. This process usually takes 2 hours after they are coated. Chocolates containing hand-rolled cream centers or cream centers cast in starch should not be placed in a cold room immediately after they are packed. They should stay in a room of normal temperature for at least 2 days in order to allow the invertase, which is added to the cream, to react and soften the cream centers. After 2 days, they can go in a cold storage room.

Certain marshmallow formulas in this encyclopedia call for a hot room; these cannot be made unless there is a well-equipped hot room in the factory. Smaller concerns find it almost impossible to maintain hot rooms, since this means they must operate their own engine room. Most retail manufacturers and a large percentage of medium-sized wholesale manufacturers buy their marshmallows from specialty houses. However, there is a possibility that future research will develop formulas for producing marshmallows without a hot room.

Confectionery machinery demands careful attention. Machines should be thoroughly cleaned and lubricated at least once a week. Bearings that are exposed to heat should be lubricated with heat-resisting grease. Once a week, drop rollers and dies should be removed for thorough cleaning. They should be freely greased with slab oil to prevent the candy from sticking to them. Wrapping machines should be thoroughly cleaned after each day's work. Particular care and attention should be given this machine. The confectioner will observe that the spindles, axles, and bearings collect a tarlike substance. This consists of candy dust, moisture, and lubricating grease. The following cleaning proce-

dure should be adopted: The machine should be sprayed with boiling soap water about once a week. The solution should contain one large handful of soft-soap powder to a pail of hot water. After the machine is sprayed, it should be dried and the grease nipples thoroughly lubricated.

Pans, kettles, tools, measuring equipment, and weighing equipment should be washed, scoured, and rinsed at the end of each workday. All formulas must be followed with scrupulous accuracy. It is, therefore, essential that the weighing and measuring equipment is checked for accuracy at least once a week.

An effort has been made in this introduction to give an over-all picture of basic operations. Perhaps it will also give some insight into the more common problems that come up in making candy. However, the confectionery industry, like every other, has not yet solved all its problems. In the course of various operations, the reader may face enigmatic situations for which there are as yet no solutions. To mention but a few: How can hard candy be made so that it will always keep dry, crisp, and fresh in all climates? How can nut brittle be made so that it will always stay fresh, crisp, and crunchy? How can after-dinner mints be made so that they will not harden or stick together? The author believes that the answer to these and related problems lies in developing good stabilizers that will act as homogenizers and keep all the ingredients in the finished product from separating. Separation of ingredients causes most candy troubles. The ingredients will not always hold together. That is why hard candies grain and stick together. That is why taffies, toffies, caramels, and nougats end by graining, melting, or sticking to wrappers. That is also why cream centers harden, crystallize, and ferment.

Invertase is used as a softening agent in cream centers. When one of these centers is opened up after a short period of time, the confectioner or the consumer will find that part of the center is really running liquid and a large amount of the cream around the sides of the center is semicrystalline. It now appears that the center is divided into three different textures: liquid, semisoft, and semicrystalline. A good stabilizer would homogenize the center to only one texture: semisoft. It would prolong the shelf life of chocolates and prevent fermentation.

Another urgent need is for homogenized chocolate coating that will always stay in good condition. Such a coating would not turn

grey, nor would the cocoa butter in it separate from the other ingredients. In extreme heat, the cocoa butter separates and causes what is commonly called the fat bloom. It melts, leaks out from the chocolate, and often causes an entire layer of chocolates to form one sticky mass. When the cocoa butter leaks out, the centers dry out and the chocolates become inedible. There is some evidence that fat bloom can be eliminated by a powerful stabilizer. The author has experimented with two different kinds of coating. One coating contained lecithin and the other did not. If identical centers are covered with the two different coatings and kept apart under identical conditions, the results vary. At the first stroke of heat the sample without lecithin becomes scrap, but the sample that contains the lecithin comes through in better, though by no means perfect, shape. The experiment indicates that lecithin, a relatively weak stabilizer and emulsifier, does make some difference and does have some effect in preventing ingredients from separating and chocolates from sticking together. This suggests that a stabilizer more powerful than lecithin would solve this major problem.

A final word about the formulas in this encyclopedia. In formulating recipes, several factors must be kept in mind. These include the desired appearance of the finished product, its durability and shelf life, its probable selling price, the problems that will be encountered in shipping it, and, above all, its eating quality. When these factors have been considered and all the ingredients formulated, still another question remains: How large should the batch be?

For several reasons, it is not practical to formulate all recipes so that the finished products will be of uniform weight. For example, some hard candy flavors are more popular and sell faster than others. Therefore, these should be made in larger batches. After they are finished some hard candies are cut into large pieces and some into miniature pieces. When it is spun out, the life of a hard-candy batch is short. It will stay soft and pliable for 20 to 40 minutes and then harden into scrap. Hard candy which will be cut into miniature pieces should be made in smaller batches than hard candy which will be cut into large pieces, because cutting into miniature pieces takes longer. The time element also figures in making creams, jellies, and gum drops. Creams which are molded in larger shapes are made in larger batches, but creams

which are molded in smaller shapes can only be made in small batches, because it takes longer to cast them in molded starch. If the batch is too large and is not finished in time, the melted cream hardens into scrap; if the confectioner tries to soften it by applying more heat, the result will be tough and hard cream centers. Fruit jellies cooked on the open fire are made in small batches, but jellies and gum drops containing cooking starch are steam-cooked in large batches. The double-jacketed kettles used in steam cooking usually come in larger sizes. Also, steam cooking is relatively expensive, and the confectioner wants to compensate for his investment in machinery and maintenance by cooking in large batches and cutting labor costs. For example, the largest cream-fondant batch that can be cooked on the open fire would weigh about 100 pounds and take about 45 minutes to cook. In contrast, a proper-sized, steam-equipped kettle could cook a 300-pound cream-fondant batch in approximately 40 minutes.

In the formulas contained in this encyclopedia, the size of the batch given varies with the usual demand for the candy and the usual difficulties encountered in producing it. In general, formulas for the more popular items call for larger batches and formulas for the more difficult products call for smaller batches. Effective formulas are like tailor-made clothes. They come in various sizes and are made to order. Whether or not formulas for "fruit tablets" and "barley-sugar cuts" yield the same poundage is relatively unimportant. What matters is that the formulas yield products which retain their quality for a reasonable length of time.

Where the confections belong to the same group, are produced with about the same amount of difficulty, and have about the same popularity, the quantities in the formulas are roughly the same. The recipes have been formulated with the smaller and medium-sized factory in mind. Larger confectioners, who wish to adjust these formulas to their own needs, should take the quantities listed in them as a guide and increase them proportionately. For example, if a formula calls for a 50-pound batch of butter creams and a reader wants to steam cook a 300-pound batch, he should increase every ingredient sixfold. Conversion from smaller to larger batches seldom raises chemical problems, but usually raises equipment problems. In this case, the problem is the cream beater. A quality fondant can only be made with a round, open-type cream beater. The largest cream beater of this type is 6 feet in diameter; it can

handle a maximum batch of 100 pounds. Therefore, the confectioner who wants to steam cook a 300-pound batch must use three cream beaters. After the batch is cooked, it should be poured in equal amounts into all three cream beaters. The procedure described in the original formula can then be followed.

Most of these formulas call for open-fire cooking, although other methods are sometimes specified. If a reader is working on a product that can be cooked either by open fire or by steam and wants to convert an open-fire formula to a steam formula, he should first adjust the quantities to give him the larger batch and then adjust his equipment. For example, a small batch of hard or chewing candy may be pulled on the hook by hand, but a pulling machine is needed to pull a large batch. A small batch of jellies of the pectin or agar-agar type that are molded in starch when they are finished would fill about twenty starch boards, but a larger batch might require forty to sixty starch boards. A small batch of jellies molded in starch may be cast manually by funnel, but a larger batch would require a depositing machine, and a still larger batch would require the giant Mogul. Adjustment from open-fire to steam methods always involves larger quantities and additional equipment.

Larger manufacturers who are interested in quality as well as large-scale production may find it profitable to adjust retail-type candy to wholesale production methods.

HOW TO USE THIS ENCYCLOPEDIA

THE ENCYCLOPEDIA OF CANDY MAKING is an alphabetical listing of confections, ingredients, and processes designed to meet the needs of the smaller and medium-sized manufacturer who wants to know what goes into a particular confection and how to handle the ingredients effectively. All entries are in one alphabetical list. The terminology found in this encyclopedia is commonly used in shops and factories throughout America.

Most of the entries in this encyclopedia consist of formulas followed by explicit directions. Standard abbreviations are used in both.

There are general discussions of the major types of confections (e.g., BRITTLES); these are supplemented by entries which deal with the individual numbers that belong to the major types (e.g., BLACK-WALNUT BRITTLE, BRAZIL-NUT BRITTLE). When a confection belongs to a distinct group, it will be found under the group name (e.g., BARLEY-SUGAR CUTS) instead of the flavor name (e.g., clove). However, if the reader looks under the flavor first, a cross reference (CLOVE BARLEY-SUGAR CUTS: *See* BARLEY-SUGAR CUTS, CLOVE) will guide him to the proper entry. Where the confection does not belong to a distinct group, it will be found under the flavor name (e.g., BUTTERSCOTCH TOFFEE).

If the reader is looking for information on chocolate-covered confections, he should consult the various entries under CHOCOLATE-COVERED. However, if he looks under the name of the center first, a cross reference (BRAZIL NUTS, CHOCOLATE-COVERED: *See*

CHOCOLATE-COVERED BRAZIL NUTS) will guide him to the proper entry. If the reader wants information on salted nuts, he should look under SALTED. However, if he looks under the name of the nut first, a cross reference (e.g., BRAZIL NUTS, SALTED: *See* SALTED BRAZIL NUTS) will guide him to the proper entry. The abundant cross references are listed to prevent confusion and guide the reader quickly to the information he wants.

Special ingredients are usually described in detail under the particular confection in which they are used. For example, bob syrup, which is used in making cast creams, is discussed in the entry which describes the manufacture of cast creams (i.e., BOB SYRUP: *See* CAST CREAMS). Special processes are explained either under their own names (e.g., CRYSTALLIZING) or under a particular confection in whose manufacture they are used (e.g., BUILD-UP COATINGS: *See* CHOCOLATE ALMONDS, PAN-COATED).

Items, referred to in the formulas or directions, which have been described in more detail elsewhere in this Encyclopedia are printed in capital letters with or without (*See*) after them.

Illustrations of the machines commonly used in candymaking are inserted according to their basic name in alphabetical order. The courtesy line after the description of a machine will indicate the name and address of its manufacturer.

AN ENCYCLOPEDIA OF CANDY AND ICE-CREAM MAKING

A

AFTER-DINNER MINTS

After-dinner mints are so named because they are usually served when dinner is over. They usually sell well during the winter months, but their sale increases considerably when summer comes.

To keep the after-dinner mint color a clear white, the batches should be cooked rapidly. The faster a batch cooks the clearer and whiter its color will be. Cooking converts part of the sugar by breaking up some crystals and inverting them into syrup. The faster a batch cooks the fewer crystals will be broken up. In addition to a clearer, whiter color, rapid cooking gives the batch a modified graining consistency that hastens the creaming of after-dinner mints, which is the final stage in their production. Graining takes place before the after-dinner mints are creamed and are ready for packing.

Graining and creaming go hand in hand. Before any batch can be creamed, it must first undergo limited graining. Therefore, it is important not to prolong the cooking of the batch.

While it is necessary to break a certain amount of crystals to keep the batch from getting too grainy, breaking up too many crystals will deprive the batch of all graining consistency. This is harmful to both hard candies and creamed candies. In hard candies, it causes sweating and sticking; in creamed candies (which include mints), it sometimes stops a batch of fondant

from creaming altogether and it can also prevent a batch of after-dinner mints from creaming. That makes the batch scrap.

Although the average candymaker is not a chemist and cannot measure the chemical processes involved in graining and creaming, he can use his skill and experience and develop his own independent system for cooking the batch of after-dinner mints. He must set his own time for cooking a batch. He must add just enough water and "doctor" to the batch, cool the batch rapidly after it is poured on the cooling slab, and bring it to the right degree of hardness to be ready for the pulling machine.

During all these operations, the candymaker must have two objectives in mind: (1) The batch must not grain *before* it is finished and ready for the setting process, and (2) it must grain *after* setting overnight and be ready for breaking apart the following morning.

The manner in which the mint flavor is added to the batch of after-dinner mints is also important. Although the following formulas state that the mint flavor is stirred into the batch while it is being folded on the slab, this direction should not be observed by smaller confectioners who do not have water-cooled slabs or have slabs with low water pressure which prolongs the time it takes to cool the batch before it goes to the pulling machine. These candymakers should keep in mind that excessive stirring of the batch on the slab may cause graining. For them the following two alternative ways of adding flavor are recommended: (1) The flavor can be added gradually during the pulling process. It can be held ready in the measuring glass, and when the batch begins to pull on the machine, the flavor may be added gradually in a fine stream until all of it is in the batch. (2) Again the flavor can be mixed in while the batch is being pulled, but in a different way. Before the batch goes to the pulling machine, a small deep hole can be formed in it by hand. The flavor can be poured into this opening and enough powdered sugar sprinkled on top of the flavor to absorb all of it. The opening can then be closed by folding a part of the batch over the top of the hole. The batch can then be placed on the pulling machine in the usual manner.

Some precautionary measures: Pulling should not be overdone. From 5 to 7 minutes is the specified time. When a batch is pulled on the pulling machine two changes occur. Pulling makes the batch fluffy; it changes color from gray to white and becomes lighter in weight. This is the first change. The second change is

called graining. While pulling, the batch is being agitated and is, therefore, coming nearer the graining point. The effect of pulling on after-dinner mints is somewhat like that of cream beating on creams and fondants. Because creams and fondants are closely "doctored" and cooked at lower temperatures, the agitation of the cream-beating machine causes the batch to cream to a lump. After-dinner mints, however, are of a higher cook and more strongly "doctored"; therefore, the agitation may not grain the batch immediately, but it can and will cause the batch to grain prematurely. That is why a 7-minute pull is the limit.

Immediately after creaming, the after-dinner mints should be packed in airtight cans. When they are first creamed and broken apart, they are not as soft as they should be. A good after-dinner mint melts in the mouth, but will not ripen until it is covered in cans for a day or two. If the jars or the cans are left open or are not airtight, the mints will dry out, lose their flavor, and become inedible.

The after-dinner mint department in the average candy factory is usually housed jointly with the hard-candy section. The same cooking stoves, cold-water cooling slabs, and pulling machine are used. Space in the hot room is usually borrowed from the gum and marshmallow departments. The mint-cutting machine is the only piece of equipment that is used exclusively for making after-dinner mints. This is a two-in-one machine. It consists of two sets of changeable, brass, cutting rollers which are connected with a moving belt. The first roller takes in the batch, sizes it, and carves it into six lengths, i.e., vertically. The carved candy then travels to the second roller, which cuts it the other way, i.e., in the width, horizontally. The cut candy then travels on the belt to an end table, where strips measuring the length of the starchboards are chopped off with a long knife and placed on the starchboards. The candy is then ready for the warming room.

There is quite a demand for miniature after-dinner mints, which usually sell for a higher price. All after-dinner mint formulas can be used in making miniature mints. They are made in the manner specified in the formulas, but are cut smaller. For this purpose, a special set of two rollers with smaller carving space is used. The cutting machine can be quickly reconverted. The original rollers are taken out of the frame and the miniature cutting rollers are inserted in their place, fastened, and bolted.

The mint-cutting machine has a ten-year life span; it should

be checked periodically. The confectioner should see that the cutting knives slice the candy evenly and thoroughly so that it breaks apart in good shape and does not become scrap. In plants where after-dinner mints are only one of the regular products and are not made in large quantities, breaking apart is accomplished by hand and creates no production problem. However, in factories that specialize in after-dinner mints, breaking apart by hand is a costly procedure. For these plants, mint-breaking machines have been designed. These machines are not all built alike, but all serve the same purpose and some do a good job.

Crystallized after-dinner mints are more attractive than the usual variety. When a good crystallizing job is done, the mints will be sparkling bright. Any after-dinner mint formula may be consulted in making crystallized mints. The only necessary change is that the batch should be cooked 2 to 4° higher. The overnight crystal is preferred. The crystal syrup should be cooked in the afternoon and applied when still lukewarm. This will give the mints a more sparkling finish.

It is important to pack the finished product in airtight tins in order to keep it fresh, soft, and creamy. Large tins are used for bulk, and fancy, 1-pound lithographed tins are used for packaged goods.

For the various after-dinner mint formulas, see the individual names, such as CREAM MINTS, BUTTER MELLOW MINTS, etc. *See also* JELLIED MINTS.

ALL-SUGAR CREAM: *See* CREAMS.

ALMOND BRITTLE

The ENGLISH WALNUT BRITTLE (*see*) formula is used, substituting 8 pounds of raw almonds for English walnuts.

ALMOND COATING: *See* BURNT ALMONDS.

ALMOND CREAM CUTS

Sugar	40 lb
Water	7 qt
Cream of Tartar	3 teaspoonfuls
Corn Syrup (melted)	5 lb