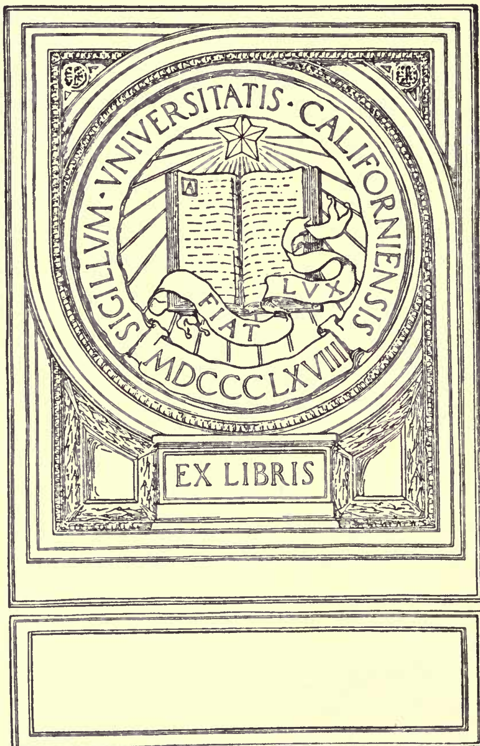
# SUGAR

A Popular Treatise

By

ALLEN RAY KAHN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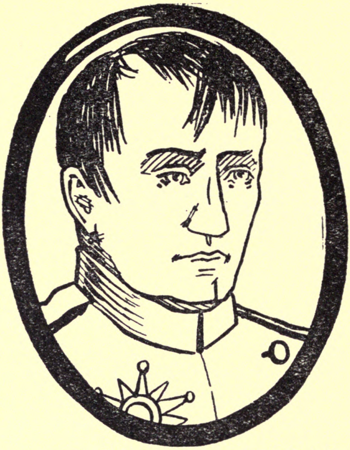
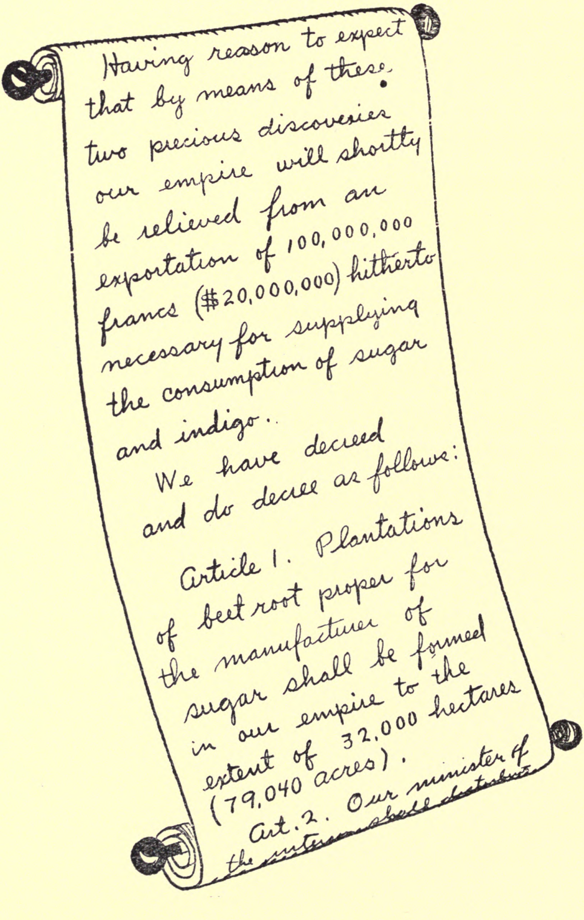



Having reason to expect that by means of these two precious discoveries our empire will shortly be relieved from an exportation of 100,000,000 francs ($20,000,000) hitherto necessary for supplying the consumption of sugar and indigo..
We have decreed and do decree as follows:
Article 1. Plantations of beet root proper for the manufacture of sugar shall be formed in our empire to the extent of 32,000 hectares (79,040 acres).
Art. 2. Our minister of

# Preface

The third edition of this book having been practically exhausted and the demand for same appearing to still exist, this fourth edition is now presented to the public. Revisions have been made in line with the original purpose of the book, viz., to explain sugar and sugar manufacture in such simple and brief terms as to enable anyone interested to secure a fairly clear idea of the subject at one reading.

Acknowledgment is made to the following works and authors:

"Beet Sugar Manufacturing and Refining," Lewis S. Ware.

"Beet Sugar Making and Its Chemical Control," Y. Nikaido.

"Zuker Fabrication," Claassen.

"Sugar and the Sugar Cane," Noel Deerr.

"Concerning Sugar," Truman G. Palmer.

And the sugar publications, "Louisiana Planter," New Orleans; "Sugar," New York City; "Facts About Sugar," New York City, and "International Sugar," London, England.

To those seeking a more complete knowledge of the subject, these books are recommended. Same can be purchased through any of above named publications.

Thanks are also due to Dr. Leroy S. Weatherby, of the University of Southern California, for compilation of diagrams of extraction and refining; to Mr. J. J. Armstrong, well known sugar technologist, for valued suggestions, and to the various sugar companies for lists of their executives.

ALLEN RAY KAHN.

Los Angeles, California,
February 26, 1921.

Every man on every station in a sugar factory ought to know why he does the work which he performs. This should follow all the way through from the fireman at the boilers until the sugar is shipped away from the factory.

Louisiana Planter.

I

# Sugar Consumption and Production

The past hundred years has seen sugar develop from a luxury of the rich to a common necessity in those countries most advanced.

In the United States, the average yearly per capita consumption amounts to approximately ninety pounds. Only two countries exceed this, one being Canada, the other Australia, which would appear to indicate that the prosperity of the average individual is greater in both these countries than in the United States. England consumes almost as much sugar as the United States per capita, but considerable allowance must be made for the amount of sugar used in jams and preserves annually exported by that country. The per capita consumption in the leading sugar consuming countries of the world before the war was as follows:

Great Britain—93 pounds.
United States—89 pounds.
Germany—45 pounds.
France—43 pounds.
Netherlands—41 pounds.
Belgium—36 pounds.
Australia—29 pounds.
Russia—25 pounds.
India—21 pounds.

There was consumed throughout the world in the year before the war approximately 20,000,000 tons of sugar. Of this amount, a little over one-half was made from sugar beets.

Of the approximately four million tons of sugar annually consumed in the United States, the refineries of the country still handle about two and three-quarter million tons. Louisiana turns out about one-quarter million tons of direct consumption sugar, and the beet factories of the United States about a million.

The value of sugar consumed in the United States is in the neighborhood of $700,000,000 yearly.

A little over 20 per cent of the world's production of sugar is consumed in the United States, but in the ratio of its production to consumption, the United States has been one of the most backward countries. Including all our island possessions, such as Porto Rico, the Hawaiian Islands and the Philippines, the United States manufactures only about one-half of what it consumes. Contrast this with the steel, flour, or cotton business. Moreover, this is a sad reflection upon our country's boasted efficiency, since unlike most other business concerns, the sugar factory, except on very rare occasions, experiences little, if any, difficulty in disposing of its product.

II

# The Carbo-Hydrate Sugar

Of all substances produced by nature and transformed by the art of man, none is more interesting than the Carbo-Hydrate sugar.

Nature produces the plant which collects carbonic acid gas, hydrogen and water from air and soil and converts same into food for future use such as production of seed or regrowth. Before the formation of seed or regrowth commences, however, the beet roots or cane stalks are removed to the factory where the transformation of this stored up food to table sugar takes place.

The highest sugar content is reached at the end of the first year and as the production of seed, which occurs during the second year is at the expense of the sugar stored the first year, it naturally follows that sugar is extracted at the factory at the end of first year's growth.

The beet or cane seed (the latter generally consisting of two joints of cane), is planted and after it has secured a firm hold in the ground, water consisting of hydrogen and oxygen, chemically combined, passes upward and the plant commences to grow above the surface with formation of leaves—the leaves, through their green coloring matter (chlorophyl), acted upon by sunlight, attract carbondioxide, which abounds in the air, combines it with other properties absorbed from soil through water and produces starch. This starch, in the cane or beet, is converted, by a process peculiar to sugar plants, into sucrose in which form it can be stored up in beet root or cane stalk for seed or regrowth, but as aforesaid roots or stalks are removed to factory before regrowth starts.

A PRIMITIVE SUGAR PLANT

## III

# Saccharum Officinarun

*(Sugar Cane)*

The sugar cane, a tall perennial grass-like plant was first grown, as far as can be determined, in India about 600 B. C. Cane sugar appears to have been first introduced as an article of commerce, in the seventh century A. D., by the Arabs. Columbus was the first to plant cane in the new world. From Santo Domingo, its culture early spread to Brazil, Peru, Argentine, Cuba, Porto Rico and other new world countries.

Cane was first planted in the United States in Louisiana, at a time when Louisiana was foreign territory, the year being 1673. Today in Louisiana, there are over 160 factories, where either sugar or cane syrup is manufactured. There are also a number of large sugar refineries in Louisiana. Other states in our Union in which cane is grown are Georgia, North Carolina, South Carolina, Arkansas, Alabama, Florida and Texas, but with the exception of Texas, which possesses two factories, none of these manufacture sugar unless Georgia with a refinery at Savannah be also excepted.

Most of the cane sugar consumed in the United States is obtained from Cuba, Porto Rico, and the Hawaiian Islands, being shipped to this country in the form of raw sugar and converted to the granulated sugar of the table by large refineries. The yield of cane per acre in the

United States is from 15 to 20 tons. The sugar per ton of cane is from 6½ to 9%. The yield of cane per acre in other parts of the world is 20 to 60 tons and the sugar per ton of cane is from 10 to 13%.

Cane grows, without replanting, from two to forty years depending upon zone in which it is grown. Second and subsequent crops grown from the same roots are called ratoons.

In Cuba the planters are referred to as colonos and the mills they send their cane to are called centrals. In Mexico, the factory is often called an Ingenio.

## Some Sugar Trade Names

Glucose, a non-crystalizable sugar made from starch particularly from Indian corn, sorghum, etc., with only 40% of the sweetening power of beet or cane sugar. It is sold in form of a liquid.

Raw sugar is any grade of sugar from which the impurities have not been removed.

Muscovada is a dark, moist sugar, containing molasses and impurities made by boiling to crystals in open kettles from which it is run into hogsheads, the bottom of which are filled with small holes to allow bulk of molasses to drain off.

Panocha is a crude brown cake of sugar, made in Mexico from a non-crystalized thick juice poured into moulds to dry and harden.

Saccharin is not a sugar, but a coal tar product with over 300 times the sweetening power of sugar. One tablespoon full is sufficient to sweeten over 31 gallons of water. It has no food value, however, and the use of same is considered by many physicians to be injurious.

Saccharose is the general name of any crystalline sugar having the formula $C_{12}H_{22}O_{11}$, such as cane, beet and maple sugar.

## IV

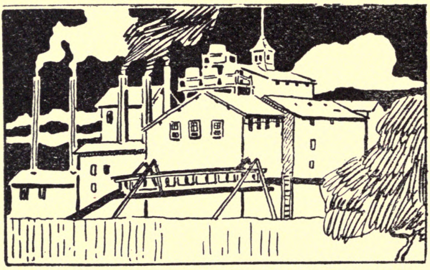
# Beta Vulgaris

## *(The Sugar Beet)*

In the year 1747 the great German chemist Margraf, after analyzation of numerous plants, predicted that beet roots of the same species as the common garden variety would ultimately become a great source of sugar. Based on Margraf's investigations, Achard succeeded in converting the carbo-hydrates (carbon, hydrogen and water chemically combined by nature) of the beet to a palatable product. This took place in 1797 and a few years later, factories were established in Germany and France, the industry receiving the especial attention and encouragement of the great Napoleon. At the beginning of the industry, beets averaged 6% sugar. The average today is 16% with an average yield of 260 pounds of refined sugar per short ton (2,000 lbs.) of beets. The yield of beets per acre in the United States is ten to twelve tons.

As recently as 1870 the first really complete beet-root sugar plant was erected in our country, this at Alvarado, California, where it is still in operation. Up to 1879 it remained a failure, when an American, by name Dyer, took hold and made it a financial success. The second successfully operated plant was erected by Claus Spreckels in 1888 at Watsonville, California. The third successful mill was built by the Oxnards in 1890 at Grand Island, Nebraska, and an uncle of the author was one of the first farmers to grow beets for that factory.

Beet sugar is now manufactured in the following states: California, Colorado, Idaho, Illinois, Iowa, Indiana, Kansas, Michigan, Minnesota, Montana, Nebraska, Nevada, Ohio, Utah, Washington, Wyoming and Wisconsin. In all about 100 factories. Prior to the war, there were over 1,200 beet sugar factories in operation throughout the world.



THE FIRST SUCCESSFUL BEET SUGAR FACTORY IN AMERICA.

V

# The Difference Between Beet and Cane Sugars

The sucrose content of both beet and cane sugar is transformed at the factory into identically the same substance—sugar. Chemically pure sugar made from either beet or cane analyzes exactly the same. Dr. H. C. P. Geerligs, an international authority on sugar has this to say of the two:

"The largest constituent of the two sugars is the same, viz.: the sucrose, which is the identical chemical body both in cane and in beet sugar, the difference, if there be any, must be found in the very small amount of impurities in or around the crystals.

"Every cane juice contains glucose; sound beet juice, on the contrary, does not contain any glucose. This is the main difference between the two; all the other bodies as gums, mineral matter, etc., are found in both.

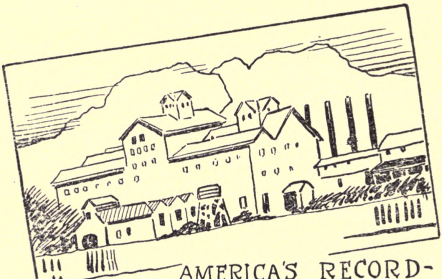
"In the very great majority of cases this small admixture of glucose is perfectly harmless; except in some cases for confectionery, glucose present will not cause any trouble.

"The very best cane sugar will always contain a very small amount of glucose, while granulated pure beet sugar is free from glucose."

The Agricultural Department of the University of California after tests with fruit canned with both beet and cane sugar found at the end of two years that out of 2,000 cans treated there were only six of the beet lot and only seven of the cane spoiled. Their report in part follows:

"Of the 2,000 cans which were thus treated only six cans from the beet sugar lot and seven from the cane sugar lot spoiled during the two years, and these were evidently due to imperfect sealing of the cans, thus showing the utter lack of foundation for the idea that fruits do not keep well when preserved with beet sugar.

"In the jelly trials apples and currants were used as the basis, equal quantities of juice and sugar being used, and the mixture boiled until of the right consistency to jell. The product in each case was as clear as it is possible for jelly to be, and not the slightest difficulty was experienced in the making of it."



AMERICA'S RECORD-BREAKING BEET SUGAR FACTORY, UPTO 1897.

## VI

# Sugar as an Energy Producer

Sugar produces energy and does its quickly. Its stimulating effect, differing from alcohol, is so natural that its moderate use is beneficial instead of, as in the case of alcohol, detrimental to the bodily system. Half an ounce of sugar will produce heat energy in the body equivalent to raising a kilogram of water 1 degree C. Sugar's attribute of sweetness renders it, especially in combination with other substances, very pleasing to the taste. It excites the salivary glands and digestive apparatus regardless of hunger, and can be eaten without taxing the stomach whilst in the performance of one's duties. Soldiers on the march, for instance, find chocolate candy a great boon.

Dr. Hall says of sugar: "It would be a strange contradiction in the nature of things if sugar and candy in moderation should be hurtful to the human body in any way, for sugar is a constituent of every article of food we can name; there is not a vegetable out of which it cannot be made, not a ripe fruit in our orchards which does not yield it in large proportions, and it is the main constituent of that 'milk' which is provided for the young of animals and men all over the world. Perhaps the child has never lived who did not love sweet things beyond all others; it is an instinct, a passion, not less universal than the love of water. A very little child can be hired to do for a bit of sugar what nothing else would. The reason for this is, that without sugar no civilized child could possibly live, it would freeze to death; it is the sugar in its food which keeps it warm, and warmth is the first necessity for a child."

VII

# Popular Sugar Chemistry

*(Terms Most Commonly Used)*

**Acid Juice:** Juice that is liable to sour and invert.

**Alkaline Juice:** A juice that has been rendered neutral to acid by admixture of some alkaline substance, such as lime.

**Degree Brix:** Indicates the approximate amount of solid substance in a sugar solution, ascertained by immersing what is called a Brix Spindle (a glass tube containing a graduated scale and similar to a hydrometer) in such a solution.

**Fructose or Levulose:** A form of sugar produced by action of acids on sucrose during the latter's recovery from the beet or cane. One part of the so-called invert sugar produced by fermentation of beet or cane syrup before reaching its final state of purity for use on the table. Invert sugar is composed of two parts, one fructose, the other glucose; glucose plus fructose plus water ($H_2O$) form sucrose.

**Granulated Sugar:** A pure sugar which has been crystallized and centrifuged then run through a long horizontal revolving drum called a granulator, where it is dried by heat and screened to desired size of grains.

**Invert Sugar:** See Fructose.

**Magma:** A mixture of crystals of sugar, non-crystallized sugar, molasses and impurities. (See Massecuite.)

**Massecuite:** Product obtained in boiling or graining cane or beet sugar syrups from which final sugars are separated in the centrifugals.

**Melada:** Crude sugar mixed with molasses.

**Polariscope:** A beam of light when acted upon by certain optical devices in passing through a sugar solution will be deflected from a straight path to either the right or the left, direction of deflection depending upon the chemical composition of the solution. Light so acted upon is called polarized light. Sucrose will deflect the light to the right—fructose to the left. The degree of deflection, which is read off a graduated scale on the instrument used, indicates the percentage of sugar in a solution. The optical instrument used is called a polariscope.

**Purity:** The percentage of pure sugar to solid substance (either dry or in solution) contained in either juice, syrup, massecuite, molasses, cane or beets.

**Sucrose:** Sugars identical in composition with cane or beet sugar, having the formula $C_{12}H_{22}O_{11}$.

**Sugar or Per Cent Sugar** (See Polariscope): The percentage of sugar contained in either juice, syrup, massecuite, molasses, cane or beets.

**Sugar Factors:** Sugar is found by multiplying the purity by the Brix. and dividing the result by 100. Brix. is found by dividing the sugar by the purity and multiplying the result by 100. Coefficient of purity is found by multiplying the sugar by 100 and dividing by degrees Brix.

## VIII

# Cane Sugar Manufacture

The majority of cane sugar factories or centrals, as they are usually called in tropical countries, do not market their product themselves, but ship it to sugar refineries in the form of what is called raw sugar, a brown or yellow sugar, running from 94 to 98% pure. They, therefore, do not have as an elaborate system for purifying the juices in the early stages as American beet sugar factories, where the product is turned out between 99 and 100% pure, ready for the table.

The cane arriving from the fields goes first to the cane crusher (so-called), an arrangement of two horizontal iron or steel rolls with surface corrugations, passing between these rolls the cane is pre-crushed or flattened into a matte of pieces about six inches long, and delivered to the first cane mill, of which there are generally three running in tandem. A metallic carrier is placed between each mill to convey the cane from one mill to another.

The juice is extracted from the cane by squeezing it between the rolls of the cane mill. The cane mill consists of three heavy iron or steel horizontal rollers (similar in appearance to a cylinder printing press) usually about 32 inches in diameter by 78 inches long, driven by a steam engine through powerful spur and pinion gearing. The juice falls on to the bed plate of the mill and from there flows to mill juice tanks, from where it is pumped to juice scale tanks and limed therein. Liming consists of mixing about one-half to one pound of lime, in form of milk of lime, to one ton of juice.

The juice is not entirely extracted from the cane by the first set of rolls, but is sent to a second and a third set. On its way to each succeeding set, the juice is moistened to a certain degree with either water or diluted juice, which operation is technically known as maceration.

The small amount of lime used permits of a quick settling of impurities later on in the process. From scale tanks, juice flows to heaters, where temperature is raised to a little over 200 degrees F. From heaters, juice is pumped to settling tanks, where it is allowed to remain for about half an hour. The clear juice is then drawn off and sent to evaporators. The scum that rises to the surface together with settled mud is then filtered through presses, the filtered juice going to evaporators, the mud cake to fields where it is used as fertilizer or otherwise disposed of.

**Evaporation:** The juice is evaporated at low temperature—first in a number of multi-tubular vessels which run in a series of from three to five (called multiple effect evaporators), in which the vapors given off the juice in the first effect or body goes over to evaporate the juice in another body at a lower pressure. The second, third and fourth bodies operate in a partial vacuum, which permits evaporation at a much lower temperature than when under atmospheric pressure, decreasing the amount of fuel consumed considerably. The juice enters the evaporators with a water content of about 86% and leaves same with a water content of about

40%. The final evaporation is concluded in what are called vacuum or boiling pans.

In the vacuum or boiling pans, the sugar which enters same in solution is crystallized. When the masse content in the pan has reached the proper degree of crystallization, the pan is emptied and contents flow to what is known as a mixer, a long horizontal tank through which a paddle bearing shaft constantly revolves to prevent hardening of the masse. These mixers have a number of spouts below, through which the masse (massecuite) enters centrifugals or sugar separators. A description of centrifugals will be found in an article following, entitled "A Tour of a Complete Sugar Plant." From the centrifugals, the sugar is conveyed to weighing machines where it is automatically sacked and weighed, then transferred to car or warehouse.

Some factories, a number especially in Java, employ instead of crusher and cane rolls, practically the same system of diffusion and carbonation as is used in the beet sugar factory, but the vast majority of cane sugar factories, of course, use the modern cane mill for extracting juice.

The up-to-date cane sugar factory has one great advantage over the beet sugar factory, in that fuel costs practically nothing due to the fact that the stalks of the cane from which the juice is extracted, called bagasse, is used for furnishing the necessary heat and power for the various milling and evaporating operations. The bagasse goes directly from the rolls, in its moist state, to especially designed furnaces which furnaces are a product of American engineering effort and research.

It would be well to follow this article with "The Tour of a Complete Sugar Factory" start-ing with sub-heading "Evaporation" and reading through the sub-heading "Resolving the Sugar." Though the same is a description of beet sugar house work — the operations described under sub-headings mentioned differ but slightly from that of the cane sugar plant.

SUGAR FACTORY EQUIPPED THROGHOUT WITH AMERICAN MADE MACHINERY

## IX

# Sugar Refineries

With the exception of most of the cane sugar factories in Louisiana, also some of the cane sugar factories in Java, nearly all cane sugar produced is shipped, as stated in a previous article, to sugar refineries in the form of what is called raw sugar, a brown or yellow sugar, running from 94 to 98% pure.

Most of the refineries in the United States are located on the Atlantic Coast. The two exceptions are the California Hawaiian Company and the Western Sugar Refinery in San Francisco, California. These two receive most of their raw sugar from the Hawaiian Islands. The principal source of supply of the Atlantic Coast refineries are Cuba and Porto Rico, almost two and a half million tons coming from these islands alone yearly.

Of the total amount refined in this country, approximately 30% is handled by the American Sugar Refining Company, in their six different plants.

The other principal refineries are the National Sugar Refining Company, The Federal, Arbuckle Bros., Warner, Revere, McCahan, Savannah, Pennsylvania, Henderson, Godchaux and Colonial Sugar Refining companies.

The raw sugar upon arriving at the refinery is first washed then remelted, sent through bone char and other filters for purification, crystallized in vacuum pans, centrifuged, washed, dried, and granulated and packed for shipment in various size packages, boxes and barrels.

Most of the refineries manufacture their own barrels. For instance, the American Sugar Refining Company owns the Brooklyn Cooperage Company, New York, which has factories in Boston, New York Philadelphia and Chalmette, and owns in New York State 50,000 acres of timber land, with stumpage rights on 40,000 more acres. In Arkansas, it owns about 70,000 acres; in Missouri about 80,000 acres, and in other states owns and controls approximately 100,000 acres. It owns and operates seven stave and heading mills, and incidentally operates 135 miles of railroad in order to get its timber to the mills.

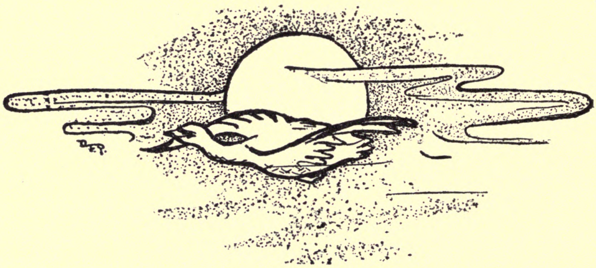
The machines used for forming the sugar into cubed and rectangular shapes and for packing same into paper boxes are marvels of ingenuity, as from the time sugar leaves the granulator until the time it is ready for shipment not a hand touches the sugar.

The public demand for packaged sugar and the great cost of the machinery is one of the reasons why the cane sugar factories themselves do not find it profitable to refine and market their product direct to the consuming public and therefore, use the refineries, with their elaborate equipment and selling organizations to act as intermediaries.

The fact that the refineries handle a million pounds and upward daily, enables them to sell the product at only a slight increase in cost over the raw sugar. In fact, the average central could not refine and market its product as cheaply as the refineries.

The refineries turn out many different grades and forms of refined sugar, including fine, standard, coarse and hard granulated sugars, powdered sugar, cube, and rectangular shape sugar, and special grades for use of candy makers.

The term refiner's margin refers to the difference between the cost of raw sugar, duty and freight paid and the wholesale price of refined granulated sugar. The American Sugar Refining Company states that it takes about 107 pounds of raw sugar to produce 100 pounds of refined sugar, the seven pounds being "lost in refining."



X

# The Making of Sugar from Beets Briefly Described

The sliced beets are immersed in warm water, the sugar diffusing through the walls of the cells of the root into the water. This operation is carried out systematically in a series of tanks called a diffusion battery, arranged in a circle and connected together. The juice from one cell passes through the others continuously; the nearly exhausted slices receiving fresh water, which, as it goes from cell to cell, coming in contact with fresher and fresher cuttings, grows accordingly richer in sugar.

The exhausted slices, after being pressed, removing such water as is possible, or after being dried in special ovens, are used as cattle food.

After leaving the diffusion battery the juice is treated with lime, is heated, and is then acted upon by carbon dioxide (commonly known as carbonic acid gas). The object of liming is to neutralize and precipitate the organic acid present. The carbon dioxide removes the excess of lime; the precipitate of calcium carbonate which is formed carries down other organic impurities. As some of the impurities precipitated are soluble in any but alkaline solutions, the first treatment with carbon dioxide is stopped while there is still about 0.1% of caustic lime present.

After leaving the first set of carbonation tanks the mass is filtered and a second carbonation reduces the amount of free lime to about 0.03%. A second filtration follows the second carbonation, often affected in gravity presses which require much less pressure than the ordinary presses.

After further treatment and a third filtration the juice is evaporated at low temperature—first in a series of multi-tubular vessels which run in a series of four or five (called multiple-effect evaporators) in which the vapors from one effect or body go to evaporate the juice in another at a lower pressure; and then after a brief heating at atmospheric pressure, sulphuring and filtering through gravity filters, the evaporation is concluded in steam-heated vacuum pans. (This last evaporation process is termed boiling.)

In the boiling pans crystalization is effected and these crystals are separated from the uncrystallizable syrup in separating devices called centrifugals. From the centrifugals the white sugar, which is practically 100% pure, though still containing a percentage of moisture, is conveyed to the granulators, where it is sifted and dried, then to weighing machines, where it is sacked in 100-pound bags.

The molasses obtained is sold to distilleries for the manufacture of alcohol, or is subjected either to the Osmose or to the Steffens process of sugar recovery.

In the Osmose process the syrup is diffused into water through parchment paper, which allows the salts that hinder crystallization to pass through more rapidly than the sugar and other organic compounds present. After a sufficient treatment the syrup left is re-boiled.

In the Steffen's process, now largely used, the molasses is diluted to contain about 12% solids, then about as much powdered burned lime as there is sugar present is sifted into the solution, the temperature being kept below 18° Centigrade. This precipitates all the sugar into what is called a Tri-calcium saccharate, which is filtered off and used in place of lime in treating the raw beet juice.

## XI

# A Tour of a Complete Sugar Plant

This section is written with the thought in mind of avoiding, as far as possible, intricate technical description—to explain the process of sugar manufacture in such simple and brief terms as will enable anyone interested to secure a fairly clear idea of this subject.

After reading to Beet Bins, let the reader imagine that he has arrived at a sugar mill and is following the course of the beets throughout the factory, beginning at the point when the beets are stored awaiting their turn to start on their trip of transformation.

### THE BEET ROOT

**Beet Loading Stations:** For receiving beets for shipment by rail, a weighing and carloading platform is generally erected alongside railroad tracks at a point most convenient for farmers of a particular section. In some districts where beet growing is extensive, beet sugar companies will each have their own loading station, in some cases, only a few feet apart. The most modern type of loading stations are those known as the "Ground Level," to distinguish them from the old type, which are built like bridges, necessitating wagons and teams ascending and descending an incline in order to dump the beets into freight cars. With the new type station, the farmer dumps his load into a hopper directly from the roadside. Beets slide from hopper into buckets attached to a wheel or endless belt. On the way from hopper to buckets, most of the adhering dirt is removed. Clean beets fall from the wheel into a scale hopper, the weight being read on recording beam below, which typewrites the weight on cards in triplicate. One of these cards is handed to the farmer. From scale hopper, clean beets fall directly into freight car. The best known of the modern types of beet dumps are the Weller, the Waverly and the SMC.

**Beet Bins:** Beets, arriving in wagon and carload lots, are dumped herein.

**Flumes:** At bottom of each bin is a concrete ditch or canal connecting with main flumes. As beets are required, they are pitched into these branches, through which a current of water flows, which conveys the beets to the mill.

**Stone Catcher:** In the harvesting of beets, many small stones are caught up and conveyed to the mill. These stones, if carried into slicers, break the knives and also seriously interfere with the operation of the slicer. The stone catcher is placed in beet flume to intercept the passage of these stones. It was invented by Messrs. Franklin and Daley. Mr. Franklin is superintendent of one of the Great Western Sugar factories, and Mr. Daley is District General Superintendent of the Holly Sugar Corporation.

**Weed Catcher:** The swinging paddles comb the weeds and trash out of channel as they try to pass. Paddles are made of sharply notched bar iron, and as they drag through flume, the notches fill up with the objectionable matter and upon ascending, a projecting end of paddle strikes against lateral bars at the top of device, loosening the trash.

**Tare-Room:** Here samples, as obtained from each load, are tested, and sugar per cent determined by the chemist, as the price of beets is based on the percentage of sugar content. Sample is weighed just as it comes from load, then beets are cleaned, and weighed again in same bag; the proportion that the difference bears to original weight of sample is figured as the per cent of tare for the entire load.

**Beet Wheels:** Main wheel is located near end of mill and flume. Beets drop into buckets attached to the inner rim and are elevated to floor level and conveyed through short flumes to scrolls.

**Scrolls:** These monster screws elevate the beets to "washers." Dirty water from flume going to sump to be pumped onto the land.

**Beet Washer:** The beet washer is a rectangular tank through which runs a paddle bearing shaft, thus beets are carried forward from one end of tank to other and agitated sufficiently to clean off dirt adhering. A "kicker" at end of shaft throws beets onto a set of rolls upon which a stream of water flows, providing an additional cleansing before entering cutters. From rolls beets drop into buckets attached to a long endless chain called a beet elevator which carries the beets to the top floor of factory.

**Beet Root Separator:** In the harvesting, transporting and washing of beets, many rootlets are broken off. These rootlets average well in sugar content. The boot root separator separates rootlets from the trash, delivering the rootlets direct to beet elevator, thence to cutters. The separator is placed between the beet washer and the beet elevator. Heretofore, the rootlets were mixed up with the trash and went to the sewer. The separator intercepts the passage of the rootlets and, as aforesaid, delivers them to the beet elevator. It is an invention of Mr. Joseph Sailer, General Engineer of the American Beet Sugar Company.

**Scale:** From top of elevator beets drop into a hopper, from whence they go to automatic scale set to weigh about 800 lbs. When scale hopper is filled to this amount main hopper automatically closes at bottom. From scales beets go to hopper serving beet slicers.

## COSSETTES

**Beet Slicers:** Beets are sliced into long V-shaped slices or strings called "cossettes." Cutting them in this manner exposes the greatest amount of the cell structure of the beet to the action of the sugar-extracting medium, and, at the same time, permits circulation between the slices; thus hastening the process of diffusion. The modern beet slicer is shaped like a big bass drum, about 5 feet in diameter by 18″ wide, having a shaft passing through the center.

A steel ring, slightly smaller in diameter than the outer casing, is bolted to a disc mounted upon the shaft, and revolves inside of this outer casing. The ring, known as the knife block ring or spider, is provided with a number of slots for receiving the knife holders or blocks, either eight or nine of which are furnished, depending upon the type of the cutter—the Binkley Cutter having nine blocks, the Maguin eight, the diameter of ring being the same in both cases.

Each knife block carries three sets of knives, two knives to a set. The knives in each set are bolted opposite to each other in each knife block. The knives themselves are about 6½″ long, 3″ wide, and ¼″ thick. Each knife has about 30 blades or divisions, about 3/16 of an inch apart. (See Disston Ad for illustration.) A 9-block ring carries 54 separate knives.

**Diffusion:** Fourteen cells to a "battery." Water at a temperature of about 175° F. or 80° C., is the diffusing agent. To diffuse a cell takes about an hour. The cells of the battery are so arranged that they may be connected as in a circle. They are also so arranged that any cell may be cut out of the circle while being emptied and refilled without stopping the flow of water in the circuit. The water enters the circuit at the cell containing the cossettes most nearly extracted and travels from one cell to another, absorbing from the cossettes more sugar as it proceeds on its course, until it arrives at the freshest sliced beets. The sugar content of these cossettes being higher, the water becomes more heavily saturated with sugar, so that it will scarcely hold any more. In this state it remains in the final cells for only a short period, during which further extraction continues; after which the liquid—which is now juice—is drawn off and pumped into an automatic weighing tank. Complete extraction of sugar from the slices is not practical, and about 3-10 to 5-10 of one per cent of the sugar content is therefore lost in pulp and water. To keep the loss from this source within reasonable limits requires chemical and mechanical control of the highest order; and in this connection tanks to measure the diffusion juice as it leaves the battery are employed so that the amount of juice drawn off (draft) can be so regulated as to serve in a measure to control loss in question.

**Pulp Disposal:** After the sugar has been extracted from beet slices, the exhausted cossettes, heavily laden with water, are pumped to drier, where bulk of moisture is evaporated. Wet pulp contains about 85% of water and the dried product about 10%. From drier (an arrangement of revolving drums and hot-air furnaces) the pulp is blown through large galvanized pipes to the warehouse and is there automatically weighed and sacked. Automatic carriers convey sacks to cars directly or to any particular section of the warehouse.

**Diffusion Measuring Tanks:** For each ton of beets cut, the diffusion juice averages about 1½ tons (about 11% sugar, 2½% of other solid substances and the balance water). Tanks can be adjusted so that upon filling up to a certain point they will be emptied automatically.

**Diffusion Juice Reheaters:** Here juice is heated to about 190° F. and passes into the carbonation tanks.

## EXTRACTION OF IMPURITIES

**Liming:** Lime is added to the juice in the form of slaked lime, calcium hydroxide [$Ca(OH)_2$], also called milk of lime, or in the form of a "saccharate" of lime, a compound of lime and sugar obtained in recovering the sugar in the final molasses by the Steffens process. The addition of the lime causes the precipitation of the organic acids and their salts which were extracted from the beets along with the sugar, as the lime or calcium salts of these acids. The lime also renders the juice alkaline, which is a necessary factor to prevent the sugar from breaking down into its components, glucose and fructose, during the further process of heating and evaporation.

**First Carbonation:** The juice is next saturated with carbon dioxide gas, $CO_2$. This precipitates the excess of lime as calcium carbonate. Not only does this greatly reduce the alkalinity of the juice, but the precipitated calcium carbonate, along with the original precipitate of lime salts, carries down with it much of the remaining organic impurities as albuminoids and gums. The carbondioxide used in this step is obtained from the lime kilns in which limestone, heated by the burning of coke, is calcined to yield both the carbon dioxide for this process, and also the lime for the liming process or to be used in the Steffen's process later in the course of extraction.

**Carbonation Presses:** Squares of canvas on iron frames. The carbonated juice passing through these presses leaves the lime and insoluble substances deposited on the filter cloths in form of a cake about one inch in thickness. This "lime cake," is burned again to form fresh lime or after being well washed with hot water, is dropped in a trough and conveyed to a tank where water is added until the whole mass becomes of a thick, pasty consistency known as "mud." From here it is pumped into the waste water where it is in turn carried out and used with irrigation water on the land. The juice, which before treatment was dark in color and nearly opaque; on leaving the presses is a thin, transparent straw colored liquid.

**Second Carbonations:** First carbonation process repeated and soda added to offset lime salts, which form incrustations on evaporator tubes.

**Second Carbonation Presses:** The juice is again filtered and lime cake and more organic impurities removed.

## EVAPORATION

**Evaporators:** Leaving the bag filters, the "thin juice" enters the first evaporator at a density of about 14° Brix (solid substance, see page 18 for interpretation) and leaves the fourth body at about 60°. The evaporated liquid is termed "thick juice." In process of evaporation the juice goes through a series of four evaporator bodies. The vapor, given off in the first body, in which the steam is utilized, is used to heat the juice in the second body, and so on, thus affording a great saving of fuel. The second, third and fourth bodies operate in a vacuum, which condition permits evaporation at a much lower temperature than when under atmospheric pressure. After evaporation, remelted raw sugar, obtained from the molasses further on in the purification process, is added. This sugar passes through the purification process a second time, along with the fresh juices.

**Blow-Ups:** The Alkalinity of the juice sometimes becomes increased to such extent through evaporation that it must be reduced before entering vacuum plant. This reduction is accomplished through the "Blow-Ups" which are round iron tanks provided with a perforated steam coil and a chamber for entrance of sulphur gas, sulphur dioxide, $SO_2$. After heating the thick juice, if it is found too alkaline enough sulphur gas is admitted to correct. This also serves to whiten, or bleach, the juice.

**Syrup Presses:** Thick juice and other syrups coming here from blow-ups pass through these presses. The excess of lime is removed as calcium sulphate, along with other impurities.

## RESOLVING THE SUGAR

**Vacuum Pans:** Here thick juice or a mixture termed "standard liquor" is boiled and grained to sugar crystals.

The juice or liquor arrives here with the sugar in solution and through boiling a part of the sugar assumes a crystaline form.

By operating in a vacuum the boiling point of the syrup is lowered, not alone affording a saving in fuel, but preventing burning of the sugar. Pans contain a series of copper coils, through which the steam circulates.

Syrup is admitted to the pan by degrees, and as it boils and crystals form, the sugar boiler by observation determines amount of syrup to admit. When the proper growth of the crystals has reached its limit, he "drops" the pan, and calls or signals, "Strike."

To boil white sugar takes about 3½ hours; to boil "browns" or "raws," from 5 to 14 hours.

**Mixers:** From both white pans and brown sugar crystallizers, the fillmass or massecuite, as the crystallized syrup is called, enters respective mixer, through which a paddle-bearing shaft constantly revolves to prevent hardening of the mass. These mixers have a number of spouts below, through which the fillmass enters centrifugals or sugar separators.

**Centrifugals:** The frames of these machines, cylindrical in form, contain a bronze basket of varying diameter according to needs of factory (standard diameters are 30″, 36″ and 40″). The inside height of the basket is usually 24″. This basket, which contains a fine mesh screen, revolves at a speed of from 1,100 to 1,400 revolutions per minute; "green syrup" flies off and white sugar remains. The remaining molasses is then washed out by an automatic spraying device and pure sugar is discharged into a screw conveyor below, thence to granulators (the syrup produced by the sprays is the so-called "wash" syrup). The separation of about 250 pounds of sugar from the fillmass takes from 7 to 10 minutes. Raw fillmass gives a separation of brown or yellow sugar. This yellow sugar goes to melter to be added to thick juice; molasses is pumped to the steffen house to be treated with lime, forming the saccharate with which fresh beet diffusion juice is mixed.

**Granulators:** White sugar leaving centrifugals contains a certain per cent of moisture; here sugar is dried in a rotary drier. It is then sifted through fine mesh screens into granules, forming granulated sugar. This is the ordinary or **"granulated sugar"** as it is known by all.

The "first" or "white sugar," upon being run through the dryers or "granulators" loses about 3% moisture and comes out a 99.8 or 99.9% sugar ready for sacking. From the granulators it is conveyed by scrolls to the hoppers supplying the sacking machines. These machines are operated by electricity and weigh out very accurately 100 pounds of sugar. The sack of sugar is then set on a conveyor which carries it around to the sewing machine where in a few seconds the sack of sugar is sewed and ready to be carried to the freight car or to the sugar warehouse, in which the surplus sugar is stored awaiting shipment.

**Crystallizers:** In centrifuging, or spinning, the mass from the vacuum pans (separating the crystals), a proportion of same is thrown off in the form of a syrup, usually running from 70% to 75% sugar, which can be reboiled and about 20% recovered as raw sugar; this residue, called "green syrup," is sent to "blow-ups"; is sulphured, reheated and filtered; then boiled in raw pans, referred to previously, but (unlike fresh "thick juice" or standard liquor) crystals are not as readily formed in the pan, and after boiling for from 5 to 14 hours, the raw product or "fillmass" is transferred to crystallizers in which the mass is agitated from 3 to 5 days, during which time crystals grow, from which brown sugar can be extracted.

## EXTRACTION OF SUGAR FROM MOLASSES

**Steffen's Process:** Molasses, with a sugar content of about 50%, is pumped from main building, weighed, and diluted to a comparatively low density, as compared with original molasses (there also enters at this point a small percentage of milk of lime from hydrate presses). From here solution goes to solution tank to be cooled. After cooling in tank, solution is pumped to "coolers" (about 1,600 pounds of molasses thinned down enters a cooler at one time); here powdered lime is added; an agitator at bottom keeps the cooler mixture in circulation; ice water circulating through coils in bottom of cooler keeps temperature down and prevents lime from slaking. After a certain period, usually about six minutes, cooler is emptied and contents pumped to cold presses.

**Steffen's Cold Presses:** Saccharate solution, in passing through presses, leaves cold saccharate adhering to cloths. The waste water from cold presses holding a little over 1% sugar is heated and sent through hot presses, where hot saccharate cake adheres to cloth, waste water going to sewer. The saccharate cake is a lime salt of sugar. The composition of this salt is usually expressed as tri-calcium saccharate, or $C_{12}H_{22}O_{11}$-3 CaO-3 $H_2O$. This ratio varies somewhat, however; the cold saccharate diluted cake contains about 15% sugar, the hot saccharate cake about 12%. From presses, saccharate cake goes by scroll to mixing tank, is diluted with wash water from the first carbonation presses to a brix of between 35° and 40°, forming a cream, and is pumped in this form to first carbonation to be added to fresh beet juice or to hydrate mixer.

It has been found that double-warp jute cloths from Steffens cold presses, if washed in softened water, can be utilized again on Steffens hot presses, as heat reopens the pores of these cloths. This affords a great saving.

**Solution Tanks, Etc.:** Solution tanks contain an arrangement of coils to cool the molasses solution. In plants, except in the colder regions, an ammonia refrigeration system is used to cool the brine circulating in the coils.

**Hydrate Mixer:** More lime is used to work up the molasses produced than is needed to purify the fresh beet juice. The compound of lime and sugar (saccharate) coming from the Steffen's presses has a sugar content of about 13%—the lime of this saccharate is what is used to purify the fresh beet juice, for as it is added to the water solution it forms calcium hydroxide and frees the sugar. If any remains unchanged it is decomposed by the carbonation process by which the lime is precipitated out. The part of saccharate not needed for purifying purpose is sent to hydrate mixers. Here, slowly revolved in large tanks, its temperature raised from about 65° to 80° C. (149° to 176° F.), and diluted from 35° to about 20° Brix by an admixture of juice from carbonation filter presses. After a few minutes of mixing the liquid is sent to presses to be filtered, the hydrate, or slakened lime, adhering to cloths is used again in working up the molasses.

## LIME KILNS

**Kiln and Pulverizer:—**

Lime rock and coke are burned together to produce plain unslacked lime and carbon dioxide. $CaCO_3 = CaO + CO_2$. The gas is pumped to the carbonation tanks for use therein, the lime goes to the crusher; is ground up, elevated and distributed to Raymond pulverizing mills; blowers above suck the lime away from the mills as fast as it is powdered and deliver same to conveyors, thence to hoppers serving Steffens coolers.

**Rotary Kilns:** Waste lime from first carbonation presses is pumped to rotary kilns, of which there are two, each consisting of a long horizontal tube about 6 feet in diameter. The fire, an oil flame, is introduced at one end. About half way back from firing end is superimposed another tube about one-half the diameter and the length of rotary. The diluted lime, entering at one end of this upper tube, is carried backward by a revolving screw and at the same time subjected to a heat which evaporates most of the water. From opposite end to that of entry, lime falls into the kiln tube proper, through which shoots flaming oil; the organic impurities go out through the stack and the almost pure calcium oxide (unslackened lime) in small marble-shaped pieces is carried forward by the rotating movement, drops into wheelbarrows, is then laid out to cool, and when cooled is transferred to main kiln to be ground up with other lime for use in Steffen House.

## POWER

Sterling boilers equipped for oil burning and with flue gas economizers are the ones commonly in use. Tests are made of the escape gas, so that the efficiency of all boilers is known at all times. Flue gases are utilized to heat water as it enters boilers.

Both high and low exhaust steam from engines is used whenever possible, especially in first evaporator body and vacuum pans (in conjunction with live steam). Most all reheating is done by vapors from evaporators.

## RÉSUMÉ OF PROCESS

After being weighed the beet roots are sent to the cutters, which contain a series of revolving corrugated knives, thence to large iron tanks called diffusion cells, holding about four tons each. Here sugar is removed from slices by hot water. After diffusion, the juice is reheated and receives an addition of lime and is then saturated with carbonic acid gas, which precipitates the lime together with certain impurities. It is then reheated and filtered, relimed, carbonated and treated with soda, reheated and refiltered, is partially evaporated to about 60% of solid substance, bleached with sulphur gas and filtered. After filtration, juice enters "boiling pans" where further concentration takes place and the sugar is resolved to a crystalline form. From the "boiling" or vacuum pans the mass enters sugar separators or centrifugal machines, which revolving at high speed, throw off the molasses and retain the pure sugar, which in a moist form is conveyed to granulators, where it is dried and sifted, then dropped below to automatic scales, where it is sacked ready for shipment.

The sugar remaining in the molasses is precipitated by the addition of lime. This lime-sugar compound is added to the fresh beet juice where the lime is freed to interact in purifying the juice, and the recovered sugar passes a second time through the refining process.

## CHEMICAL CONTROL

Sugar manufacture is most effective under chemical control; at each stage of the process small samples of the juice are taken at intervals, dependent on conditions, and these samples are chemically analyzed to determine the per cent of sugar and other content. The density of the juice must be within certain limits at various stages and its purity must be known. This all comes under the jurisdiction of the chemical department. The amount of materials consumed and their relation to the output must be known exactly at any time by the superintendent, and hourly records are therefore made in every department and at each station.

## NOTEWORTHY FEATURES

A feature especially noteworthy is the recording of work done by shift machinists and their daily suggestions for further work to be done to anticipate breakdowns; also suggestions for improvements that come to their minds daily and which might be forgotten if left to be suggested at the end of the campaign. A further feature is the advocacy of suggestions from all men regardless of the importance or unimportance of their duties. Unless such co-operation is obtained men are apt to consider that their suggestions will be frowned down upon by their immediate superiors, and thus faults, such as leaky valves, for instance, that permit of a small loss here and there, great in the aggregate, are sometimes not reported promptly.

Again, the comfort of the men should be looked after. In a certain mill where overflows at the sulphur station or blow-ups were quite frequent, there resulted a loss during the campaign of hundreds of dollars, due no doubt to the fact that escaping gas fumes lowered the energy of the men and caused them to relax their alertness. A certain mill in California has provided shower baths and lockers for their men at a cost of over $25,000, and finds that it pays. Every morning a clean suit of white linen, provided and laundered by the company free of cost to the men, is laid in the locker of each man, which he dons, thus presenting a spick-and-span appearance. This mill, one of the oldest in the United States, secures the highest known extraction of any American mill in the business, which result speaks for itself.

## KEEPING ABREAST OF PROGRESS

In regard to keeping up with modern methods of sugar recovery, it has been said by Lewis E.

Ware, the well known authority on beet sugar production:

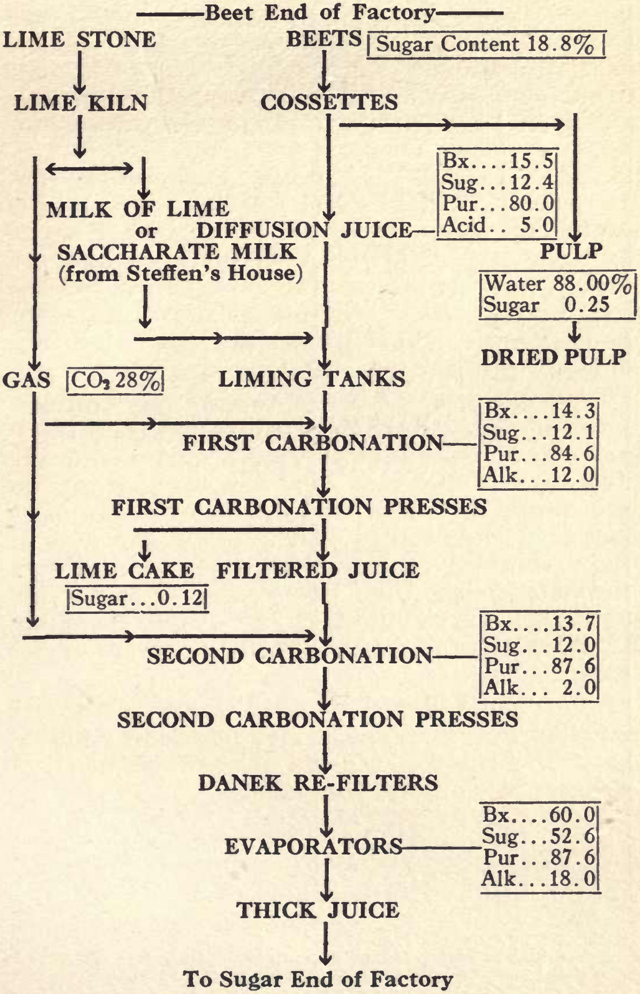
"Beet sugar manufacture from year to year undergoes important changes which result in considerable economy, not only in the modes of extraction, but in the percentage of extraction realized; $50,000 additional expenditure in the machinery furnished frequently means one-half per cent more sugar. If 50,000 tons of beets are worked during the campaign, this additional sugar means 250 tons, the money outcome of which is more than sufficient to pay for the supposed excessive expenditure the first year. Certain contractors of beet sugar machinery whom we could mention, live up to the times, reject all obsolete methods and are consequently at an enormous expense for the construction and designing of new machines and devices. Their prices are high, but are certainly profitable in the long run.

"The practical advice is to give any contemplated change all due consideration, and if all issues have been thoroughly weighed and the advantage of the new device are apparent, **no time should be lost** in making use of it. In most cases it is essential to demand that there shall follow sufficient gain that the device may pay for itself in less than five years. The narrow margin of the manufacturer's profit demands that his plant keep pace with the progress of the times."

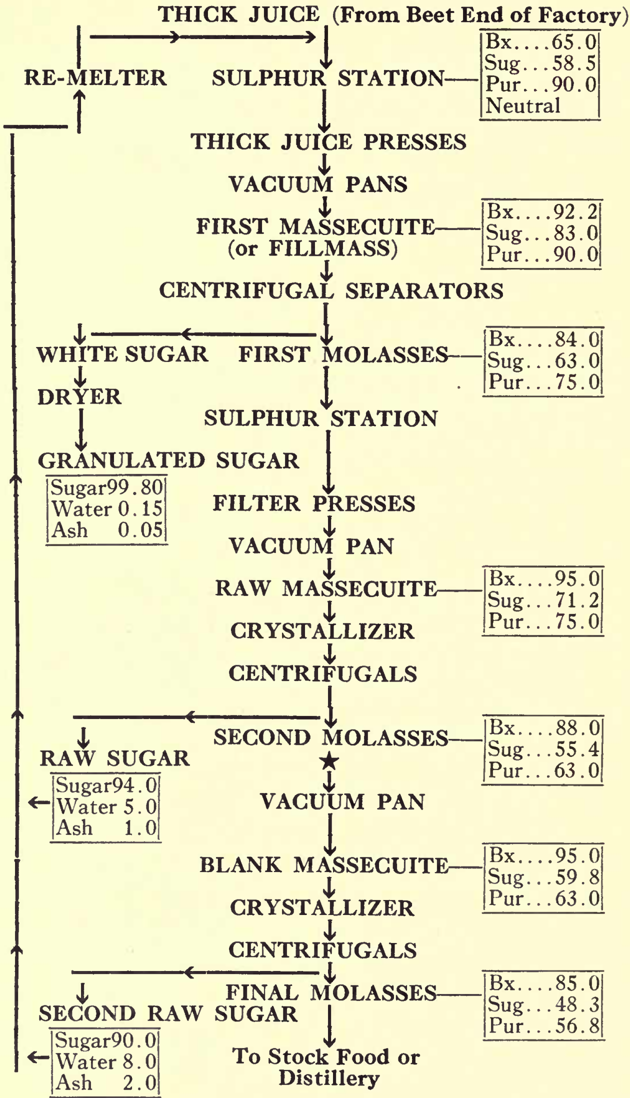
A very good idea of many of above mentioned machines and devices can be obtained by glancing at illustrated cut at end of book, contributed by Sugar Machinery Company.

**DIAGRAM OF EXTRACTION AND REFINING WITH COMPLETE ANALYSIS AT EACH STEP.**

**Bx. . . . Degree Brix, or Percent of Total Solids.**
**Sug. . . Percent Sugar, or Polarization.**
**Pur. . . Purity, or Ratio of Sugar to Total Solids.**
**Alk. . . Alkalinity in c.c. of $\frac{1}{10}$ N $H_2SO_4$ per 10 c.c. of Juice.**
**Acid . . Acidity in c.c. of $\frac{1}{10}$ N KOH per 10 c.c. of Juice.**

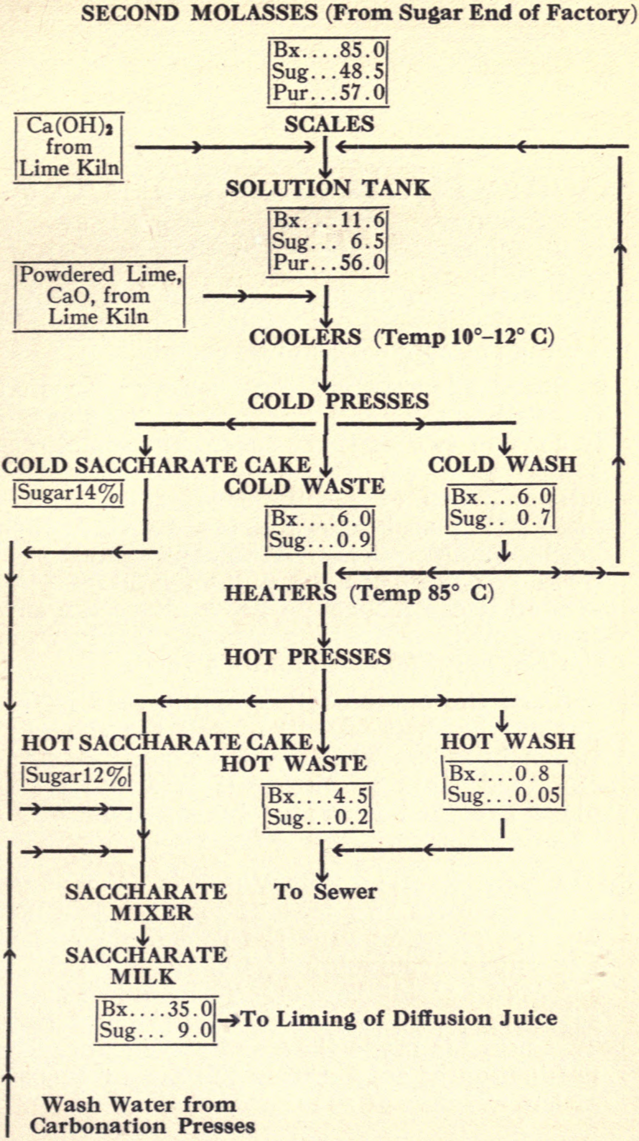


## Sugar End of Factory




★In factories having **Steffen's Recovery Process**, more raw sugar is removed and process after SECOND MOLASSES is omitted. Pass to next page.

## Steffen's House



XII

# Some Hints on Sugar Beet Culture

**Beet Seed:** The younger the seed the greater the germinating principle. Two-year-old seed is not as good as one-year-old.

Beet seeds are stuck together forming what is called a "seed ball." Beet seed balls usually contain two or three seeds, but sometimes as high as seven. Beet seed contains a plantlet composed of a number of cells, and is filled with starch, albumin, etc., for its growth while underground. After the plant puts forth root and secures a firm hold in the ground it commences to grow above the surface, and by absorbing carbon-dioxide from the air, manufactures its own food.

Since the outer coating of the seed is frequently hard, it is well to roll the seed between boards. This manipulation separates one seed from another. It is also well to place the seed in water for an hour or so before planting.

**Sugar Beet Roots:** Beta-Vulgaris (the sugar beet) requires two seasons to reach full maturity. The first year the root is developed and sugar accumulated; the second year is the seed bearing season. The highest sugar content is reached at the end of the first year. The sugar is made then and stored up. The production of seed during the second year is at the expense of sugar stored the first year.

It naturally follows that sugar beets are sliced after one season's growth.

Beet roots that have short, small necks are the most desirable, since they contain the most sugar. To produce such a beet ground must be well worked, and not too compact. The more abundant the leaves the more sugar in the beet. Leaves under no circumstances should be stripped. If the ground is not plowed in the proper manner to permit the air to penetrate proper results cannot be obtained. The soil should be of such texture that but little resistance will be offered to the passage of the roots; and where sub-soil is so compact as not to permit the passage of water, it should be improved by drainage. It is advisable to rid the soil of the weeds by hand, rather than with the hoe, the first ten days.

Beet roots when fresh and in good condition contain very little glucose, but if mutilated, glucose will form, causing proportional loss in sucrose.

The well known authority, Lewis S. Ware, in discussing beet culture states: "In Germany, where less weeds exist than in any other country, nevertheless hoeing after thinning is repeated five and even more times. Hoes should not penetrate too deeply. Hoeing has for a general effect the development of the leaves, which development results in a greater formation of sugar, but should be continued only until the root has attained its full growth. If continued after full growth, hoeing would cause the leaves to grow larger, but at this period sugar is increasing in the root and the growth of the leaves at the same time has an opposite effect. Leaves at this time are large and numerous enough anyway to smother the weeds by keeping them from sun and air."

Dr. J. K. Greisenegger, of the Czecho-Slovak republic, has been experimenting with the question of which beets yield the best results, those planted north and south or those east and west. These experiments have been watched with considerable interest and were spread over considerable area in order to ascertain rather definite data on this question. Where air and moisture were at a minimum and where other conditions remained about equal it was ascertained that beets planted in rows running from west to east produced the best sugar content. They produce the largest number of beets, the highest sugar content and also the best leaves. The very opposite results were obtained with rows planted north and south. Then another experiment was made with rows running northwest to southeast and northeast to southwest. These rows again showed a medium output or a lesser content than east and west and a better output than those north and south. It was also ascertained that where the planter was obliged to plant them diagonally to the meridian, preference should be given to rows planted from northeast to southwest.

The fallacy that sugar beets injure the soil has not only been exploded states "Field and Farm," but just the reverse has been found to be the fact. It is true that sugar beets take out of the soil the same elements that are removed by other crops, but in slightly different proportions. But, as has been stated, a large part of these mineral elements is in the top, which, if kept on the farm and fed to livestock, should be returned to the soil in the form of manure, so that in the end but little plant food is permanently removed from the soil by the beet crop. Experience in all sugar beet countries has demonstrated that larger crops of grain can be grown after beets than after any other crop. This seems to be due to the excellent condition in which the soil is left by the beet crop and to the depth of the root bed occupied by the beet roots. It is not apparent that sugar beets add to the soil any fertilizing material, but the fibrous roots left in the ground when the beets are harvested improve its physical condition.

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"The Department of Agriculture figures show that beets were the only crop in the United States to show a gain in value in 1920." This remarkable return says the Broderick, Cal., "Independent," was due to the high contract price for beets which was out of all proportion to the selling price of sugar at harvest time. It speaks well for the sugar factories that they would carry out their contracts under conditions prevailing and illustrates in a striking manner the value of a contract crop which protects the farmer against violent fluctuations of the market.

*Sugar beets and beet sugar: acreage and production in 1918–1920.*

[Figures for 1920 are based upon returns made before the end of the season and are subject to revision.]

| State and year.[1] | Factories in operation. | Sugar made. | Average extraction.[2] | Average sugar content.[2] | Beets worked in factories. | | Average farm price of beets per ton. | Area of beets planted. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Area harvested. | Quantity worked. | | |
| | *Number.* | *Short tons.*[3] | *Per cent.* | *Per cent.* | *Acres.* | *Short tons.*[3] | *Dollars.* | *Acres.* |
| California: | | | | | | | | |
| 1920 | 11 | 163,700 | 15.79 | 17.90 | 123,500 | 1,037,000 | 13.62 | 135,700 |
| 1919 | 10 | 131,172 | 16.30 | 17.87 | 107,174 | 804,642 | 14.17 | 129,500 |
| 1918 | 13 | 122,795 | 14.62 | 17.03 | 100,684 | 845,728 | 9.95 | 120,900 |
| Colorado: | | | | | | | | |
| 1920 | 17 | 302,700 | 12.77 | 15.83 | 221,500 | 2,370,000 | 11.88 | 253,600 |
| 1919 | 15 | 193,890 | 11.71 | 13.62 | 182,616 | 1,656,113 | 10.85 | 236,300 |
| 1918 | 14 | 191,880 | 14.07 | 16.10 | 125,882 | 1,363,277 | 10.02 | 142,000 |
| Idaho: | | | | | | | | |
| 1920 | 9 | 64,600 | 12.97 | 16.08 | 55,600 | 498,000 | 12.09 | 57,600 |
| 1919 | 6 | 26,159 | 13.29 | 15.48 | 30,331 | 196,847 | 11.00 | 53,700 |
| 1918 | 7 | 44,682 | 13.66 | 16.57 | 32,306 | 326,979 | 10.00 | 37,700 |
| Michigan: | | | | | | | | |
| 1920 [4] | 17 | 167,500 | 13.30 | 16.21 | 145,200 | 1,259,000 | 9.99 | 173,400 |
| 1919 [4] | 16 | 130,385 | 12.63 | 14.57 | 123,375 | 1,032,018 | 12.52 | 166,100 |
| 1918 | 16 | 127,979 | 14.38 | 16.61 | 114,976 | 890,238 | 10.08 | 134,500 |
| Nebraska: | | | | | | | | |
| 1920 | 5 | 87,500 | 12.38 | 15.70 | 72,000 | 707,000 | 11.94 | 78,900 |
| 1919 | 4 | 60,870 | 10.99 | 13.14 | 59,113 | 554,100 | 10.90 | 64,800 |
| 1918 | 4 | 63,494 | 14.01 | 16.05 | 42,746 | 453,266 | 9.96 | 44,600 |
| Ohio: | | | | | | | | |
| 1920 | 5 | 55,700 | 12.35 | 15.66 | 46,800 | 451,000 | 9.22 | 44,300 |
| 1919 | 5 | 31,864 | 10.93 | 14.15 | 30,909 | 291,583 | 12.75 | 37,100 |
| 1918 | 5 | 35,476 | 12.19 | 15.74 | 32,547 | 291,064 | 10.03 | 36,100 |
| Utah: | | | | | | | | |
| 1920 | 18 | 153,200 | 11.40 | 15.41 | 112,700 | 1,304,000 | 11.66 | 116,100 |
| 1919 | 18 | 101,025 | 11.12 | 13.87 | 103,247 | 908,122 | 10.97 | 109,700 |
| 1918 | 16 | 105,794 | 11.69 | 15.29 | 81,717 | 905,064 | 10.01 | 90,100 |
| Wisconsin: | | | | | | | | |
| 1920 | 5 | 25,100 | 12.49 | 15.92 | 23,200 | 201,000 | 10.47 | 29,000 |
| 1919 | 4 | 10,636 | 10.07 | 13.16 | 12,100 | 105,578 | 12.02 | 16,200 |
| 1918 | 4 | 13,358 | 14.29 | 16.29 | 12,400 | 93,467 | 10.00 | 14,900 |
| Other States: | | | | | | | | |
| 1920 | 12 | 89,600 | 12.48 | 15.72 | 81,500 | 718,000 | 11.34 | 89,900 |
| 1919 | 11 | 40,450 | 11.95 | 14.27 | 43,590 | 338,554 | 11.08 | 77,000 |
| 1918 | 10 | 55,492 | 13.59 | 15.95 | 50,752 | 408,423 | 9.86 | 68,900 |
| United States: | | | | | | | | |
| 1920 [4] | 99 | 1,109,600 | 12.99 | 16.06 | 882,000 | 8,545,000 | 11.63 | 978,500 |
| 1919 [4] | 89 | 726,451 | 12.34 | 14.48 | 692,455 | 5,887,557 | 11 74 | 890,400 |
| 1918 | 89 | 760,950 | 13.64 | 16.18 | 594,010 | 5,577,506 | 10.00 | 689,700 |

[1] Acreage and production of beets are credited to the respective States in which the beets were made into sugar.
[2] Based upon the weight of the beets.
[3] A short ton is 2,000 pounds.
[4] Including beets and sugar from 1,500 acres in Ontario, Canada, 1920, and 850 acres in 1919.

**Bureau of Crop Estimates**

# AMERICAN BEET SUGAR FACTORIES

**Their Beet Cutting Capacity, Names of Corporation and Operating Officials**

**Alphabetically Arranged by States and According to Factory Location**

**CALIFORNIA—**

**Alameda Sugar Co., ALVARADO:** C. H. Crocker, Pt., San Francisco; P. C. Drescher, V.-P., Sacramento; E. R. Lilienthal, V.-P., San Francisco; G. E. Springer, S. & T., San Francisco; F. R. Haas, Purch. Agt., 351 California St., San Francisco; Ray S. Stewart, Supt. Capacity, 800 tons daily. Non-Steffens.

**Anaheim Sugar Co., ANAHEIM:** A. R. Peck, Pres.; L. H. Multer, Secy.; J. A. Purduyn, Purch. Agt., Sixth and Spring Sts., Los Angeles; D. Jesurun, Supt.; A. C. Berry, Asst. Supt.; B. Lawrence, Chief Chem.; Edward Stark, Agr. Capacity, 1200 tons daily. Non-Steffens.

**Union Sugar Co., BETTERAVIA:** P. C. Drescher, Pres., Sacramento; E. R. Lilienthal, V.-P., San Francisco; C. H. Crocker, V.-P., San Francisco; G. E. Springer, S. & T., San Francisco; F. R. Haas, Purch. Agt., 351 California St., San Francisco; F. H. Johnson, Mgr.; J. R. Rogers, Supt.; T. McFarland, M. M.; W. Montgomery, Chief Chem.; J. L. Harris, Agr.; A. J. Hebert, Chief Engr.; J. T. Avington, Office Supt. Capacity, 1200 tons daily. Equipped with Steffens.

**American Beet Sugar Co., CHINO:** H. R. Duval, Pres., N. Y. City; Robert Oxnard, V.-P., San Francisco; H. T. Oxnard, V.-P., N. Y. City; E. C. Howe, V.-P. and Genl. Mgr., Sugar Bldg., Denver; C. C. Duprat, S. and T., 32 Nassau St., N. Y. City; C. R. Hays, Purch. Agt., Sugar Bldg., Denver; J. D. Barry, Local Mgr. (See Oxnard, Cal.). Capacity, 1100 tons. Non-Steffens. Also see Colorado and Nebraska.

**Santa Ana Sugar Co., DYER STATION:** J. Irvine, Pres.; S. W. Sinsheimer, Genl. Mgr.; E. M. Smiley, Mgr.; F. L. Klentz, Supt. (controlled by Holly Sugar Corp.). Capacity, 1200 tons. Steffens.

**Holly Sugar Corporation, HUNTINGTON BEACH:** Ex. Offices, Boston Bldg., Denver, Colo.; A. E. Carleton, Pres.; S. W. Sinsheimer, V.-P. and Genl. Mgr.; Remsen McGinnis, Secy.; J. Doheney, Sales Mgr.; M. J. Beausang, Purch. Agt., Boston Bldg., Denver, Colo.; C. A. Johnson, Mgr.; G. J. Daley, Genl. Supt.; C. A. Bullen, Genl. Engr.; G W. Miles, Supt.; R. J. Prescott, Local Purch. Agt. (also see Dyer Station and New Delhi, Cal.). Capacity, 1200 tons. Steffens. Also see Colorado.

**Sacramento Valley Sugar Co., HAMILTON CITY:** Wm. Lacy, Pres.; Edgar Baruch, V.-P. and Genl. Mgr., Los Angeles, Cal. (Not in operation during 1920, but raising hay, grain and livestock on extensive scale on own land.) A. M. Gelston, Local Mgr. Capacity, 700 tons. Non-Steffens.

**Los Alamitos Sugar Co., LOS ALAMITOS:** Senator W. A. Clark, Pres., Butte, Mont.; J. Ross Clark, V.-P.; H. C. Lee, V.-P., P. E. Bldg., Los Angeles; E. C. Hamilton, Mgr.; G. Strodholf, Sales Mgr.; K. V. Bennis, Supt.; Wm. C. Poe, Chief Engr.; Frank Norton, Asst. Supt.; Wm. Loranger, M. M.; W. B. Ladd, Chief Chem. Capacity, 900 tons. Steffens.

**Spreckels Sugar Co., MANTECA:** Executive Office, No. 2 Pine St., San Francisco; J. D. Spreckels, Pres.; A. B. Spreckels, V.-P. and T.; W. H. Hannam, Secy.; H. P. Howard, Sales Mgr.; K. I. Dazey, Purch. Agt.; F. E. Sullivan, Genl. Mgr.; J. F. Taddiken, Chief Engr., No. 2 Pine St., San Francisco; S. E. Miller, Local Mgr. (Same officials for Western Sugar Refinery, San Francisco, Cal.) (Also see Spreckels, Cal.) Capacity, 1200 tons. Non-Steffens.

**American Beet Sugar Co., OXNARD:** (For Corp. officials see Chino). Fred Noble, Mgr.; H. E. Zitkowski, Genl. Chem.; F. C. Zitkowski, Supt.; Joseph Sailer, Genl. Engr.; A. B. Westfield, M. M.; F. R. Bachler, Chief Chem.; C. H. Weaver, Cashier. Capacity, 3000 tons. Steffens.

**Southern California Sugar Co., NEW DELHI:** (Suburb of Santa Ana.) (Owned by Holly Sugar Corp.). J. Rose, Supt. (see Huntington Beach). Capacity, 600 tons. Non-Steffens.

**Spreckels Sugar Co., SPRECKELS:** C. L. Pioda, Res. Mgr.; E. M. Bergh, Supt.; W. B. Adams, M. M.; A. Boyd and J. Dios, Asst. Supts.; L. A. Kemper, Chief Chem.; Geo. Scott, Agr. Capacity, 4500 tons daily (world's largest). Steffens. (See Manteca, Cal.)

**Alameda Sugar Co., TRACY:** (For Corporation officials see Alvarado, Cal.). Ray S. Stewart, Supt. Capacity, 500 tons. Non-Steffens.

## COLORADO—

**Great Western Sugar Co., Exec. Offices, Sugar Building, DENVER:** C. S. Morey, Chm. Board of Dir.; W. L. Petrikin, Pres.; W. D. Lippitt, V.-P. and Genl. Mgr.; C. W. Luff, Secy.; H. J. Miller, Purch. Agt.; W. L. Baker, Sales Mgr.; R. M. Booraen, Consultor; Edwin Morrison, Genl. Supt.; M. D. Thatcher, Treas. (Pueblo); N. R. McCreery, Dist. Mgr.; Geo. M. Shaffer, Asst. Genl. Supt.; W. A. Mitchell, Asst. Chief Engr.; S. J. Osborn, Genl. Chem.; H. Mendelson, Chief Agri. Factories in Colorado, Montana and Nebraska, which see following:

**Great Western Sugar Co., BRIGHTON:** C. L. Castleton, Jr., Mgr.; H. A. Harbeck, Supt.; H. A. Johnstone, M. M.; F. W. Cowell, Trav. Engr.; J. F. Hume, Cashier; C. E. Houston, Agr.; W. C. Henry, Chief Chem.; C. S. Scott, Trav. Chem. Capacity, 1000 tons.

**Great Western Sugar Co., BRUSH:** H. C. Giese, Mgr.; O. M. Cummer, Supt.; J. B. Lackner, M. M.; R. M. Parsons, Trav. Engr.; C. M. Good, Cashier; H. C. Giese, Agri.; L E. Jeffery, M. M.; P. Koller, Trav. Engr. Capacity, 1100 tons.

**Holly Sugar Corp., DELTA:** S. W. Sinsheimer, Genl. Mgr.; E. M. Drummond, Genl. Supt.; Irvg. Sinsheimer, Supt. (Exec. office, Denver, see Huntington Beach. Cal.).

**Great Western Sugar Co., FT. COLLINS:** D. J. Roach, Mgr.; F. Klingenberg, Supt.; E. A. Franklin, M. M.; J. F. Rasmussen, Trav. Engr.; Byron Albert, Cashier; H. H. Griffin, Agri.; E. J. Matteson, Chief Chem.; J. A. Bair, Trav. Chem. Capacity, 2150 tons.

**Industrial Sugar Co., FT. LUPTON:** Chas. Bliss, Pres.; Doctor R. E. Jones, S. and T.; E. F. Ogborn, Genl. Mgr.; R. F. Walker, Genl. Auditor (Exec. offices, Barclay Block, Denver); H. J. Klinge, Supt. Capacity, 600 tons.

**Great Western Sugar Co., GREELEY:** W. S. Garnsey, Jr., Mgr.; C. H. Criswell, Supt.; H. Howard, M. M.; I. E. Gilbert, Cashier; H. Timothy, Agri.; A. H. Edwards, Chief Chem. Capacity, 1050 tons.

**Holly Sugar Corp., GRAND JUNCTION:** (See Huntington Beach, Cal.). F. G. Holmes, Mgr.; E. M. Drummond, Genl. Supt.; R. M. White, Supt.; C. M. Phelps and T. E. Gardiner, Asst. Supts.; S. Gourley, M. M.; H. S. Saxton, Chief Chem. Capacity, 700 tons.

**American Beet Sugar Co., LAS ANIMAS:** (See Chino, Cal.). Frank Noble, Mgr.; W. F. Caton, Supt.; Harvey Morris, M. M.; E. B. Cowan, Chief Chem.; R. G. Dobbins, Asst. Cashier. Capacity, 1000 tons.

**Great Western Sugar Co., LONGMONT:** F. A. Wilson, Mgr.; F. S. Treadway, Supt.; E. Vosburgh, M. M.; J. F. Rasmussen, Trav. Engr.; J. B. Hitt, Cashier; R. M. Barr, Agri.; E. K. Huleatt, Chief Chem. Capacity, 2350 tons.

**Great Western Sugar Co., LOVELAND:** H. Scilley, Mgr.; Sam Mooney, Supt.; E. J. Nugent, M. M.; F. W. Cowell, Trav. Engr.; C. L. Atkins, Cashier; H. Scilley, Agri.; V. V. Hartman, Chief Chem Capacity, 1950 tons.

**American Beet Sugar Co., LAMAR:** Frank Noble, Mgr. Capacity, 500 tons. (Did not operate in 1920.)

**American Beet Sugar Co., ROCKY FORD:** Frank Noble, Mgr.; E. H. Gerecke, Asst. Mgr.; W. J. Kellogg and C. A. Allen, Supts.; W. A. Park, Chief Engr.; S. J. Kelso, M. M.; I. W. Reed, Chem. Capacity, 1800 tons.

**Great Western Sugar Co., STERLING:** C. E. Evans, Mgr.; R. C. Welsh, Supt.; George Walters, M. M.; R. M. Parsons, Trav. Engr.; J. C. Rece, Cashier; C. E. Evans, Agri.; G. W. Atkinson, Jr., Chief Chem.; P. Koller, Trav. Chem. Capacity, 1050 tons.

**National Sugar Manufacturing Co., SUGAR CITY:** F. K. Carey, Pres.; F. J. Carey, V.-P.; E. L. Burke, Secy., Baltimore, Md.; John H. Abel, Genl. Mgr. and Purch. Agt., Sugar City; H. B. Coggeshall, Supt. Capacity, 500 tons.

**Holly Sugar Corp., SWINK:** E. W. Stevenson, Mgr.; E. M. Drummond, Genl. Supt. Capacity, 1200 tons.

**Great Western Sugar Co., WINDSOR:** J. R. Clark, Mgr.; William Barber, Supt.; E. B. Taylor, M. M.; J. E. Rork, Cashier; E. C. Walter, Agri.; C. B. Millen, Chief Chem. Capacity, 1150 tons.

**Great Valleys Sugar Corp., DENVER:** S. R. Fitzgerald, Pres.; A. F. Lyster, Chief Engr.; F. F. Gazelle, Genl. Supt. Will erect plants at Ault and Lafayette, Colo.

## IDAHO—

**Utah Idaho Sugar Co., Executive Offices, SALT LAKE CITY:** Heber J. Grant, Pres.; Thos. R. Cutler, V.-P.; W. A. Wattis, Managing Dir.; Merrill Nibley, V.-P. and Asst. G. M.; W. T. Pyper, Secty.-Treas.; W. Bert Robinson, Asst. Secty.-Treas.; T. Geo. Wood, Pur Agt.; B. R. Smoot, Gen. Supt.; J. H. Gardner, Consulting Supt.; M. W. Ingall, Consulting Engr.; W. Y. Cannon, Chief Engr.; H. B. Whitney, Mgr. Indust. Relations Dept.; E. G. Titus, Dir. Agri. Research; Frank Ingalls, Trav. Chem.; S. H. Love, Sales Mgr.

**Utah Idaho Sugar Co., BLACKFOOT:** B. R. Smoot, Gen. Supt.; C. B. Rackstraw, M. M.; H. Greenwood, Chief Chem. Capacity, 800 tons.

**Utah Idaho Sugar Co., IDAHO FALLS:** H. A. Major, Supt.; E. J. Whitson, M. M.; L. E. Pearson, Trav. Chem. Capacity, 900 tons.

**Utah Idaho Sugar Co., SHELLEY:** J. M. Gaddie, Supt.; J. R. Peterson, M. M.; L. E. Pearson, Trav. Chem. Capacity, 750 tons.

**Utah Idaho Sugar Co., SUGAR CITY:** D. Scalley, Supt.; J. R. Peterson, M. M.; J. C. Keane, Chf. Chem. Capacity, 900 tons.

**Amalgamated Sugar Co., Executive Offices, OGDEN, Utah:** A. H. Lund, Pres.; D. E. Eccles, V.-P.; J. Quinney, Jr., Secty.; Fred G. Taylor, Gen. Mgr.; H. A. Benning, Asst. Gen. Mgr.; N. A. Lockwood, Consulting Engr.; F. H. Ballou, Chief Engr.; Chas. Giddings, Purch. Agt.

**Amalgamated Sugar Co., BURLEY:** B. O. McCullock, Supt.; Geo. Hunt, M. M. Capacity, 700 tons.

**Amalgamated Sugar Co., PAUL:** H. W. Taylor, Supt.; A. Drussell, M. M. Capacity, 600 tons.

**Amalgamated Sugar Co., TWIN FALLS:** A. Thomas, Supt.; I. Fairbanks, M. M. Capacity, 800 tons.

**Beet Growers Sugar Co., RIGBY:** J. H. Hawley, Pres.; A. G. Goodwin, V.-P.; Geo. E. Hill, Secty-Treas.; A. W. Gabbey, Asst. Secty-Treas.; J. F. Featherstone, Gen Mgr.; E. C. Caneck, Supt.; T. S. Kanen, Chief Agric. Capacity, 800 tons.

**Idaho Co-Op. Beet Sugar Co., TWIN FALLS:** Contemplate erection of factories at Filer and Hansen, Idaho.

**Preston Sugar Co., WHITNEY:** E. A. Nickerson, Pres. In course of construction. (Removed from Corcoran, Calif.)

## ILLINOIS—

**Chas. Pope, RIVERDALE:** E. R. Hatch, Secty.; Chas. Pope, Mgr. Office, 208 North Wabash Ave., Chicago, Ill. Capacity, 500 tons.

## IOWA—

**Iowa Valley Sugar Co., BELMOND:** W. C. Tyrell, Pres.; C. T. Fenton, V.-P. and G. M.; A. L. Luick, Secty.-Treas.; L. L. Putnam, Asst. Gen. Mgr.; W. H. Adams, Supt.; R. E. Stevenson, Chief Engr. Capacity, 600 tons.

**Northern Sugar Corporation, MASON CITY:** H. A. Douglas, Pres.; S. W. Ladd, V.-P.; S. A. Hill, Secty. Metropolitan Bank Bldg., Minneapolis, Minn. At Mason City: W. H. Baird, Gen. Mgr.; W. E. Groom, Asst. Secty.-Treas.; E. C. Moore, Chief Agric.; A. R. Finley, Supt. Capacity, 1200 tons.

**Iowa Sugar Co., WAVERLY:** C. G. Edgar, Pres.; Detroit; A. W. Beebe, Mgr.; J. M. Booth, Supt.; J. B. Smith, Agric.; E. F. Cramer, Asst. Capacity, 600 tons.

## INDIANA—

**Holland St. Louis Sugar Co., DECATUR:** See Holland, Mich., for Corporation Officials. B. F. Arendt, Gen Supt.;

J. H. Cormody, Mgr.; F. R. Gordon, Asst. Supt.; James Westveld, Chief Chem.; Walter Beane, M. M. Capacity, 800 tons.

**KANSAS—**

**Garden City Sugar & Land Co., GARDEN CITY:** A. E. Carleton, Pres.; J. Stewart, V.-P.; F. A. Gillespie, Secty-Treas.; E. Stoeckley, Gen. Supt. and Purch. Agt.; J. Ortman, M. M.; H. Edminston, Chief Chem. Capacity, 1000 tons.

**MICHIGAN—**

**Michigan Sugar Co., Executive Offices, Union Trust Bldg., DETROIT:** Chas. B. Warren, Pres.; Geo. B. Morely, V.-P.; F. R. Hathaway, Secty-Treas. At Saginaw, Mich.: W. H. Wallace, Gen. Mgr.; J. Dooley, Gen. Supt.; C. W. Orton, Purch. Agt.

**Michigan Sugar Co., ALMA:** Jotham Allen, Mgr.; Guy V. Lockwood, Supt.; E. E. Brown, Asst. Supt.; Wm. Dast, Chief Engr.; H. C. Hines, Chief Chem. Capacity, 1400 tons.

**Michigan Sugar Co., BAY CITY:** Eugene Fifield, Mgr. Capacity, 1400 tons.

**Michigan Sugar Co., CARO:** L. R. Stewart, Mgr. Capacity, 1200 tons.

**Michigan Sugar Co., CARROLLTON:** F. D. Ewen, Mgr. Capacity, 900 tons.

**Michigan Sugar Co., CROSSWELL:** Fred Harvey, Mgr. Capacity, 750 tons.

**Michigan Sugar Co., SEBEWAING:** W. M. Smith, Mgr. Capacity, 850 tons.

**Columbia Sugar Co., Executive Offices, BAY CITY:** John C. Ross, Pres.; N. R. Wentworth, V.-P.; E. W. Cressey, Secty.; Henry A. Vallez, Gen. Supt.

**Columbia Sugar Co., BAY CITY:** T. C. Carpenter, Supt.; Wm. Large, M. M.; A. J. Laporte, Chief Chem.; L. B. Tompkins, Chief Agric. Capacity, 1500 tons.

**Columbia Sugar Co., MT. PLEASANT:** O. J. McEwan, Mgr.; E. T. Oberg, Supt. Capacity, 1000 tons. (Also see Paulding, Ohio.)

**Continental Sugar Co., BLISSFIELD:** See Ohio for Corporation Officials. J. S. Eckart, Supt.; H. A. Tuttle, E. G. Kienbaum, Victor Beebe, Asst. Supts.; Noble Zinser, Chief Engr.; F. C. Mitchell, Chief Chem. Capacity, 1000 tons.

**Holland St. Louis Sugar Co., General Offices, HOLLAND:** G. J. Diekema, Pres.; C. T. Wright, V.-P.; C. M. McLean, Secty.-Treas.; C. M. McLean, Gen. Mgr.; S. R. McLean, Local Mgr.; C. J. McLean, Supt.; Frank Price, Asst. Supt.; J. S. Van Joren, Chief Chem.; Wm. Burt, M. M. Capacity, 500 tons.

**Owosso Sugar Go., General Offices, OWOSSO:** Chas. W. Brown, Pres. Pittsburgh; E. Pitcairn, V.-P., Pittsburgh; Daniel E. Crane, Secty-Treas.; Chas. D. Bell, Gen. Mgr.; F. E. McConnell, Purch. Agt.

**Owosso Sugar Co., LANSING:** Geo. L. Walt, Mgr.; S. Oberg, Supt.; A. Gillis, Chief Engr.; H. Schreiber, Chief Chem. Capacity, 800 tons.

**Owosso Sugar Co., OWOSSO:** Wm. H. Demuth, Supt. Capacity, 1300 tons.

**Independent Sugar Co., MARINE CITY:** Thos. L. Handy, Pres.; C. W. Handy, V.-P.; Geo. W. Handy, Treas.; F. S. Handy, Secty.; Ira H. McKinney, Mgr.; D. L. Smith, Supt.; J. Goulette, M. M.; J. E. Kemp, Agric.; Theo. Koenig, Cashier. Capacity, 600 tons.

**Menominee River Sugar Co., MENOMINEE:** J. W. Wells, Pres.; John Henes, V.-P.; Frank L. Brown, Secty.; G. W. McCormick, Gen. Mgr.; A. Ludwig, Supt.; C. F. Lamb, M. M. Capacity, 1200 tons.

**Mt. Clemens Sugar Co., MT. CLEMENS:** J. Davidson, Pres.; J. E. Davidson, Secty.-Treas., Bay City; W. M. Streit, Mgr.; O. F. Kaiser, Supt. Capacity, 600 tons.

**West Bay City Sugar Co., WEST BAY CITY:** M. J. Bialy, Pres. and Treas.; A. D. Bialy, Secty.; F. P. S. Kelton, Supt. Capacity, 900 tons.

### MINNESOTA—

**Minnesota Sugar Co., CHASKA:** H. A. Douglas, Pres.; Geo. A. DuToit, V.-P. and Treas., Metropolitan Bank Bldg., Minneapolis, Minn. Fred C. Hicks, Secty.; Louis E. Flink, Mgr.; R. L. Bowman, Supt. Capacity, 800 tons.

### MONTANA—

**Great Western Sugar Co., BILLINGS:** W. H. Hogarty, Mgr.; H. S. Barringer, Supt.; H. Scherer, M. M.; B. W. Morrison, Chief Engr.; E. L. Gutberlet, Chief Chem.; J. T. Davis, Trav. Chem.; C. F. Ridley, Cashier; John Meyer, Agric. Capacity, 2000 tons.

### NEBRASKA—

**Great Western Sugar Co., District Office, SCOTTSBLUFF:** E. Simmons, Asst. Gen. Mgr.; H. W. Hooper, Asst. Gen. Supt.; N. C. Chatfield, Asst. Chief Engr.; A. M. Gregg, Trav. Engr.; C. C. Crawford, Trav. Chem.; A. H. Heldt, Chief. Agri.

**Great Western Sugar Co., BAYARD:** C. B. Turner, Mgr.; R. J. Bristol, Supt.; D. L. Kussy, M. M.; J. H.

Zisch, Chief Chem.; H. V. Towner, Cashier. Capacity, 1000 tons.

**American Beet Sugar Co., GRAND ISLAND:** (See Chino, Calif., for Corporation Officials.) A. J. Denman, Mgr.; F. L. Mehring, Supt.; A. T. Wilson, Chief Chem.; R. R. Mehring, M. M. Capacity, 500 tons.

**Great Western Sugar Co., GERING:** A. M. Ginn, Mgr.; V. I. Daniels, Supt.; R. P. Gookins, Chief Chem.; W. T. Warren, M. M.; R. McDonald, Cashier. Capacity, 1100 tons.

**Great Western Sugar Co., MITCHELL:** C. S. Campbell, Mgr.; E. E. Durnin, Supt.; Floyd Powell, M. M.; M. K. Hollowell, Cashier; R. I. Babbitt, Chief Chem. Capacity, 1000 tons.

**Great Western Sugar Co., SCOTTSBLUFF:** A. M. Ginn, Mgr.; Henry Schmode, Supt.; Stephen Morrison, M. M.; Geo. Goldfain, Chief Chem.; E. H. Clay, Cashier. Capacity, 2000 tons.

**NEVADA—**

**Lahontan Valley Sugar Co., FALLON:** B. C. Hubbard, Pres., St. Louis, Mich.; Albert W. Black, V.-P., Bay City, Mich.; Chas. Cave, Treas., Indianapolis; Wm. Kremers, Mgr.; Fred Hinze, Supt. (This factory has been idle for a number of years, but will probably operate with increased capacity, either the season of 1921 or 1922.) Present capacity, 500 tons.

**OHIO—**

**Continental Sugar Co., Executive Offices, TOLEDO:** C. S. Edgar, Pres. and Gen. Mgr.; E. H. Cady, V.-P.; F. T. Sholes, Secty.; J. F. Thompson, Purch. Agt.; W. H. Neidig, Chief Engr.; E. Durkee, Chief Chem. (Factories at Findlay and Fremont, Ohio and Blissfield, Mich.)

**Continental Sugar Co., FINDLAY:** W. E. Weller, Supt.; A. B. Krentel, Chief Chem. Capacity, 900 tons.

**Continental Sugar Co., FREMONT:** E. McClenathan, Supt.; B. A. Klapka, Chief Chem. Capacity, 600 tons.

**Columbia Sugar Co., PAULDING:** (See Bay City, Mich., for Corporation Officials.) J. A. Scott, Mgr.; H. C. Pety, Supt.; E. Girard, M. M.; W. M. Krause, Chief Chem. Capacity, 900 tons.

**Ohio Sugar Co., OTTAWA:** F. H. Hubbard, Secty. and Mgr.; S. O. Kerr, Chief Agri.; E. F. Wolfe, Supt.; Roy Stahl, M. M.; W. A. Deeds, Chief Chem.; S. I. Nepp, J. O. Knutson and D. A. Hebert, Assts. to Supt. Capacity, 600 tons.

**Toledo Sugar Co., TOLEDO:** (Controlled by Michigan Sugar Co.) F. L. Carroll, Mgr.; M. J. Kirk, Supt.; J. Kelton, Chief Engr. Capacity, 1500 tons.

UTAH—

**Utah Idaho Sugar Co., BRIGHAM CITY:** (See Idaho for Corporation Officials.) A. C. Pearson, Supt.; Thomas W. Lee, M. M.; J. T. Roberts, Chief Chem. Capacity, 750 tons.

**Amalgamated Sugar Co., CORNISH:** (See Idaho for Corporation Officials.) S. Christensen, Dist. Mgr.; C. E. Hogge, Supt.; R. B. Lewis, M. M.; J. P. French, Office Supt.; H. E. Hatch, Agri. Supt.; P. Barrett, Chief Chem. Capacity, 600 tons.

**Utah Idaho Sugar Co., DELTA:** Wm. Varley, Supt.; J. Gardiner, M. M.; E. A. Miller, Chief Chem. Capacity, 1000 tons.

**Utah Idaho Sugar Co., ELSINORE:** C. R. Wing, Supt.; J. R. Middleton, M. M.; R. O. Daniels, Chief Chem. Capacity, 750 tons.

**Utah Idaho Sugar Co., GARLAND:** F. W. Hilliard, Supt.; H. C. Hart, M. M.; L. B. Morely, Chief Chem. Capacity, 900 tons.

**Gunnison Valley Sugar Co., GUNNISON:** (Executive Offices at 532 Clift Bldg., Salt Lake City.) W. Harvey Ross, Pres.; Wm. Wrigley, Jr., Chairman of Board; O. H. Egge, Direc. and Conslt. Engr; L. Holman, Secty.; G. G. Light, Supt.; Frank Clegg, Asst. Supt.; Wm. Conner, M. M.; Walter E. Smith, Chief Chem.; J. O. Anderson, Agri. Capacity, 600 tons.

**Pioneer Sugar Co., HOOPER:** B. Y. Benson, Pres., Logan, Utah; C. G. Patterson, Secty.; C. D. Adams, Supt. Capacity, 400 tons.

**Layton Sugar Co., LAYTON:** E. P. Ellison, Pres.; D. O. McKay, V.-P.; R. E. Allen, Secty.-Treas.; James E. Ellison, Mgr.; T. Sass, Supt. Capacity, 600 tons.

**Amalgamated Sugar Co., LEWISTON:** S. Christensen, Dist. Mgr.; I. J. Clark, Factory Supt.; E. N. Rogers, M. M.; H. G. Spencer, Chem.; H. Ezra Hatch, Agri. Supt. Capacity, 800 tons.

**Amalgamated Sugar Co., LOGAN:** F. W. Hunter, Supt.; Wm. Laughlin, M. M. Capacity, 700 tons.

**Utah Idaho Sugar Co., LEHI:** David Hodge, Supt.; L. Taylor, Asst. Supt.; J. Triniman, M. M.; J. P. Bush, Chief Chem. Capacity, 1200 tons.

**Peoples Sugar Co., MORONI:** G. E. Browning, Pres.; N. G. Stringham, V.-P. and Gen. Mgr.; J. Grant Stringham, Secty.-Treas.; N. P. Sorensen, Supt.; G. E. Kirkham, Asst. Supt.; John Hardy, Foreman; F. Beckstrom, Foreman; K. M. Draper, M. M.; M. H. Jamison, Chief Elec.; F. D. Yearance, Chief Chem. Capacity, 400 tons.

**Amalgamated Sugar Co., OGDEN:** E. Sebelov, Dist. Mgr.; C. E. Hogge, Supt.; J. F. Yearsley, M. M. Capacity, 1000 tons.

**Utah Idaho Sugar Co., PAYSON:** E. Brown, Supt.; E. C. Petrie, Chief Chem.; C. E. Drake, M. M. Capacity, 750 tons.

**Springville-Mapleton Sugar Co., PROVO:** Jesse Knight, Pres.; W. Mangun, V.-P.; C. R. Jones, Mgr. Capacity, 350 tons.

**Amalgamated Sugar Co., SMITHFIELD:** Wm. Baer, Supt.; Amos Brown, M. M. Capacity, 700 tons.

**Utah Idaho Sugar Co., SPANISH FORK:** T. E. Edwards, Supt.; C. N. Jacobson, M. M.; E. T. Cluff, Chief Chem. Capacity, 1000 tons.

**Utah Idaho Sugar Co., WEST JORDAN:** Y. Foote, Supt.; E. A. Miller, Chief Chem.; H. K. Bytheway, M. M. Capacity, 750 tons.

**WASHINGTON—**

**Utah Idaho Sugar Co., NORTH YAKIMA:** (Not in operation during 1920.) Capacity, 750 tons.

**Utah Idaho Sugar Co., SUNNYSIDE:** C. V. Halliday, Supt. Capacity, 750 tons.

**Utah Idaho Sugar Co., TOPPENISH:** R. L. Howard, Supt.; J. D. Allmondinger, M. M.; E. H. Young, Chief Chem. Capacity, 750 tons.

**WYOMING—**

**Great Western Sugar Co., LOVELL:** Chas. F. Johnson, Mgr.; H. Sandman, Supt.; H. Fletter, M. M.; J. W. Kendall, Chief Chem.; C. F. Johnson, Agri.; A. A. Tinn, Cashier. Capacity, 600 tons.

**Sheridan Sugar Co., SHERIDAN:** (Controlled by Holly Sugar Co.) S. W. Sinsheimer, V.-P.; and G. M.; J. D. McIntyre, Supt.; O. V. Mumaugh, M. M. Capacity, 900 tons.

**Wyoming Sugar Co., WORLAND:** J. M. Eccles, Pres. and Gen. Mgr.; C. E. Kaiser, V.-P.; M. Browning, Treas.; A. C. Lighthall, Secty.; Frank Kaspar, Supt. (Executive offices, Eccles Bldg., Ogden, Utah.) Capacity, 600 tons.

**WISCONSIN—**

**Chippewa Sugar Refining Co., CHIPPEWA FALLS:** M. Hottolet, Pres.; A. P. Mann, V.-P.; J. S. Lawson, Secty.-Gen. Mgr., 428 Grand Ave., Milwaukee, Wis.; J. A. Brooks, Mgr.; R. E. Pospisil, Supt. Capacity, 600 tons.

**Green Bay Sugar Co., GREEN BAY:** J. H. Taylor, Pres.; A. J. Tippler, V.-P.; J. Kittel, Secty.; W. B. Rosevear, Gen. Mgr.; C. H. Hine, Factory Mgr. Capacity, 600 tons.

**Rock County Sugar Co., JANESVILLE:** James Davidson, Pres.; J. E. Davidson, Secty.-Treas., Bay City, Mich.; W. B. Davis, Gen. Mgr.; A. W. Robbell, Supt. Capacity, 700 tons.

**U. S. Sugar Co., MADISON:** J. S. Lawson, Pres.; J. G. Kremers, V.-P.; J. A. Schulte, Secty., 428 Grand Ave., Milwaukee, Wis.; A. E. Johnson, Factory Mgr. Capacity, 600 tons.

**Wisconsin Sugar Co., MENOMINEE FALLS:** J. K. Farley, Sr., Pres., Chicago, Ill.; Dean Farley, V.-P. and Gen. Mgr.; E. O. Eckland, Secty. and Gen Supt. Capacity, 600 tons.

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For a complete list of Louisiana sugar factories including names of officials and data covering amount of cane ground and sugar made, etc., the reader is referred to the "Year Book of the Louisiana Planters' Association," 407 Carondelet St., New Orleans, La.

For a complete list of the sugar factories of the world, the reader is referred to the "Sugar Annual," published by the "Journal des Fabricants de Sucre," 3, Rue de Richelieu, Paris, France.

# SUGAR REFINERIES OF THE UNITED STATES

**American Sugar Refining Co.**—Earl D. Babst, Pres.; S. Stubbs, V.-P.; A. B. Wollam, Treas.; E. T. Gibson, Secty.; H. A. Niese, Consultg Refiner; Howard Dalton Consultg. Engr.; E. C. Grether, Eqpt. Engr., 117 Wall St., New York. Refineries at Boston. Capacity, 2,000,000 lbs. daily; (2, "Reserve" 3,000,000 lbs., and "Spreckels," 2,-000,000 lbs); Jersey City, 2,000,000 lbs., Brooklyn, 4,500-000 lbs., Chalmette, La., 3,000,000 lbs. and Baltimore, which is under Const.

**Arbuckle Bros.**—W. A. Jamison, Managing Dir., 71 Water St., New York City. Refinery at Brooklyn, New York, John W. Scott, Gen. Supt. Capacity, 2¼ million lbs. daily.

**California Hawaiian Sugar Refining Co.**—W. M. Alexander, Pres.; P. Welch, V.-P.; W. H. McBryde, Secty.; Geo. M. Rolph, Gen. Mgr.; D. B. Gray, Pur Agt., 230 California St., San Francisco, Calif. Refinery at Crockett, Calif. A. M. Duperu, Mgr.; Paul Caster, Asst Mgr.; Martin Tost, Supt.; Uno Hartman, Consultant; L. L. Edmunds, Chief Engr.; H. C. Welle, Chief Chem. Capacity, 4½ million lbs. daily.

**Colonial Sugars Co.**—John Farr, Pres.; James H. Post, Treas.; T. A. Howell, V.-P.; W. J. Vreeland, Secty., 129 Front St., New York City. Refinery at Grammercy, La.; Chas. N. Wogan, Gen. Mgr.; D. G. Jackson, Gen. Supt.; T. R. Wilson, Pur. Agt. Capacity, 1½ million lbs. daily.

**Federal Sugar Refining Co.**—C. H. Spreckels, Pres.; L. L. Clarke, V.-P.; A. H. Platt, Secty.; P. J. Smith, Treas.; P. L. Wooster, Purch. Agt., 91 Wall St., New York City. Refinery at Yonkers, New York. Louis Spreckels, Mgr.; Walter Spreckels, Asst. Mgr.; Chas. Graham, Chief Engr. Capacity, 4¼ million lbs. daily.

**Godchaux Sugars, Inc.**—Chas. Godchaux, Pres.; Ed. Godchaux, V.-P.; Jules Godchaux, V.-P.; Paul L. Godchaux, Treas.; Emile Godchaux, Secty., 221 Godchaux Bldg., New Orleans, La. Refineries at Reserve and Napoleonville, La. Capacity, 800,000 lbs. daily.

**Henderson Sugar Refining Co.**—Wm. Henderson, Mgr. Dir.; Adam Gambel, Mgr.; B. E. Michel, Sales Mgr., 749 South Peters St., New Orleans. Refinery at New Orleans, C. J. Gambel, Supt.; R. Caster, Chief Engr. Capacity, 600,000 lbs. daily.

**Imperial Sugar Co.**—I. H. Kempner, Pres.; G. D. Ulrich, V.-P. and Gen. Mgr.; J. Vickerman, Secty.; E. O. Gunther, Treas., Sugarlands, Texas. Refinery at Sugarlands, Texas. B. H. Varnau, Supt.; R. L. Lavender, Chief Engr. Capacity, 800,000 lbs. daily.

**McCahan Sugar Refining Co.**—Manuel Rionda, Pres.; B. B. Rionda, V.-P.; H. B. Young, Secty.; W. J. Craig, Treas., 101 South Front St., Philadelphia. Refinery at Philadelphia, Pa. Thomas Kavanaugh, Gen. Mgr. 1¼ million lbs. daily.

**National Sugar Refining Co.**—James H. Post, Pres.; Thomas A. Howell, V.-P.; G. A. Bunker, Secty.; H. F. Mollenhauer, Treas. Refinery at Long Island City, New York. J. Henry Leinau, Supt, Yonkers, New York; Warren H. Kipp, Supt. Capacity, 3,000,000 lbs. daily for Long Island City. Capacity, 2,000,000 lbs. daily for Yonkers.

**Pennsylvania Sugar Co.**—G. H. Earl, Jr., Pres.; S. F. Houston, V.-P.; J. A. McCarthy, Secty-Treas. Refinery at Philadelphia. V. H. Hoodless, Supt.; F. McGuire, Pur. Agt. Capacity, 2,000,000 lbs. daily.

**Revere Sugar Refining Co.**—A. W. Preston, Pres.; D. P. Thomas, V.-P.; F. J. Tilden, Secty.; J. W. Damon, Treas., 15 Broad St., Boston, Mass. Refinery at Charleston, Mass. H. E. Worcester, Supt.; E. Lowe, Asst. Supt.; C. W. Febbetts, Chief Engr. Capacity, 1,500,000 lbs. daily.

**Savannah Sugar Refining Co.**—B. A. Oxnard, Pres.; N. B. Lane, V.-P.; W. S. Pardonner, Secty-Treas. Refinery at Port Wentworth, Savannah, Ga. B. O. Sprague, Mgr.; Alex Ormond, Engr. Capacity, 1,500,000 lbs. daily.

**Warner Sugar Refining Co.**—C. M. Warner, Pres.; G. E. Warner, V.-P.; C. B. Warner, Treas.; A. L. D. Warner, Asst. Treas.; R. M. Bell, Secty.; J. R. Pels, Purch. Agt. Refinery at Edgewater, N. J. E. W. Gerbracht, Mgr.; Arthur Gerbracht, Supt.; A. Claus, Chief Engr. Capacity, 3,000,000 lbs. daily.

**Western Sugar Refinery**—John D. Spreckels, Pres.; A. D. Spreckels, V.-P.; W. D. K. Gibson, Secty.; W. H. Hannam, Mang. Direc.; F. E. Sullivan, Gen. Mgr.; K. I. Dazey, Purch. Agt., 2 Pine St., San Francisco. Refinery at San Francisco, Calif. C. J. Moroney, Mgr.; N. E. Dole, Supt.; J. F. Taddiken, Chief Engr. Capacity, 2,000,000 lbs. daily.

# HAWAIIAN SUGAR FACTORIES

| Manager's Name. | Name of the Factory. | Name of Island | Post Office Address. |
|---|---|---|---|
| J. M. Ross..... | Hakalau Plantation....... | HAWAII | Haklao |
| W. H. Campbell. | Hawaii Mill Co .... | .. | Hilo |
| J. A Scott | Hilo Sugar Co.......... | .. | Hilo |
| C. C. Kennendy. | Waiakea Mill Co.... ....... | .. | Hilo |
| K. S. Gjendrum. | Honokaa Sugar Co..... | .. | Honokaa |
| Wm. Pullar.. . | Honomu Sugar Co..... | .. | Honomu |
| E. E. Conant.... | Kona Development Co.. . | .. | Kelakekua |
| J. Atkins Wight.. | Halawa Plantation Co. .... | .. | Kohala |
| Jhon Hind .. | Hawaii Mill & Plant Co . | .. | Kohala |
| Geo C. Watt... | Kohala Sugar Co...... .. | .. | Kohala |
| Robt Hall ..... | Niuli Mill Plantation.. | .. | Kohala |
| R. H. Bryant.. | Puakea Plant Co........ ... | .. | Kohala |
| J. C. Searle ...... | Puako Plantation .. | .. | Kohala |
| H. H. Renton... | Union Mill Co.............. | .. | Kohala |
| E. Madden .... | Kukaiau Mill Co.. .. . ... | .. | Kukaiau |
| A. Horner | Kukaiau Plantation.. ... | .. | Kukaiau |
| A. Ahrens......... | Pacific Sugar Mill......... | .. | Kukuihaele |
| Carl Wolters ... | Hutchinson Sug. Plant, Co.. | .. | Naalehu |
| J. Watt........ | Olaa Sugar Co. Ltd........ | .. | Olaa |
| J. T. Moir....... | Onomea Sugar Co...... . | .. | Onomea |
| Geo McCubbin... | Kaiwiki Sugar Co ... .. | .. | Ookaa |
| A. Lidgate..... | Hamakua Mill Co .......... | .. | Paauilo |
| A. Smith......... | Paauhau Sug. Plant. Co | .. | Paauhau |
| W. G Ogg... .... | Hawaiian Agr. Co ...... | .. | Pahala |
| C. McLennan | Laupahoehoe Sugar Co..... | .. | Papala |
| Jas Wesbter.... | Pepeekeo Sugar Co......... | .. | Pepeke |
| W. Stordat..... | McBryde Sugar Co . . .... | KAUAI | Eleele |
| G. H. Fairchild . | Makee Sugar Co............ | .. | Kealia |
| J. Fasot ... | Waimea Sugar Mill Co..... | .. | Kekaha |
| J. R Meyers .... | Kilauea Sugar Plant. Co ... | .. | Kilauea |
| C. R. Wilcox .... | Koloa Sugar Co........... | .. | Koloa |
| Ed. Broadbent | Grove Farm Plantation .. | .. | Lihue |
| F. Weber... .... | Lihue Plantation Co.. ..... | .. | Lihue |
| G. R. Ewardt, jr. | Gay & Robinson........... | .. | Makaweli |
| B. D. Baldwin. | Hawaiian Sugar Co. .... | .. | Makaweli |
| H. P. Faye .... | Kekaha Sugar Co......... | .. | Waimea |
| Jhon Chalmers | Kaeleku Plant. Co., Ltd... | MAUI | Kaeleku |
| Ah Ping ........ | Kipahulu Sugar Co ... | .. | Kipahulu |
| Geo. Gibb. .. | Olowalu Co................ | .. | Lahina |
| L. Weinzheimer.. | Pioneer Mill Co.. Ltd....... | .. | Lahina |
| H. A. Baldwin.. | Main Agricultural Co...... | .. | Paia |
| F. F. Baldwin.. | Hawaiian Com. & Sugar Co. | .. | Puunene |
| H. P. Penhallan | Wailuku Sugar Co...... | .. | Wailuku |
| James Gibb.... | Honololu Plantation Co.... | OHAU | Aiea |
| G. F. Renton.. | Apokaa Sugar Co., Ltd .. | .. | Ewa |
| G. F. Renton.... | Ewa Plantation......... .. | .. | Ewa |
| J. J. Dowling... | Koolau Agricultural Co.... | .. | Hauula |
| Andrew Adame.. | Kohuku Plantation Co..... | .. | Kahuku |
| S. E. Wooley .. | Laie Plantation............ | .. | Laie |
| U. W. Goodale.. | Waialua Agricultural Co. . | .. | Waialua |
| Fred Meyre...... | Waianae Co......... .... | .. | Waianae |
| G. Chalmers. | Waimanalo Sugar Co...... | .. | Waimanalo |
| E. K. Bull ..... | Ohau Sugar Co........... | .. | Waipahu |

# LOUISIANA SUGAR FACTORIES

| NAME | P. O. ADDRESS |
|---|---|
| Barton, Mrs. E. H. | Barton |
| Belle Helene Co-Operative Sugar Co. | Belle Helene |
| Evan Belle Co., Inc. | Belle Alliance |
| Miles Planting & Mfg. Co. | McCall |
| Noel, R. E. | McCall |
| Barton, C. C. | Albemarle |
| Blanchard Planting Co. | Tallieu |
| Dugas & LeBlanc, Ltd. | Paincourtville |
| Glenwood Planting Co., Ltd. | Napoleonville |
| Godchaux Co., Ltd., The Leon | Napoleonville |
| Himalaya, Inc. | Tallieu |
| Kessler & Folse | Klotzville |
| Lula Company, Inc. | Belle Rose |
| Oakley Mfg. Co., Inc. | Avoca |
| Prejean, S. | Belle Alliance |
| Robichaux Co., The E. G. | Tallieu |
| Aleman Pltg. & Mfg. Co. | Belle Alliance |
| Elfert, Robert | Labadieville |
| Martin Sons, Inc., R. C. | Albemarle |
| Simoneaux, Aurelien | Plattenville |
| Jefferson Syrup Co. | Cottonport |
| Chatsworth Pltg. & Mfg. Co. | Burtville |
| Gianelloni, S. J. | Burtville |
| Catherine Pltg. & Mfg. Co., Ltd. | Lobdell |
| Devall Pltg. Co., Inc. | Chamberline |
| Hill, George | Port Allen |
| Kahao, M. J. | Kahns |
| Laws, Harry L. | Cinclare |
| Levert Pltg. Co., The Auguste | Mark |
| McWilliams Pltg. Co., The J. | Plaquemine |
| Milliken, Estate Mrs. D. A. | Chamberlin |
| Poplar Grove Mfg. & Ref. Co. | Port Allen |
| Westover Pltg. Co., Ltd. | Kahns |
| Glynn Planting Co., Ltd. | Glynn |
| Board of Control (State Penitentiary) | Jeanerette |
| Loisel Sugar Co., Ltd. | Jeanerette |
| New Iberia Sugar Co., Ltd. | Morbihan |
| Pharr & Sons, Ltd., J. N. | Olivier |
| Teche Syrup & Canning Co., Inc. | Jeanerette |
| Vida Sugar Company | Loreauville |
| Lewis, John B. | Jeanerette |
| Roger Co., Ltd., The Ernest | Thibodaux |
| Waverly Sugar Mfg. Co. | Thibodaux |
| Roth & Lagarde | Thibodaux |
| Deer Range Pltg. Co., Inc. | Myrtle Grove |
| Plaquemines Sugar Co., Inc. | Dalcour |
| Alma Plantation, Ltd. | Lakeland |
| Central Louisiana Sugar Factory, Inc. | Valverda |
| Ingleside Sugar Co., Inc. | Lakeland |
| McCrea Planting & Mfg. Co. | McCrea |
| Meeker Sugar Refining Co. | Meeker |
| Shirley Company, Inc. | Bunkie |
| Blouim Co., Ltd., The L. A. | Luling |
| Hymel, Stanislas | Luling |
| Landeche Co., Ltd. | Killona |
| Milliken, Estate Mrs. D. A. | Killona |
| Dubourg, J. B. (Lessee) | Welcome |
| Hymel Bros. P. & M. Co. | Central |
| Keller & Co., L. | Hester |
| Laurel Ridge P. & M. Co. | Lagan |
| Longview Sugar Co. | Remy |
| Miles Pltg. & Mfg. Co. | St. Patrick |
| Salsburg Refining Co., Ltd. | Lauderdale |
| St. Joseph P. & M. Co. | Feitel |
| Uncle Sam P. & M. Co. | Convent |
| Union P. & M. Co. | Union |
| Waguespack, Felicien | Mt. Airy |
| Waguespack & Haydel | St. Patrick |
| Waguespack P. & M. Co. | Oubre |
| Webre-Steib Co., Ltd. | St. Patrick |
| Roussel, Octave | St. Amelia |
| Caire & Graugnard | Edgard |
| Champagne, A. & J. E. | Edgard |
| Godchaux Co., Ltd., The Leon | Reserve |
| Graugnard & Reynaud | Lions |
| Golden Star P. & M. Co., Ltd. | St. Patrick |
| San Francisco P. & M. Co. | Lions |
| Songy Pltg. Co., Ltd. | Wallace |
| Burch, Mrs. E. | Lucy |
| Haas, W. D. | Barbeck |
| Crockett & Weil | Opelousas |
| Devilliers, Mentor | Opelousas |
| Barton, Jr., C. C. | Sunshine |
| Clover Ridge P. & M. Co. | Rosedale |
| Folse, L. N. | Whitecastle |
| Gay Planting Co., Inc., A. H. | Plaquemine |
| Gay P. & M. Co., The E. J. | Plaquemine |
| Greenfield P. & M. Co., Inc. | Plaquemine |
| Murrell P. & M. Co., The G. M. | Bayou Goula |
| Old Hickory P. & M. Co. | Hohen Solms |
| Soniat, L. M. | Dorcyville |
| Supples' Sons Pltg. Co., The J. | Bayou Goula |
| Slack Bros. | Rosedale |
| Spiller Sugar Co. | Bayou Goula |
| Strange, W. G. | Whitecastle |
| St. Gabriel Sugar Co., Inc. | St. Gabriel |
| Wilberts Myrtle Grove P. & M. Co. | Plaquemine |
| Adams & Sons, G. G. | Whitecastle |
| Anzelmo, Tony | Plaquemine |
| Desobry, L. H. | Plaquemine |
| Landry, Stephen | Sunshine |
| Richard, Oscar | Sunshine |
| Songy, Edouard | Plaquemine |
| Sitman, Geo. W. (Receiver) | Burtville |
| Jefferson P. & M. Co. | Waggaman |
| Billeaud Sugar Factory | Broussard |
| Lafayette Sugar Ref. Co. | Lafayette |
| Youngville Sugar Factory | Youngville |
| Beadle & Bros., Wm. | Broussard |
| Conque Bros. | Carencro |
| Lariviere, L. | Broussard |
| Barker & Lepine | Lafourche Cng. |
| Godchaux Co., Ltd., The Leon | Raceland |
| Gheens Realty Co. | Gheens |
| Lafourche Sugar Ref. Co. | Thibodaux |
| Lagarde Co., Ltd., The C. | Thibodaux |
| Laurel Grove Company | Thibodaux |
| Levert-Morvant Pltg. Co. | Thibodaux |
| Libby & Blouin, Ltd. | Lafourche Cng. |
| Lockport Central Sugar Ref. Co. | Lockport |
| Lower Lafourche P. & M. Co. | Lockport |
| Mathews, C. S. | Mathews |
| Price, Mrs. Andrew | Thibodaux |
| Mary & Tuma | Washington |
| Richard & Voltz | Rosa |
| Roy, Henry | Leonville |
| St. Cyr, J. T. | Opelousas |
| Singleton, Geo. L. | Arnaudville |
| Chauffe & Bros., R. | St. Martinville |
| Levert-St. John, Inc. | Levert |
| Smedes Bros., Inc. | Cade |
| Belleview Plantation Co. | Franklin |
| Berwick P. & M. Co., The O. D. | Foster |
| Burguieres Co., Ltd. The J. M. | Louisa |
| Centreville Company | Centreville |
| Columbia Sugar Company | Franklin |
| Clausen, Estate Jacob | Foster |
| Danos & Sons, L. | Patterson |
| Delgado, Succession of Isaac | Jeanerette |
| Forsyth, Jr., L. | Baldwin |
| Franklin Sugar Ref. Co. | Franklin |
| Home Place P. & M. Co. | Glencoe |
| Foster, J. W. | Franklin |
| Laws, Harry L. | Baldwin |
| Lyon Company | Berwick |
| Moreira, Schwan & Moreira | Centreville |
| Oak Bluff P. & M. Co. | Franklin |
| Oaklawn Sugar Co. | Franklin |
| Argyle-Crescent Co., Inc. | Houma |
| Ashland P. & M. Co., Ltd. | Houma |
| Barrow & Duplantis | Houma |
| Cocke, R. W. | Ellendale |
| Crescent-Magnolia P. & M. Co. | Minerva |
| Marmande, Ltd., Estate of B. | Theriot |
| McBride & Chauvin (Lessees) | Ellendale |
| McCollam, Edmond | Ellendale |
| McCollam & Cocke | Ellendale |
| Minor, Estate H. C. | Houma |
| Moore Pltg. Co., Ltd., The J. T. | Shriever |
| Shaffer, John D. | Ellendale |
| Terrebonne Sugar Co. | Montegut |
| Erath Sugar Co. | Erath |
| Rose Hill Co., Inc. | Abbeville |
| Vermillion Sugar Co. | Abbeville |
| Board of Control (State Penitentiary) | Angola |

Compiled By "Facts about Sugar"

## PHILIPPINE SUGAR FACTORIES

Compiled By "Facts About Sugar"

| COMPANY | MUNICIPALITY | PROVINCE | MANAGER |
|---|---|---|---|
| Bacolod-Murcia Milling Co. | Bacolod | Negros Occidental | Mr. Alunan ~~Emiliano Lizares~~ |
| Binalbagan Estate | Binalbagan | " | Carlos A. Ferrandez |
| Compañia Azucarera De Bais | Bais | Negros Oriental | Wm. M. McQuaid |
| Canlaon Central | La Castillana | Negros Occidental | José Gomez |
| Calamba Sugar Estate | Canlubang | Laguna | John Dumas |
| Carmen Central | Calatagan | Batangas | J. Z. Zabarte ~~J. M. Genato~~ |
| Capiz Central | Capiz | Negros Occidental | F. Sagastezola |
| Central Bearen | Kabankalan | Negros Occidental | Lizarraga Hermanos |
| Cia. Azucarera de la Carlota | La Carlota | Negros Occidental | C. T. Lewis |
| Lumangub ~~De la Rama~~ Central | Bago | Negros Occidental | R. de la Rama |
| Magdalena ~~[illegible]~~ Central | Hinigaran | Negros Occidental | S. Ortega |
| Dinalupthan Central | Dinalupthan | Bataan | |
| Hawaiian-Philippine Sugar Co. | Silay | Negros Occidental | A. M. McKeever |
| Isabela Sugar Co., Inc. | Isabela | Negros Occidental | Mr. Infante |
| Camancy Sugar Factory | Isabela | Negros Occidental | Salvador Serra ~~F. W. Cannaday~~ |
| Ma-ao Sugar Central Co., Inc. | Pulupandan | Negros Occidental | Hamilton McCubbin |
| Mindoro Sugar Co. | San José | Mindoro | R. E. Wright |
| Muntinlupa Sugar Factory | Muntinlupa | Rizal | Carlos Young |
| North Negros Sugar Factory | Manapla | Negros Occidental | F. E. Greenfield |
| Nueva Apolonia Sugar Factory | Vallehermoso | Negros Oriental | Jose de la Viña y Cruz |
| Pampanga Sugar Development Co. | San Fernando | Pampanga | Jose Escaler |
| Palma Central | Ilog | Negros Occidental | Salvador Serra |
| Pampanga Sugar Mills | Del Carmen | Pampanga | R. Renton Hind |
| Philippine Sugar Development | San Fernando | | Carlo Adriozola |
| Saint Louis Oriental Sugar Factory | Manaoag | Pangasinan | Thomas Rous, Prop. |
| San Antonio Central | La Carlota | Negros Occidental | Antonio Urquijo |
| San Carlos Milling Co. | San Carlos | Negros Occidental | J. N. Kruseman |
| San Isidro Central | Kabankalan | Negros Occidental | Juan Vidaurrazaga |
| Talisay-Silay Milling Co. | Talisay | Negros Occidental | Emilio Gaston |
| Talisay Central | Talisay | Negros Occidental | R. de la Rama |
| Victorias Milling Co | Victorias | | No. Negros Sugar Co |

## PORTO RICAN SUGAR FACTORIES

| NAME | LOCATION | OWNER |
|---|---|---|
| Aguirre | Salinas | Central Aguirre Co. |
| Alianza | Camuy | Central Alianza, Inc. |
| Ana Maria | Anasco | Ana Maria Sugar Co. |
| Bayaney | Arecibo | Central Bayaney, Inc. |
| Belvedere | Cabo Rojo | Sucesores de Bianchi |
| Bocachica | Juana Diaz | S. V. Hennay G. Cabrera |
| Cambalache | Arecibo | Central Cambalache Co. |
| Canovanas | Loiza | Loiza Sugar Company |
| Carmen | Vega Alta | Carmen Centrale |
| Cayey | Cayey | Cayey Sugar Company |
| Coloso | Aguada | Sucesores de Bianchi |
| Columbia | Maunabo | Fantauzzi, Verges & Riefkohl |
| Constancia | Toa Baja | Comp. Azucarera del Toa |
| Constancia | Ponce | Sauri y Subira |
| Corsica | Rincon | New Corsica Centrale, Inc. |
| Cortada | Santa Isabel | Santa Isabel Sugar Company |
| Ejemplo | Humacao | Comp. Azucarera El Ejemplo |
| Eureka | Hormigueros | Central Eureka, Inc. |
| Fajardo | Fajardo | Fajardo Sugar Company |
| Fortuna | Ponce | South Porto Rico Sugar Co. |
| Guanica | Guanica | South Porto Rico Sugar Co. |
| Juanita | Bayamon | Central Juanita, Inc. |
| Juncos | Juncos | The Juncos Central Co. |
| Lafayette | Arroyo | Sucrs. C. y J. Fantauzzi |
| Los Canos | Arecibo | Central Vannina |
| Machete | Guayama | Comp. Azucarera Central Machete |
| Mercedita | Ponce | Sucesion de J. Serralles |
| Mercedita | Yubucoa | Yubucao Sugar Co. |
| Monserrate | Manati | Federico Calaf |
| Pasto Viejo | Humacao | Central Pasto Viejo, Inc. |
| Pellejas | Adjuntas | Pellejas Sugar & Coffee Co. |
| Plata | San Sebastian | Plata Sugar Company |
| Playa Grande | Vieques | Benitez Sugar Company |
| Plazuela | Barceloneta | Plazuela Sugar Co. |
| Progreso | Carolina | Central Victoria, Inc. |
| Puerto Real | Vieques | Succesion de Enrique Bird |
| Rochelaise | Mayaguez | Mayaguez Sugar Company, Inc. |
| Rufina | Guayanilla | Maria Mercado e Hijos |
| San Francisco | Guayanilla | Lluberas Hermanos |
| San Vicente | Vega Baja | Rubert Hermanos |
| Santa Barbara | Jayuya | Juyuya Development Co. |
| Santa Juana | Caguas | S. A. de Sucreries de St. Jean |
| Santa Maria | Vieques | Ch. Le Brun |
| Soller | Camuy | Soller Sugar Company |
| Triunfo | Naguabo | Garzot & Fuertes, Inc. |
| Vannina | Rio Piedras | Central Vannina |

# CUBAN SUGAR MILLS

Compiled by "Facts about Sugar"

| NAME | LOCATION | OWNER | ADDRESS | MANAGER |
|---|---|---|---|---|
| | | **Oriente Province** | | |
| Bio | Bio | Blanco Homenes | Santiago | |
| Almeida, Hatillo | San Luis | Federico Almeida | Lorraine (b) 4, Stgo | Federico Almeida |
| Alto Cedra | Macarné | West Ind. M. S. Co. | Obrapia 19, Havana | J. Hanselman |
| América | Contramaestre | Federico Almeida | Lorraine (b) 4, Stgo. | Federico F. Rosillo |
| Atlantic | Tanamo Bay | Atlantic Fruit Co. | Sama, Oriente | |
| Baguanos | Cueto | C. A. Cen. Baguanos | Holguin | Gabriel Maurino. |
| Belona | Marimon | Cia. Az. Cen. Belona | Banco Español Havana | José Marimon |
| Borjita | Dos Caminos | S. A. Ing. Cen. Borjita | Marina 1, Santiago | L. de Hechavarria |
| Boston | Banes | United Fruit Co. | 131 State St., Boston | H. Harty. |
| Cacocum | Cacocum | Cia. Az. Cen. Cacocum | O'Reilly 11, Havana | Juan de Larrea. |
| Canarias (Bayat) | San German | Miranda Sugar Co. | Bayate | L. M. A. Evans |
| Cape Cruz | Ensenada de Mora | Cape Cruz Co. | 138 Front St., N. Y. | G. R. Buchanan |
| Carmen | Julia | C. A. Cen. Carmen | Banco Nac. 518, Hav. | José G. Menocal |
| Chaparra | Puerto Padre | Cuban Amer. S. Co. | Robins Bldg., Havana | Ralph B. Wood |
| Colorados | Omaja | Colorado Sugar Co. | 449 Federal St., Boston | |
| Confluente | Guantánamo | Confluente Sugar Co. | Madrid, Spain | Manuel Orta |
| Cupey | Cupey | West Ind. M. & S. Co. | Obrapia 19, Havana | M. R. Abbey |
| Delicias | Puerto Padre | Cuban Amer. S. Co. | Robins Bldg., Havana | Ernesto Brooks |
| Dos Amigos | Campechuela | Nicolas Castaño | Cienfuegos | M. Gonzalez |
| Ermita | Ermita | Ermita Sugar Corp. | Ermita | F. S. A. Chateauviex |
| Esperanza | Guantánamo | C. A. Oriental Cubana | Marina (b) 38, Stgo. | Antonio Arias |
| Isabel | Guantánamo | Guantánamo Sugar Co. | Guantánamo | Wm. Robertson |
| Isabel | Media Luna | Beattie & Co. | Manzanillo | R. H. Beattie |
| *Jobabo | Jobabo | Compañía Cubana | 52 William St., N. Y | C. R. Stuntz |
| Los Caños | Guantánamo | Guantámo Sugar Co. | Guantánamo | H. R. Muschell |
| Madrazo Jibacoa | Manzanillo | Cía. Az. Jibacoa | O'Reilly 11, Havana | M. B. de Marchena |
| Manati | Manati | Manati Sugar Co. | Marraqué Bldg., Hav. | Regino Truffin |
| Marimon | Macurijes | C. A. Oriental Cubana | Marina, baja, 38, Stgo. | Antonio Arias |
| Miranda | Miranda | Miranda Sugar Co. | Bayate | L. M. A. Evans |
| Monona | Guantánamo | Luis E. Simon | Guantánamo | Luis F. Simon |
| New Niquero | Niquero | New Niquero Sugar Co. | 100 Broadway, N. Y. | Ricardo Narganes |
| Oriente | Xavier | Cía. Az. Oriente S. A. | Hartmann (b) 10 Stg. | Elmo J. Miller |
| Palma | Palma Soriano | Palma Sugar Corporation | Palma Soriano | Rafael Aguirre |
| Palmarito | Miranda | Miranda Sugar Co. | Bayate | L. M. A. Evans |
| Preston | Preston | Nipe Bay Co. (U. F. Co.) | 131 State St., Boston | F. W. B. Hogge |
| Rey | Rey | C. A. Cen. Rey, S. A. | Royal Bank 314, Hav. | Juan Rimblas |
| Río Cauto | Río Cauto | Cuban-Can. Sug. Co. | Rio Cauto | George T. Walker |
| Romelie | Guantánamo | Sucs. Mackinlay Brooks | Guantánamo | Francisco de Pando |
| Salvador, El | Manzanillo | Godwall, Maceo y Ca. | Manzanillo | Ramón D. Escobar |
| San Antonio | Guantánamo | Sucrs. Luis Redor | St. E. Montluc, Fr. | M. A. Labarraque |
| San Ramón | San Ramón | Fdez. Vásquez y Ca. | Manzanillo | Genaro Fernandez |
| Santa Ana | Auza | Sucrs. Auza y Escoriaza | Lorraine (b) 4, Stgo. | Francisco Auza |
| Santa Cecelia | Guantánamo | Columbia Trust Co. | New York City | Héctor Haget |
| Santa Lucía | Santa Lucía | Santa Lucia Co. | Tte. Rey 11, Havana | W. Dunn |
| Santa María | Guantánamo | Santa María Sugar Co. | 71 Broadway, N. Y. | G. Nasi |
| Holguin | Holguin | C. A. Cen. Holguin | Holguin. | |
| Margarita | Jiguani | C. A. Cubana | Jiguani | |
| Sofía | Bayamo | Sucrs. J. Alsina | Ap. 76, Manzanillo | Juan Alsina |
| Soledad | Guantánamo | Guantánamo Sugar Co. | Guantánamo | Jos. McCracken |
| Tacajó | Tacajó nr. Antilla | Tacajó Sugar Corp. | 112 Wall St., N. Y. | G. G. Trowbridge |
| Teresa | Ceiba Hueca | Cen. Teresa Sugar Co. | Obrapia 23-A, Havana | James R. Biggar |
| Unión | San Luis | Cía. Az. Santiago | Ap. 151, Santiago | Jose Rousseau |
| Yaguanabos | Omaja | Cía. Az. Yaguanabos | Holguin | Eugenio Barbero |
| Yara | Yara | Yara Sugar Co. | Carlos Mendieta | Martinez Lufriu |
| Tánamo | Cayo Mambí | Atlantic Fruit Co. | 61 Bdwy, N.Y. | |
| | | **Camaguey Province** | | |
| Adelaida | Morón | Cía. Az. Adelaida | Oficios 22, Havana | L. Falla Gutiérrez |
| Agramonte | Florida | Cía. Az. Vertientes | S. Bernardo 127, Cfgs. | Carlos Alvarez |
| Algodones | Guayacanes | Cen. Algodones, S. A. | Royal Bank, Havana | Isaías Cartaya |
| Baraguá | Baragua | Jules Godchaux | M. Gomez 444, Hav. | E. P. Cobb |
| Camagüey | Piedrecitas | Cía. Az. Camagüey | O'Reilly 11, Havana | Ramón L. Quiñones |
| Céspedes | Céspedes | Pérez y González | Céspedes | Vicente González |
| Ciego de Avila | Ciego de Avila | Cía. Az. C. de Avila | Aguiar 71, Havana | L. Octavo Diviño. |
| Cunagua | Morón | Am. Sugar Refin. Co. | Amargura 23, Hav. | Antonio G. Mendoza |
| Elia | Elia | Elia Sugar Co. | Cuban Tdg. Co., Hav. | M. J. Amezaga |
| Estrella | Sierra Morena | Cía. Central Azucarera | M. Gómez 518, Hav. | Domingo León. |
| Florida | Florida | P. A. Sug. Co. (Atkins) | Obrapia 19, Havana | H. J. B. Baird |
| Francisco | Sta. Cruz del Sur. | Francisco Sugar Co. | 112 Wall St., N. Y. | Leandro J. Rionda |
| Jagüeyal | Ciego de Avila | Cuba C. S. Corporation | Barraque Bldg., Hav. | Blas M. España |
| Jaronu | | Am. Sugar Refin. Co. | Amargura 23, Hav. | Antonio G. Mendoza |
| Jatibonico | Jatibonico | La Compañía Cubana | 52 William St., N. Y | C. L. Merriam |
| Lugareño | Lugareño | Cuba C. S. Corporation | Barraque Bldg., Hav. | José F. Ponce |
| Morón | Morón | Cuba C. S. Corporation | Barraque Bldg., Hav. | A. Betancourt |
| Najasa | Hatuey | Cía. Az. Najasa | Prado 94, Havana | M. B. de Marchena. |
| Patria | Morón | C. A. Cen. Patria | Oficios 22, Havana | H. Sanjustiz |
| Pilar | Gaspar | Cía. Central Azucarera | M. Gómez 518, Hav. | Domingo León. |
| Punta Alegre | Punta San Juan | P. A. Sug. Co. (Atkins) | Obrapia 19, Havana | L. B. Caldwell |
| Redencion | Minas | Cía Az. Redencion | Cuba Trading Co., Hav. | J. Mnez. Delmau |
| Santo Tomás | Ciego de Avila | B. Romanach | Martí 8, Caibarién | Victor Zevallos |
| Senado, El | Nuevitas | B. Sánchez Adan | Nuevitas | P. Sánchez Batista |
| Sito | Cía. Az. Cen. Sito | Kil 115 N. C. Ry. | O'Reilly 11, Hav. | Francisco de Sola |
| Stewart | Stewart | Cuba C. S. Corporation | Barraque Bldg., Hav. | Juan Pérez Ayuela |
| Violeta | Cerca de Morón | Cuban C. S. Corporation | Barraqué Bldg., Hav. | José G. Rios |
| Nauyu | Punta Alegre | C. A. Nauyu | Havana | G. Menocal |
| Santa Cruz | Sta. Cruz del Sur | C. A. Santa Cruz | " | R. Rodriguez |
| Vertientes | Camaguey | C. A. Vertientes | Cienfuegos | |

# CUBAN SUGAR MILLS (continued)

| NAME | LOCATION | OWNER | ADDRESS | MANAGER |
|---|---|---|---|---|
| | | **Pinar del Rio Province** | | |
| Francia, La | Los Palacios | Cuban Sug. Mills Corp. | Obispo 59, Havana | J. Adams |
| Galdo | | Manuel Galdo | Galdo Co., Cardenas | Manuel Galdo. |
| Galope | S. Juan y Martinez | Central Galope S. A. | Cuba 120, Havana | José Maria Herrera |
| Gerardo | Bahía Honda | Peterson, Barker & Hill | Manz. Góm. 514, Havana | Emilio Núñez. |
| Lincoln | Artemisa | C. A. Central Lincoln | Aguiar 71, Havana | Manuel Casanova |
| Mercedes | Mariel | Humberto Balsinde | Aguiar 116, Havana | |
| Mercedita | Cabañas | Cuban-Amer. S. Co. | Robins Bldg., Havana | E. A. Longa |
| Orozco | Cabañas | Cía. Az. Nacional | Banco Nac. 403, Hav. | José Rodriguez |
| Pilar, El | Artemisa | Mario G. Menocal | Mercaderes 21, Hav. | Manuel Aspuru |
| San Ramón | Mariel | Frank J. Peterson | Manz. Gómez 514, Hav. | Manuel Balsinde |
| Caribe | Taco Taco | C.A. Cen. Caribe | | |
| San Cristobal | San Cristobal | C.A. Cen San Cristobal | | |
| | | **Havana Province** | | |
| Amistad | Güines | C. A. A. Gómez Mena | Manz. Gómez, Havana | Alfonso Gómez Mena |
| Baby | Arroyo Naranjo | Cuervo & Martiate | Arroyo Naranjo | Cuervo & Martiate |
| Fajardo | Gabriel | Benito Arxer | B. N. 405, Havana | Benito Arxer |
| Fortuna | Alquizar | Ferrar, Palmer | Obispo 7, Havana | G. Hernández |
| Gómez Mena | San Nicolás | Cía A. Gómez Mena | Manz. Gómez, Havana | José Gómez Mena |
| Güira Melena | Guira de Melena | Cía. Az. G. de Melena | Empedrado 30, Hav. | José N. Espinosa |
| Habana | Hoyo Colorado | C. A. Central Havana. | Aguiar 74, Havana | R. Montalvo |
| Hershey | Sta. Cruz del Norte | Hershey Corporation | Manz. Gom 364, Hav. | E. E. Olding |
| Jobo | | | | |
| Josefita | Los Palos | S. Calcavecchia. | S. J. de D. 3, Havana | Luis E. Quirós |
| Julia, La | Durán | Cuba C. S. Corporation | Barraque Bldg., Hav. | Jerónimo Martinto |
| Mercedita | Melena del Sur | Enrique Pascual | Obrapia 38, Havana | Lesmes Pascual |
| Nombre de Dios | Güines | C. A. Cen. N. de Dios | Royal Bank 519, Hav. | S. Izquierdo |
| N. S. del Carmen | Jaruco | Cía. Az. P. F. Castro | Mercaderes 36, Hav. | P. C. Andreu |
| Nueva Pax | Los Palos | | | |
| Occidente | Quivicán | C. A. Central Occidente | B. N. 316, Havana | |
| Portugalete | San José Lajas | Manuel Otaduy | San Ignacio 72, Hav. | Vicente Goicoechea |
| Providencia | Güines | Cía. Az. de Güines | Cuba 76, Havana | A. R. de Blanck |
| Rosario | Aguacate | **Hershey Corporation** | **Manz. Gom. 364, Havana** | Ramon Pelayo |
| San Augustin | Quivicán | | | |
| San Antonio | Madruga | C. A. A. Gómez Mena | Manz. Gómez, Havana | Manuel Gómez Mena |
| Toledo | Marianao | Cía. Az. Central Toledo | Mercaderes 21, Hav. | Manuel Aspuru |
| | | **Matanzas Province** | | |
| Alava | Banagüises | Cuba C. S. Corporation | Barraque Bldg., Hav | Antonio Zubillaga |
| Araujo | Manguito | Cía. Az. Cen. Araujo | B. N. 316, Havana | Félix Risech |
| Armonía | Bolondrón | Central Armonía Co. | Marina 22, Havana | Juan S. Olano |
| Australia | Jagüey Grande | C. A. Ing. Australia | O'Reilly 11, Havana | Mario Paez |
| **Buenaventura** | **Jaguey Grande** | **Cia. Az. Buenaventura** | **Jaguey Grande** | |
| Carolina | Coliseo | M. Flores Pedroso | Coliseo | F. Fernández |
| Conchita | Unión de Reyes | Cuba C. S. Corporation | Barraque Bldg., Hav. | Alonso Alzugaray |
| Cuba | Pedro Betancourt | Cen. Cuba Sugar Co. | Aguacate 110, Hav. | Arturo Bernal |
| Dolores | Jovellanos | Melchor Gastón | G. y Calzada, Vedado | Aurelio Martínez |
| Dos Rosas | Cárdenas | Hires Sugar Co. | New York | E. L. Poole |
| Elena | Ceiba Mocha | Jaen, Oteiza y Hnos | Independencia 80, Mat. | A. Oteiza |
| España | Perico | José López Rodriguez | Obispo 135, Havana | Alfredo Aldereguía |
| Esperanza | Calimete | C. A. Cen. Esperanza | Mercaderes 36, Hav. | C. de la Rosa |
| Feliz | Feliz | Cuba C. S. Corporation | Barraque Bldg., Hav. | Abelardo Padrón |
| Flora | Guira de Macuriges | Cen. Cuba Sugar Co. | Aguacate 110, Hav. | Antonio M. Ronco |
| Guipúscoa | Hato Nuevo | Sobrinos de Arocena | Hato Nuevo, Martí | Ramón G. Arocena |
| Jesús María | Benavides | Mat.-Amer. Sugar Co. | Obispo 7, Havana | Bauduy Laine |
| Limones | Limonar | José I. Lezama | Empedrado 6, Havana | Socorro Garbayo |
| Loft | Macagua | George W. Loft | New York | |
| Luisa | Limonar | | | |
| Mercedes | Mercedes | Cuba C. S. Corporation | Barraque Bldg., Hav. | Antonio Carrillo |
| Por Fuerza | Calimete | La Paz Sugar Co | Reina 105, Havana | Juan Pademonte, Pr. |
| Porvenir | Cidra | Wenceslao Xagundo | Calimete | Wenceslao Xagundo |
| Progreso | Cárdenas | Laurentino García | Ap. 42, Cárdenas | M. Bardiales |
| Puerto | Arcos de Canasí | José Avendaño | Inquisidor 22, Havana | José F. Cartava |
| Reglita | Perico | José López Rodréguez | Obispo 135, Havana | Séptimo Sardinas |
| San Cayetano | Cidra | | | |
| San Ignacio | Agramonte | **Cia. Az. San Igracio S.A.** | **Agramonte** | **Victor Mujica** |
| S. J. Bautista | Arcos de Canasí | | | |
| San Vicente | Jovellanos | Cuban Com. &. Ind. Co. | B. N., Havana | Plácido Alonso |
| Santa Amalia | Coliseo | García, Mdez. Co., L. | Coliseo | Laurentino Garcia |
| Santa Gertrudis | Banagüises | Cuba C. S. Corporation | Barraque Bldg., Hav. | Francisco Bernal |
| Santa Rita | Baró | Cía Az. Caobillas | B. Nac. 405, Havana | Joaquín G. Gumá |
| Santo Domingo | Unión de Reyes | Cen. Cuba Sugar Co. | Aguacate 110, Havana | Gerardo Gutiérrez |
| Saratoga | Limonar | Cen. Cuba Sugar Co. | Aguacate 110, Havana | J. Magin Tarafa |
| Socorro | Pedroso | Cuba C. S. Corporation | Barrague Bldg., Hav. | G. B. Symes |
| Soledad | Jovellanos | Cuba C. S. Corporation | Barrague Bldg., Hav. | Alfredo Fernández |
| Tinguaro | Perico | Cuban Amer. Sugar Co. | Robins Bldg., Havana | J. W. Caldwell |
| Triunfo | Limonar | Hdos. Vda. F. Sotero | Limonar | A. Mesa Prieto |
| Triunvirato | Cidra | | | |
| Unión | Agramonte | Frank J. Peterson | Manz. Gómez 514, Hav. | Ramón Orrantia |
| | | **Santa Clara Province** | | |
| Adela | Remedios | Zarraga y Ca. | Royal Bank, Havana | Enrique Alvarez |
| Altamira | Zulueta | Espinosa & Arango | Remedios | José María Espinosa |
| Andreita | Cruces | Cía. Az. Andreita | Oficios 22, Havana | |
| Cabaiguán | Cabaiguán | Cía. Az. Cabaiguán | Apar. 26, Cabaiguán | C. Rguez. Morini |

| NAME | LOCATION | OWNER | ADDRESS | MANAGER |
|---|---|---|---|---|
| | | **Santa Clara Province** (*continued*) | | |
| Caracas | Caracas | A.-C. Estates Corp. | Aguiar 106, Havana | Theodore Brooks |
| Caridad | | | | |
| Carmita | Vega Alta | Gerardo Machado | Ap. 2446, Sta. Clara | Angel Pérez López |
| Cieneguita | Abreus | Cía. Az. Cieneguita | Oficios 22, Havana | Juan Román |
| Constancia | Constancia | Cuban-Amer. Sugar Co. | Robins Bldg., Havana | Alan B. Bailey |
| Constancia | Encrucijada | Constancia Sugar Co. | B. Nac. 209, Havana | J. Escobar |
| Corazón de Jesús | Sagua la Grande | Juan Amezaga y Cía. | Ap. 8, Sagua la Gde. | Ignacio Aguirre |
| Covadonga | Carreño | S. A. Cen. Covadonga | Mercaderes 36, Hav. | Alejo A. Carreño |
| Dos Hermanos | Cruces | Dos Hnas. Sugar Co. | Obispo 7, Havana | A. E. Martí |
| Dos Hermanos | Palmira | Casar Rodriguez Morni | Acea 95, Cienfuegos | Oscar Berrayarza |
| El Salvador | | | | |
| Fe | Salamanca | Central Sugar Corp. | Horter Bldg., Havana | H. A. Herbert |
| Fidencia | Placetas | C. A. Cen. Fid. D. Leon | M. Gómez 514, Hav. | Francisco Quiñones |
| Hormiguero | Hormiguero | Hormiguero Sugar Co. | Hormiguero | Elie L. Ponvert |
| Juraguá | Cienfuegos | Sta. C. Sugar Co., L. | Obispo 5, Havana | S. C. Murray |
| Julia, La | Taguayabón | Hdos. Hnas. Pester | Taguayabón | R. de Biscuccia |
| Lequeitio | Lequeitio | Cuba C. S. Corporation | Barraque Bldg., Hav. | A. Gou |
| Lutgardita | Sagua la Grande | Cía. Az. de Sagua | Royal Bank 408, Hav. | Marcelina García |
| Macagua | Mata | Hdos. de D. Bethart | Apartado 204, Mata. | Domingo Bethart |
| Manuelita | Palmira | L. Falla Gutiérrez | Oficios 22, Havana | César Rodríguez |
| Mapos | Guasimal | Mapos Cen. Sugar Co. | Philadelphia | A. C. Hope |
| María Antonia | Santo Domingo | Alba y González | Ap. 43, Sagua la Gde. | Ramón Alba |
| María Victoria | A. de Pasajeros | Cuba C. S. Corporation | Barraque Bldg., Hav. | Mariano Martínez |
| Naranjal | Fomento | Cía. Az. Naranjal | Fomento | José B. Labrador |
| Narcisa | Yaguajay | North Amer. Sugar Co. | B. N. 209, Havana | Ricardo Berrayarza |
| Natividad | Sancti-Spiritus | Sucrs. F. L. del Valle | O'Reilly 11, Havana | Francisco Gómez |
| Parque Alto | Parque Alto | Parque Alto Sugar Co. | B. N. 209, Havana | A. Suàrez Villar |
| Pastora | S. J. de los Yeras | Cen Pastora S.A. | Compostela 65, Hav. | Julio Martinello |
| Patricio | Encrucijada | C. A. Cen. Patricio | Ap. 582, Cienfuegos | Domingo Nazabal |
| Perseverancia | Perseverancia | Cuba C. S. Corporation | Barraque Bldg., Hav. | Edgar Garnett |
| Portugalete | Palmira | Hdos. de Escarsa | Ap. 210, Cienfuegos | Sotera F. Escarza |
| Purio | Calabazar | Hdos. de Oña | Sagua la Grande | Rogelio Tomasino |
| Ramona | Rancho Velóz | Domingo León | M. Gómez 514, Hav. | José Galbán |
| Reforma | Caibarién | C. A. Cen Reforma | M. Gómez 401, Hav. | José H. Martínez |
| Resolución | Carahatas | Rodda y Molina | Sagua la Grande | José Rodda |
| Resulta | Sagua la Grande | Juan de Dios Oña | Ap. 65, Sagua La Gde | P. Reyes |
| Rosalía | Taguayabón | Central Rosalia, S. A. | Ariosa 23, Caibarien | S. E. García |
| Rosa María | Mayajigua | P. A. Suárez Cordoves | Mayajigua | P. A. Sufirez Córdove |
| San Agústín | Lajas | Nicolás Castaño | Cienfuegos | Dr. Betancourt |
| San Agústín | Remedios | Atkins & Co. | Obrapia 19, Havana | Gabriel Montaner |
| San Antonio | Santa Clara | Vicente G. Abreu | Ap. 2489, Sta. Clara | Vicente G. Abreu |
| San Cristóbal | Seibabo | Salvador Calcavechia | S. J. de Dios 3, Hav. | E. Cardoso |
| San Francisco | Cruces | Cía. Az. de Sagua | San Ignacio 50, Hav. | Rafael F. Guardado |
| San Isidro | Quem. de Güines | C. A. de Sagua. | Royal Bank 408, Hav. | Marío de la Vega |
| San José | Placetas | Hnos. Goicoechea | O'Reilly 11, Hav. | Ezequiel Zubillaga |
| San Lino | Rodas | Domingo Ramirez Pardon | Cienfuegos | Leopoldo Suero |
| San Pablo | Zulueta | Compañia Cubana | Zulueta | José Iglesias |
| San Pedro | | | | |
| Santa Catalina | Cruces | Artime Díaz & Co. | Cienfuegos | Ricardo Díaz |
| Santa Lutgarda | Mata | José M. López | Mata | Antonio G. Solís |
| Santa María | Ranchuelo | Esteban Cacicedo | Cienfuegos | Esteban Cacicedo |
| Santa Rosa | Ranchuelo | Cía. Az. de Sagua | Ranchuelo | Marcelino García |
| Santa Teresa | Sitiecito | Cía. Az. Santa Teresa | Sagua la Grande | M. J. Mola |
| ~~Stma. Trinidad~~ | Ajuria | | | |
| Soledad | Cienfuegos | Sol. Sug. Co. (Atkins) | Obrapia 19, Havana | F. L. Hughes |
| Trinidad | Trinidad | P. A. Sug. Co. (Atkins) | Obrapia 19, Havana | Wm. G. Pullum |
| Tuinicú | Tuinicú | Tuinicú Sugar Co. | 112 Wall St. N. Y. | José V. Rionda |
| Ulacia | Rodrigo | Ulacia Hnos. | Rodrigo | Juan Ulacia |
| Unidad | Cifuentes | Cuban-Amer. Sugar Co. | Robins Bldg., Havana | R. McCulloch |
| Vega, La | Guayos | La Vega Sugar Co. | Royal Bank, Havana | Isaías Cartaya |
| Vitoria | Yaguajay | Vda. Ruiz de Gámiz | Cuba 138, Havana | Marcos Larralde |
| Washington | Hatuey | Washington Sugar Co. | 112 Wall St., N. Y. | Carlos Arche |
| Zaza | Placetas | Viuda Zulueta y Gámiz | Cuba 20, Havana | Martín Ormaeche |
| Santa Isabel | Formento | Martinez, Lopez y Co. | Formento | |

# Principal Manufacturers of Equipment Used in Sugar Houses

**Belting, Leather**
Cook, H. N., Belting Co., San Francisco.

**Belting, Centrifugal**
Cook, H. N., Belting Co., San Francisco.

**Beet Knives**
Du Vivier, E. H., New York City.
Disston & Sons, Philadelphia.

**Beet Root Separators**
Sugar Machinery Co., Los Angeles.

**Beet Seeds**
Freeman, Allen G., San Francisco.
Pettit, Marshall & Co.,Inc., New York City.

**Beet Slicers**
Du Vivier, E. H., New York City.
Sugar Machinery Co., Los Angeles.

**Beet Sugar Machinery**
Dyer Co., Cleveland, Ohio.
Kilby Mfg. Co., Cleveland, Ohio.
Sugar Machinery Co., Los Angeles.

**Centrifugals**
American Tool & M. Co., Boston, Mass.
Cresson-Morris Co., Philadelphia, Pa.
Hepworth, S. S. Co., New York City.
Wayte, J. J., Inc., New York City (Agents).

**Centrifugal Dischargers**
American Tool & Mach. Co., Boston, Mass.
Hepworth, S. S. Co., New York City.
Sugar Machinery Co., Los Angeles

**Conveyors**
Hill Clutch Co., Cleveland, O.

**Equipment for Sugar Mills**
Dyer Co., Cleveland, Ohio.
Kilby Mfg. Co., Cleveland, Ohio.
Sugar Machinery Co., Los Angeles.
Von Phul, Gilbert D., New Orleans, La.

**Engineering Companies**
Dyer & Co., Cleveland, Ohio.
Cannon & Swenson Co., Chicago, Ill.
Kilby Mfg. Co., Cleveland, Ohio
Schwarz Engineering Co., Denver, Colo.
Stewart, Jas., & Co., Salt Lake City, Utah.
Sugar Machinery Co., Los Angeles.

**Evaporators**
Baeuerle & Morris, Philadelphia, Pa.
Dyer Co., Cleveland, Ohio.
Oat, Jos. & Sons, Philadelphia, Pa.
Sugar Machinery Co., Los Angeles, Cal.
U. S. C. I. Pipe & Fdy. Co., Philadelphia, Pa.

**Fraising Machines**
Kilby Mfg. Co., Cleveland, Ohio
Sugar Machinery Co., Los Angeles, Cal.

**Juice Heaters**
Baeuerle & Morris, Philadelphia, Pa.
Kilby Mfg. Co., Cleveland, Ohio
Ogden Iron Works, Ogden, Utah
Sugar Machinery Co., Los Angeles.
Stearns-Roger Mfg. Co., Denver, Colo.

**Packing**
N. Y. Bltg. & Pkg. Co., New York City.
Squires & Co., San Francisco, Cal.
Cook, H. N., Belting Co., San Francisco.
U. S. Cast Iron Pipe & Fdy. Co. Philadelphia.

**Pipe**
Crane Co., Chicago, Ill.
U. S. Cast Iron Pipe & Fdy. Co. Philadelphia.

**Pulverizing Machinery**
Raymond Bros. Co., Chicago, Ill
U. S. Cast Iron Pipe & Fdy. Co., Philadelphia.

**Pumps**
Ingersoll-Rand Co., New York, N. Y.

**Pulp Dryers**
Stearns-Roger Mfg. Co., Denver, Colo.

**Roller Mills**
Raymond Bros. Co., Chicago, Ill.

**Screens**
Mundt & Sons, Jersey City, N. J.
Tyler Co., Cleveland, Ohio.

**Steffens House Machinery**
Dyer Co., Cleveland, Ohio.
Raymond Bros. Co., Chicago, Ill.
Faget Engineering Co., San Francisco.
Sugar Machinery Co., Los Angeles.

**Sugar Sprays**
Stearns Roger Co., Denver, Colo.
American Tool & Mach. Co., Boston.
Sugar Machinery Co., Los Angeles.

**Tanks, Carbonation, Beet Washers, Etc.**
Baeuerle & Morris, Philadelphia, Pa.
Bay City Iron Works, Bay City, Mich.
Stearns-Roger Co., Denver, Colo.
Sugar Machinery Co., Los Angeles.

**Thermometers**
Taylor Instruments Co., Rochester, N. Y.

**Vacuum Pans**
Baeuerle & Morris, Philadelphia, Pa.
Oat, Jos. & Sons, Philadelphia, Pa.
Sugar Machinery Co., Los Angeles.

**Washing Machines, Filter Cloth**
Clenzall Machines Co., St. Louis, Mo.

**Wheels, Beet Lifting**
Dyer Co., Cleveland, Ohio.
Sugar Machinery Co., Los Angeles.

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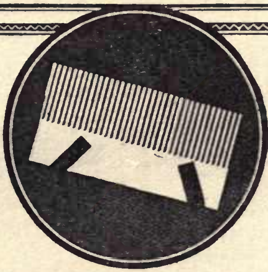
## NOTE

Catalogues issued free by the above mentioned concerns give very interesting illustrated descriptions of machinery and equipment used in sugar manufacture, and are accordingly very helpful to the sugar student.





*THE DISSTON FACTORY—SIXTY-ONE ACRES—SIXTY-EIGHT BUILDINGS*


MODERN BEET SUGAR FACTORY
S M C JUICE HEATER
MODERN CANE SUGAR FACTORY
S M C BEET LOADING STATION
S M C CANE HOIST
S M C TRASH CATCHER
S M C CANE MILL
S M Co
CABLE SUMCOLA
SAILER BEET ROOT SEPARATOR
Sugar Machinery Company
Engineers and Manufacturers
Los Angeles, California
U.S.A.
S M C FRAISING MACHINE
S M C VACUUM PAN
BINKLEY SLICER
S M C AUTOMATIC SPRAY
CENTRIFUGALS AND S M C DISCHARGERS