To children whose happiness is made brighter and whose health requires SUGAR, this story is dedicated —

"NATURE'S ESSENTIAL SWEET"
ACK FROST was tired and discouraged. For years he had stood like a tin soldier on the side of a blue pasteboard box, holding a tablet in his arms and smiling, smiling all the time. It began to be harder and harder to smile and the tablet seemed to get heavier and heavier. It would have been easier if Jack had really known what his job was but he had been standing and smiling for a long, long time without even knowing what was inside of the blue box. The tablet he held in his arms all day long had something written on it. But Jack had never learned to read and couldn't tell what his tablet was supposed to represent; and he longed so to know what it was all about and why he stood smiling all the time on the side of a blue pasteboard box.

Finally his curiosity made him so unhappy that he couldn't smile any longer. One of the men at a packing machine noticed that Jack's smile had almost disappeared, and asked him what was the matter. With that, Jack just poured out the whole story of his trouble and told the man how he longed to know something about what he was doing. He asked all sorts of questions about the white crystals that the machines poured into the boxes and about the meaning of the words that were written on the tablet which he held in his arms all day. The man told Jack that he was a trade-mark and that he really was a very important person. He said that Jack guaranteed the quality of the white crystals that went into the boxes and that these crystals were called sugar. He said that not a
single box could leave the refinery unless Jack himself was standing on the side of it with his tablet and his smile.

This made Jack feel a little happier but still he wanted to find out all about the sparkling sugar that filled the boxes. The man told Jack all he could, but he knew only about the packing and shipping and not much about how sugar actually became sugar except that it came from a plant that grew in hot tropical countries. Jack thought that it would be great fun to go and see this plant grow but the tropics seemed dreadfully far away and he didn't know where to go or how to get there, and discouragement began to overwhelm him again.

Just then two men in very earnest conversation stopped right alongside of Jack. "Yes," said the one, "we get most of our raw sugar from Cuba; there's a freighter down at the dock now which will be going back there in a day or two. Of course, there are immense fields in India, and in Java, but they feed their own countries, together with China, Japan and the rest of the Far East. You'll also find increasing crops in Hawaii, Porto Rico, the Philippines and the British West Indies, and small crops in Australia and Africa, but Cuba is still the largest single producer."
"What about beet sugar?" asked the second man. "Well," said the first, "about one-third of the world's sugar comes from beets. There are acres and acres of beets in Russia, Germany, France, Czechoslovakia and half-a-dozen other European countries and in about seventeen of the states here. We have what we call the sugar beet belt from California and Washington, across Idaho, Montana, Utah, Colorado, Nebraska, and Kansas, straight through the middle states to Michigan and Ohio. Beets make good sugar but we do not use them, for our sugar is 100% pure cane sugar."

The two men passed on and Jack didn't hear the rest but he was so excited he could hardly contain himself—a boat going to Cuba, one of the places where sugar cane grew. He must go too, but how!

That night Jack thought of a plan. He would get his twin brother, who looked just like him, to take his job for a month. Nobody would know the difference and he could learn all there was to know about sugar. After all, he reasoned, when you're a trade-mark you ought to know everything about the thing you represent.

Jack's brother finally consented to take the job for a month, and at night when no one was around they changed places. Jack stepped away from the box, gave the tablet to his brother and then ran to the wharf where the big boat bound for Cuba was just getting up steam. Up the gang plank he hurried and after a final noisy whistle the boat sailed with Jack on board.
RESTED and happy after a fine trip on the ocean, Jack stepped off the boat at Havana, Cuba. He did not stay long in the city of Havana though it was very interesting and very modern, but drove quickly out into the open country. There he found, as far as his eye could see, acres and acres of land divided up into huge sugar cane farms. The fields looked like great fields of corn, only much higher, for some of the sugar cane reached as high as twelve feet in the air. When he walked right into the fields Jack saw that the sugar cane was really a long stalk something like bamboo, with joints up and down the stalk and wide grass-like leaves and feathery flowers all up at the top. There he watched them harvest this sugar cane. The dark natives dressed in their loose garments and big sun hats walked through row after row in the blazing hot sun, cutting the canes with a very, very sharp and wicked looking knife called a machete. Then they loaded the canes on an open cart drawn by oxen. This interested Jack a lot for he had never before seen oxen take the place of horses. As the oxen ambled toward the sugar mill with the cane cart, the boy who was walking alongside driving the oxen gave Jack a piece of cane to eat. It was sweet. A shiver of delight ran through Jack as he realized, for the first time, what Pure Cane sugar might mean.
Finally they reached the sugar mill or central, as it is called, and drove into a big yard where there were lots more cane carts and oxen and brown boys. Jack sat perched up on top of his cane cart until it came time to dump the canes from the cart into the receiver of the grinding mill. He then jumped off and ran into the mill. There, a very nice man who seemed to be the mill superintendent explained what happened to the sugar canes, while Jack watched what went on. First, the canes were crushed between great rollers and all the juice was squeezed out. The man said this was called extraction. Then this juice was run into great big tanks and because it fermented so quickly was chemically treated with lime and then heated. The result was that the dirt and straw and other impurities went to the bottom of the tanks and the pure cane juice came to the top. Clarification, this step was called. Then came the third step. The pure juice was syphoned off into another tank. It was so thin it
looked just like colored water to Jack and he wondered how that could ever turn into the white crystals he knew so well. He watched them apply heat to these big closed tanks and gradually this thin fluid turned to a syrup and the man told him this process was called evaporation and that each step was necessary to get raw sugar. It was all most interesting.

The syrup was then run into what the man called vacuum pans with heated copper coils in them. Jack took some of this stuff in his hands as it came out of the pans and found it was a sticky substance with tiny granules all through it. This, the man told Jack, was the process called concentration and crystallization and that the granules were really sugar floating around in molasses. He said the next step was to get it separated from the molasses, which Jack saw done in great round drums called centrifugals. These drums spun round at a terrific speed so that the molasses ran out through the holes. The brownish raw sugar was then ready to be shipped. It looked like wet sawdust and was packed in big jute or burlap bags, about 320 pounds to a bag, and shipped away from the central. Jack had seen all they could show him there, so even though he hated to leave the great waving fields of cane and the sunshine, he rode in with the last load of bags and saw them put on his ship. When the ship was full of these big bags of raw sugar the captain gave the signal and the boat moved off with Jack on board, bound for home.

How good the Statue of Liberty looked to Jack as he came up the bay at New York! He had enjoyed Cuba so much but after all he was glad to be back. The big boat sailed up the Hudson and finally docked at his own pier. Jack watched the great bags of raw sugar being unloaded and piled in stacks in large storage sheds. All the while he kept wondering how the brown sticky substance in them ever became the glistening white crystals that had come out of his boxes.

He saw the bags taken from these sheds into the factory and so he followed the bags. He soon found another nice man who showed him just what happened to turn the brownish raw sugar into lovely, white, sparkling sugar. The man also explained that this factory was called a sugar refinery because here the color and other impurities were removed from the raw sugar and it was made into a pure, clean, fine sugar, that folks could eat. The bags were first emptied and the raw sugar was carried up into the building by endless bucket elevators and finally dumped into a long mingling trough.

This sugar then underwent a working process which served to remove the brown colored syrup from the crystals. This washing was quite different from any washing Jack had ever seen. The raw sugar in the mingling trough was mixed with syrup and the whole quite mushy mixture was

---

**Map Showing Where the Sugar of the World is Grown**

*Diagram showing various regions where sugar is grown, including Hawaii, Cuba, and sugar cane and sugar beet production.*
passed into a big mixing tank. Here it was worked over thoroughly with large revolving blades and the brown syrup clinging to the original grains of raw sugar was turned to liquid and washed off. To separate the crystals from the syrup this mixture was run into big centrifugal drums like those Jack had seen in Cuba and as they spun around rapidly the liquid flew off through the fine wire mesh of the drums and the washed crystals were left behind. These washed crystals were melted in hot water. To this thick liquor, that was still rather muddy, certain substances which caught the insoluble impurities were added to clarify it. The whole mixture was pumped through closely woven cloth in the filter presses and all the insoluble impurities strained out. This completely clarified liquor had one more purifying process through which to go. There were still some impurities in the solution which could not be strained out because they had dissolved; so next the liquor was run through great tanks of bone black, eighteen or twenty feet deep, called char filters. The liquid which flowed out of the bottom of these char filters was no longer muddy and colored but clear and sparkling like
pure spring water. This lovely white liquor was then boiled in a vacuum pan and the crystals formed in a thick syrup as they did before. Again the liquid went into the big whirling drums but this time the crystals left on the inside of the drums were pure glistening white sugar. A little warm water sprinkled on them washed off the last trace of syrup. The man explained that this was moist granulated sugar all ready for the next processes which were different for different kinds of sugar.

Jack knew what all the different kinds of sugar looked like when they were finished for he had stood on the boxes of each kind; so he watched the separate processes with the greatest interest. For granulated sugar, the moist sugar was passed through long slowly revolving cylinders which constantly picked up the sugar and rained it down through counter currents of hot air which dried and separated the grains. Ingenious machinery which seemed almost possessed of human intelligence sifted the grains into proper sizes and packed them into the barrels, bags or boxes that Jack knew so well. To form the dainty cubes and beautiful tablets, the moist granulated sugar was pressed into molds of just the right size and shape and gently dried in special ovens to make them hard and to bring out their exquisite brilliance. The powdered sugar was most interesting to Jack. It was made in a machine by grinding dry granulated sugar between two
plates traveling in opposite directions, so that two fine streams of ground sugar were thrown against each other with such violence as to pulverize the sugar to the finest powder. It was fun to have seen that. The brown sugars were made just as were the white sugars but from a lower testing solution and had smaller, softer crystals.

Jack was so thrilled at having seen the growing sugar cane actually become the pure sugar which he had known so long that he could hardly contain himself. He wanted to tell the whole story to everybody. He had never realized what a romance it all was until he had seen the steps it took to turn those corn-like stalks in the fields of Cuba into pure glistening snow white sugar. He had had a wonderful adventure and as he thought of all the thousands of men and the great chemical laboratories and the huge, almost human machines and everything else working to give people this delicacy, he couldn’t help but wonder where all this sugar went.

He still had another week before he had to relieve his brother and get back on his job and so he decided to take that week and follow the sugar out into the wide, wide world.
So the next morning.
Jack perched on the
top of a big load of bar-
rels and boxes as the first
great delivery truck left
the refinery. When the
driver started to unload an
order at a beautiful big grocery store
Jack jumped off too and offered to help. The
grocery man said he had been anxiously waiting
for the sugar, since everybody was coming home
from vacations and all the mothers were stocking up
their kitchens. The grocer seemed quite excited. "Package sugar,
package sugar, they won't have anything but package sugar because
they say it's so much cleaner and so much easier to handle than
the loose sugar. It's different than it used to be when sugar was just
sugar and we used to measure it out of a barrel, but it certainly is
lots easier for us grocers. Now all the women want special fruit
powdered sugar for the table—and a fine product it is—granulated
sugar for cooking, confectioners' sugar for fancy icings, and tablet
sugar for coffee. It's just as easy for them to get the special kind
they want, too, for we carry them all."

Jack liked the grocer and was
watching him pile the packages of
different kinds of sugar in neat rows
on his shelves when a little girl came
in with a slip of paper. The grocer
read off the list, got it most all ready,
then asked the little girl what kind
of sugar she wanted. "My mother
wants two kinds of sugar, granulated and tablet, and she said to be sure and get them both in the blue box 'cause that kind was so easy to use and the tablets 'specially were so even and smooth.' So Jack decided to go home with the little girl and see what they did with sugar.

In the kitchen there he found sugar used for many things. They were making applesauce, and cookies, and pies, and cakes, all with sugar. He saw a frosting that looked like a fluffy white cloud and it was made out of confectioners' sugar. His mouth watered for all these good things but a pleasant odor floating over from the next house intrigued him. So he ran across the grass and there he saw the cook making the most delicious pickles with brown sugar in them and at the same time making jelly with granulated sugar in it. Time went so quickly that he had to postpone his visit to the next house until the following day. But he reached there while they were eating breakfast and on the table he saw two kinds of sugar. In a lovely silver sugar bowl on a big silver tray at one end of the table were the smooth Jack Frost tablets which he knew so well. He watched the mother place one or two in each dainty cup before she poured
the coffee. On the cereal they were all using the fruit powdered sugar which is so fine and runs so freely. My! how they were enjoying it. Sugar seemed to be used so often and in so many ways in these homes that Jack wondered if there were any homes where there was no sugar.

So, he went to the poorer part of the city. He found it there too, but in one home he saw it in a flimsy paper bag that had broken at the bottom and the sugar had spilled all over the floor. It was too bad. How he wanted to tell that mother about the convenient blue package chock full of pure sugar which had been packed with such care and which could be kept so safe and clean for her family instead of the way she had it in the paper bag. This made him feel that he wanted to tell all the mothers in the country about all the different kinds of sugars and all the different ways they could be used. Most of all he wanted to tell them how wonderful it was to be able to get these sugars in packages, free from all dirt and germs, safe and ready to serve on the table or use in cooking. But the time was too short. His month of adventure was nearly over and he must go back to his job. Only now he was happy, he was really glad to be the Jack Frost trade-mark. He knew what he represented and he was proud to be the guarantee of every package of sugar that went out of his refinery. His was 100% Pure Cane sugar which he had seen start in the fields of Cuba as sweetness in the jointed canes and end in the homes of the people, delicious, nourishing snow white crystals bringing happiness and joy wherever they were used. So with a smiling face, contented and proud, he took the tablet from his brother and stepped back on to the side of the blue pasteboard box.