



THE STORY OF RUBBER

IN THE EARLY YEARS OF THE NINETEENTH Century there was no such thing as organized chemical research. There were a few pioneers, who believed in the commercial possibilities of certain materials—but these men had to carry through their experiments in their own laboratories, usually in their homes. They were handicapped by a lack of chemical knowledge, by a dearth of proper apparatus, and by the need of adequate financial backing. New products were produced by individuals, through their own efforts, from the materials at hand.

In 1834, millions had been invested in manufacturing rubber articles which, as time proved, rapidly deteriorated. Ruin was facing the rubber companies, and crude rubber was an interesting new material. Outside the store of the Roxbury India Rubber Company in New York City, a young man was attracted by a curious round circle of rubber displayed there. Suddenly, the door opened. The manager of the store stepped out. . . .

MANAGER: Well, young man, what can I do for you?

CHARLES GOODYEAR: I was just looking at this.

MANAGER: I've been watching you. You've been looking at it for the past half-hour. Do you know what it is?

CHARLES GOODYEAR: Oh, yes. It's one of the new India rubber life-preservers. But I've never seen one before.

MANAGER: Do you want to buy it?

CHARLES GOODYEAR: No. But I've been thinking about that wreck at sea the other day. More than two hundred people drowned. Did you see where it said they all had India rubber life-preservers, like this one? And yet most of them drowned. Why?

MANAGER: These life-preservers are still in the experimental stage, young man. They're not perfect yet.

CHARLES GOODYEAR: Don't you know what's wrong with them?

MANAGER: Of course we do. For one thing the inflating apparatus isn't quite right—a good many of them develop air leaks.

CHARLES GOODYEAR: I've been studying this one—I think maybe I can suggest an improvement.

MANAGER: What's your idea?

CHARLES GOODYEAR: Well, this air-stem is just set loosely in the rubber. Now if you'd put a screw thread on it and fasten it with a clamp—then it would fit tight and the air couldn't leak out around the stem.

MANAGER: You're a very clever young man, Mister—Mister—

CHARLES GOODYEAR: Goodyear—Charles Goodyear.

MANAGER: Well, Mr. Goodyear, how much do you want?

CHARLES GOODYEAR: For what?

MANAGER: Why, for your idea, of course!

CHARLES GOODYEAR: Do you really think it would improve your life-preservers?

MANAGER: Of course. The company could use it.

CHARLES GOODYEAR: It would help save a lot of lives, if it worked, wouldn't it?

MANAGER: I suppose it would.

CHARLES GOODYEAR: Then I don't want anything for it.

MANAGER: Wait a minute, young man—don't run away—I want to talk to you. What do you know about India rubber?

CHARLES GOODYEAR: I know they're making shoes of it.

MANAGER: We won't even be making those much longer.

CHARLES GOODYEAR: Why not?

MANAGER: Because they melt in hot weather and turn as hard as rock in winter. The same with these life-preservers—wagon-covers—everything we make. Why, just this week we've had more than twenty thousand rubber shoes returned, all of them smelling so bad we had to bury them.

CHARLES GOODYEAR: Can't you find out how to keep it from melting?

MANAGER: We haven't had much luck so far and we're losing money rapidly. In fact, if we don't find the right method of preparing rubber soon, we'll be ruined.

CHARLES GOODYEAR: There must be some way. . . .

MANAGER: Look here. You're clever—you've got a good head on your shoulders. Do you think you can find the right way to prepare India rubber?

CHARLES GOODYEAR: I can try.

MANAGER: How much do you want for the job?

CHARLES GOODYEAR: I don't want anything—unless I succeed.

MANAGER: When can you get started?

CHARLES GOODYEAR: I've already started. And I'm going to keep right on!

From that day, rubber became Charles Goodyear's one great absorbing interest. Shortly after his return to Philadelphia, the hardware firm of A. Goodyear & Sons, in which he had been a partner, failed—leaving debts of about \$30,000. But Goodyear was far more interested in rubber than in the failure of his father's hardware company. He turned his tremendous energy towards solving the complicated problem of making rubber serve mankind. One day, Goodyear returned late to his home. His wife, Clarissa, was cooking in the kitchen of their modest home. . . .

CHARLES GOODYEAR: Hello, Clarissa.

CLARISSA GOODYEAR: Oh, Charles, you're back. You've been gone so long I was getting worried.

CHARLES GOODYEAR: It took me longer than I thought. I had trouble getting what I wanted, but is there any fire in the stove?

CLARISSA GOODYEAR: Why, of course there is.

CHARLES GOODYEAR: Good. Then get those pots and pans off right away. I want to use the stove.

CLARISSA GOODYEAR: But, Charles, I'm cooking supper.

CHARLES GOODYEAR: Never mind that. We can eat any time. I've something more important to do now. Help me clear the stove.

CLARISSA GOODYEAR: But, Charles dear, your dinner will be spoiled.

CHARLES GOODYEAR: Never mind—I must have room to work. Look, Clarissa—I've got a surprise for you.

CLARISSA GOODYEAR: Oh, how nice, Charles! What's in the package?

CHARLES GOODYEAR: I'll show you. There! See this?

CLARISSA GOODYEAR: Yes—but what is it?

CHARLES GOODYEAR: It's India rubber, my dear—crude India rubber! There was only one place in town where I could get it.

CLARISSA GOODYEAR: But what are you going to do with it?

CHARLES GOODYEAR: I'll show you. Hand me that big kettle there.

CLARISSA GOODYEAR: Yes, Charles—

CHARLES GOODYEAR: Thank you. Now—I'm going to put some of this India rubber in the kettle—and we'll put it on the stove and heat it until it melts.

CLARISSA GOODYEAR: But, Charles—I don't understand!

CHARLES GOODYEAR: Nobody knows how to cure rubber properly—but there must be some way of

making use of it, and I'm going to experiment until I find out how.

CLARISSA GOODYEAR: And this is your first experiment?

CHARLES GOODYEAR: That's right. When the heat makes the rubber soft and pliable, I'm going to try kneading it—the way you do with dough. Then I'm going to roll it as thin as I can with a rolling pin. Better put some more wood in the stove, dear.

CLARISSA GOODYEAR: Yes, Charles.

CHARLES GOODYEAR: There—now we'll have a good hot fire—it shouldn't take long. Is that someone knocking at the door?

CLARISSA GOODYEAR: Yes, Charles.

CHARLES GOODYEAR: Come in!

The door opened and a man walked in. Clarissa Goodyear met him just as he entered.

SHERIFF: I saw Mr. Goodyear come in, ma'am. I want to talk to him.

CLARISSA GOODYEAR: I'm afraid you can't just now—he's very busy.

SHERIFF: He'll see me, all right. I'm from the sheriff's office.

CLARISSA GOODYEAR: Oh!

SHERIFF: You're Mr. Charles Goodyear, aren't you?

CHARLES GOODYEAR: Yes. What do you want?

SHERIFF: They sent me up here to get you.

CHARLES GOODYEAR: But why do you want me? I haven't done anything.

SHERIFF: Mebbe not and mebbe so. There's a fellow lost considerable when your company went bankrupt, Mr. Goodyear.

CHARLES GOODYEAR: But I was simply a junior partner! It wasn't my business.

SHERIFF: This man wants his money back.

CHARLES GOODYEAR: He'll get his money back—they all will. I'll pay them back if it takes me all my life.

SHERIFF: Mebbe so, Mr. Goodyear. But this particular gentleman wants his money now.

CHARLES GOODYEAR: I can't pay him now. I paid off everyone I could. I haven't any more money.

SHERIFF: Then you'll have to come with me. This gentleman's got a good claim against you. If you don't pay him, you got to go to jail for debt—and you got to stay there till you *do* pay him. That's the law.

CHARLES GOODYEAR: How can I earn the money to pay him back, if I'm in jail?

SHERIFF: That's your concern, Mr. Goodyear. The law isn't interested in anything but justice. Come on now.

CLARISSA GOODYEAR: Oh, Charles! They have no right to take you away.

CHARLES GOODYEAR: Now, Clarissa—you mustn't get upset. It'll only be for a little while.

SHERIFF: Orders is orders, Mister. You got to stop what you're doing and come along with me.

CHARLES GOODYEAR: I'll go with you—but you can't make me stop thinking—you can't put a lock on mind! This gives me all the more reason to succeed—to pay back every cent! I'm going to take these things with me and finish my experiments in jail, if I have to—but I'm going to finish them!

And so Charles Goodyear began his life's work within the limits of a debtors' prison. For in those days, in the state in which he lived, the bankruptcy law gave him no protection. For the next six years, until 1841, he was seldom out of prison a whole year, and always in danger of arrest. But even this hardship did not discourage him. All the money he possessed went into purchasing crude rubber gum for his endless experiments—and when he had no more money, he borrowed from his friends.

Before he came even close to solving the problem, all the rubber manufacturing companies had failed. Still Charles Goodyear kept on with his experiments. Finally, in 1836, he began to treat rubber with sulphur. He obtained limited financial backing and began manufacturing rubber articles of various kinds in Roxbury, Massachusetts. Success seemed near. One day, after a long absence, he returned to his place of

business, in high good humor. He found his assistant, Nathaniel Hayward, standing guard outside the store room. . . .

CHARLES GOODYEAR: Well, Nathaniel, I see you're following my orders.

NATHANIEL HAYWARD: That's right, Mr. Goodyear. When did you get back from Boston?

CHARLES GOODYEAR: Just this minute.

NATHANIEL HAYWARD: Did that post-office man come back with you?

CHARLES GOODYEAR: Yes—I hurried out here ahead of him, to make sure everything was all right. Are the rubber mail-bags still in the store room?

NATHANIEL HAYWARD: Aye, that they are, Mr. Goodyear. All hundred and fifty of them—under lock and key as you ordered. Nobody's been in there since you left. I've made sure of that.

CHARLES GOODYEAR: Fine! We can't afford to take any chances with this government order.

NATHANIEL HAYWARD: This is a great day for you, sir.

CHARLES GOODYEAR: It'll be a great day for the world, Nathaniel. When the post office accepts our rubber mail-bags, the public will be convinced that at last the right method of preparing rubber has been found.

NATHANIEL HAYWARD: Indeed it will, sir.

CHARLES GOODYEAR: Quick—here comes the Inspector! Open up the store room.

NATHANIEL HAYWARD: Yes, sir.

INSPECTOR: Ah, there you are, Mr. Goodyear! Now, where are the mail-bags you've made for us?

CHARLES GOODYEAR: Inside this store room.

INSPECTOR: Well, well! Let's have a look at them.

CHARLES GOODYEAR: Right away. Open the door, Nathaniel.

NATHANIEL HAYWARD: Yes, sir.

CHARLES GOODYEAR: This way, sir.

INSPECTOR: I hope the bags are all you say, Mr. Goodyear. I'm a busy man—I can't afford to waste any time.

CHARLES GOODYEAR: The bags are hanging along the store-room wall, on hooks. Bring one over here, Nathaniel.

NATHANIEL HAYWARD: (*off*) Mr. Goodyear, Mr. Goodyear! Something terrible has happened!

CHARLES GOODYEAR: What's the matter, man?

NATHANIEL HAYWARD: Look, sir—the bags have all fallen off the handles!

CHARLES GOODYEAR: So I see, but—I can't understand it.

INSPECTOR: It's simple enough. They've melted, just like India rubber always does. That's what's happened.

CHARLES GOODYEAR: But my new process worked all right on raincoats and carriage covers.

INSPECTOR: Well, it didn't work on these mail-pouches! You've wasted my time, Goodyear, and tricked me into the bargain. You told me your new method would work on anything!

CHARLES GOODYEAR: I thought it would.

INSPECTOR: Well, it doesn't!

CHARLES GOODYEAR: Let me try again. . . .

INSPECTOR: Not with me! I'll cancel that order here and now! You're a fraud, Goodyear, a fraud! Goodbye!

So Charles Goodyear went back to the weary process of trying all over again. But this time it was almost impossible to get help of any kind. His failure on the government order which he had widely publicized served to convince people that it was impossible to make use of rubber in any form. Weeks—months—passed. And then, one day, two men were standing on a street corner. . . .

FRIEND: Have you heard what they're saying about Goodyear?

TIMMONS: Not lately. What is it?

FRIEND: They say, "If you see a man in a rubber coat with rubber shoes and a rubber cap and a rubber purse—without a penny in it—then that's Goodyear."

TIMMONS: Poor Goodyear! As mad as ever, eh?

FRIEND: Worse, if anything. He still insists he's going to discover a way to use India rubber.

TIMMONS: Why, everyone knows it's impossible!

FRIEND: Of course, but it's a shame the way Goodyear neglects his family to go begging about the streets.

TIMMONS: Something should be done about it.

FRIEND: Say—look! Down the street there!

TIMMONS: Well, speak of the devil! It's Goodyear!

FRIEND: He's coming this way. We'd better move on before he sees us. He's bound to try to borrow from us.

TIMMONS: That's right. Let's turn this corner.

CHARLES GOODYEAR: Hey! Timmons! Hey, there!

FRIEND: He's seen us.

TIMMONS: Hurry—he's running after us.

CHARLES GOODYEAR: Hey! Wait a minute!

FRIEND: Faster—he's catching up with us!

TIMMONS: It's no use. We'll have to face him.

CHARLES GOODYEAR: I thought you didn't hear me.

FRIEND: We didn't realize who was calling.

CHARLES GOODYEAR: Gentlemen, this is a fortunate meeting. I've been wanting to talk with you both.

TIMMONS: Some other time, Goodyear.

FRIEND: Yes. We're in a hurry.

CHARLES GOODYEAR: But, gentlemen! I wanted to tell you—at last I've found the proper way to prepare India rubber.

FRIEND: Come now, Goodyear. You've been saying that for the past two years.

CHARLES GOODYEAR: But it's true! I know I'm on the right track this time. All I need is a little money to buy rubber, so I can finish my experiments.

FRIEND: You'll not get it from me.

TIMMONS: Nor me.

CHARLES GOODYEAR: I'll pay you back—I promise I will!

FRIEND: We've had enough of your fantastic ideas, Goodyear, we can't afford to keep throwing money away, simply because you're mad enough to think anything can be done with India rubber.

TIMMONS: Exactly. It's high time you gave up your crazy ways, Goodyear. You owe it to your family. Why don't you get a job?

CHARLES GOODYEAR: I can't take the time from my experiments—they're too important.

FRIEND: Understand this, Goodyear, once and for all. We'll have nothing to do with you. Good day.

CHARLES GOODYEAR: Surely you don't mean that!

TIMMONS: I'm sorry. But it's exactly what we *do* mean!

Goodyear begged and borrowed. He turned everything he had into cash to buy more rubber for his

experiments. Again and again, he went back and started his experiments all over again, along different lines. Every process he developed promised success—and then failed him. In the spring of 1839 he plumbed the depths of despair. Late one night, when he returned to his home at Woburn, he found his wife, Clarissa, waiting for him. . . .

CLARISSA GOODYEAR: Oh, Charles—you look half frozen—come over here by the stove.

CHARLES GOODYEAR: It's no use, Clarissa. I've tried everywhere—I haven't been able to raise a cent today—everyone I ask turns away. Sometimes I think I haven't a friend left in the world.

CLARISSA GOODYEAR: Of course you have, Charles. They just don't understand.

CHARLES GOODYEAR: It's more than that. They think I'm mad. Well, perhaps I am. But I know I'm on the right track this time. If only I could get some money—I must have more rubber to experiment with!

CLARISSA GOODYEAR: What's that in your hand, Charles?

CHARLES GOODYEAR: This? Oh, it's no good—just some gum rubber mixed with sulphur.

CLARISSA GOODYEAR: Be careful, Charles—you'll burn yourself on the stove.

CHARLES GOODYEAR: I don't see why you care.

I've taken everything from you, and given you nothing.

CLARISSA GOODYEAR: We love each other, Charles. That makes up for everything.

CHARLES GOODYEAR: I've sold everything we own—stripped the house bare to get money to continue my work, while our children went hungry. Is it any wonder people think me mad? But, I can't stop, Clarissa—I can't—not until my work is finished.

CLARISSA GOODYEAR: Of course you can't, dear. You'll succeed some day—I know you will.

CHARLES GOODYEAR: If I can only find the right process. Think what it would mean to the world, Clarissa—shoes, blankets, life-preservers—there are any number of uses for rubber if only I can cure it properly. But now—now there's nothing left I can pawn to buy rubber to continue my experiments!

CLARISSA GOODYEAR: There's one thing left—here, take it.

CHARLES GOODYEAR: What, oh! No—not your wedding ring. . . .

CLARISSA GOODYEAR: Take it, Charles. Your work must go on.

CHARLES GOODYEAR: No—I can't—I won't—Clarissa!

CLARISSA GOODYEAR: Charles—don't you remember when you gave it to me—"for better, for worse?"

CHARLES GOODYEAR: "Till death do us"—no, Clarissa! I can't take the ring!

Suddenly Clarissa was startled by the sharp hiss of wet rubber hitting the hot stove.

CLARISSA GOODYEAR: Oh, Charles!—your hand—have you burned it?

CHARLES GOODYEAR: Look, Clarissa—look!

CLARISSA GOODYEAR: Oh, my dear—are you hurt?

CHARLES GOODYEAR: No—but look! The rubber—when I struck it against the hot stove—it should have melted—but it didn't.

CLARISSA GOODYEAR: Charles, what are you talking about?

CHARLES GOODYEAR: It—it's charred, like leather—and the rim around the charred part is—is even *more* elastic than natural rubber.

CLARISSA GOODYEAR: Have you gone mad?

CHARLES GOODYEAR: I don't know. What if I have? Because at last I've got it. I've found it, Clarissa—the way to *prepare India rubber!*

At last Goodyear was on the track of the vulcanization of rubber. But it took five more years of heart-breaking experiment to learn the correct proportions of sulphur and gum, the right amount of heat to apply and how best to apply it. Finally in 1844, after ten years of privation—after ten years of unremitting toil, Goodyear learned how to conduct the process of vulcanization with absolute certainty. His long search ended in success—and true to his promise, he

paid every cent of the \$35,000 liabilities resulting from the original bankruptcy. One day, as he sat talking with his brother-in-law, William De Forrest, who had advanced Goodyear more than \$46,000 to conclude his experiments, a stranger entered. . . .

MERCHANT: Good afternoon, gentlemen. Which of you is Charles Goodyear?

CHARLES GOODYEAR: I'm Goodyear. This is my brother-in-law, Mr. De Forrest.

MERCHANT: Mr. Goodyear, I'll come right to the point. I want to manufacture India rubber shoes under your new patent. How much do you want as a license fee?

CHARLES GOODYEAR: Why, I really don't know. How much would you say?

MERCHANT: Well, suppose we make an arrangement that you get a royalty of a half-cent a pair. How does that strike you?

CHARLES GOODYEAR: It sounds fair to me.

WILLIAM DE FORREST: It's not enough!

MERCHANT: But Mr. Goodyear just said—

WILLIAM DE FORREST: Mr. Goodyear doesn't realize the value of his patent. He struggled for years to perfect his process. His royalty on rubber shoes ought to be a great deal more than half a cent a pair.

MERCHANT: Of course, it's whatever he says. But the royalty will have to be added to the retail price.

CHARLES GOODYEAR: That's right. The higher my

royalty, the more the retail price of the shoes will be.

WILLIAM DE FORREST: Naturally.

CHARLES GOODYEAR: A half a cent a pair is plenty.

WILLIAM DE FORREST: But, Charles—

CHARLES GOODYEAR: Yes, William. I know what your objection will be. But you don't know what it's like—trying to buy things, when you have very little money. I do. I know what it's like to beg, even, William. And now that I've perfected the process of curing rubber, I want every product made from it to be available to everybody.

WILLIAM DE FORREST: But, Charles—you could build a tremendous fortune from your patent. You don't understand. They've *got* to come to you, to manufacture rubber goods! You should make yourself a millionaire!

CHARLES GOODYEAR: I've got what I want, William. I'll have the means to continue my experiments.

WILLIAM DE FORREST: Continue your experiments? Why, your work is finished—after all these years!

CHARLES GOODYEAR: Finished? Oh, no, William. My work is just beginning. Some day, the world will use rubber in a thousand different ways!

Charles Goodyear was right. Before his death, he lived to see rubber used in five hundred different ways, all of them made possible through his discovery of vulcanization. His vision was great. The his-

tory of the rubber industry for its first 25 years is the personal history of Charles Goodyear's life. Today, the manufacture of rubber articles is one of the world's greatest industries. Rubber has been put to commercial use in more than thirty thousand different ways. For his courage, his unselfish devotion to an idea, his faith in himself and his work, the world owes Charles Goodyear a lasting debt of gratitude.