Wonderful Rubber

by Charles S. Harris Ooltewah, Tennessee

Probably the second most important invention that concerns the convenient nursing of infants is the glass Feeding Bottle which we are all ultimately familiar with. If it weren't for the Glass Baby Bottles, not very many of us would be very literate on the subject or even know about each other's existence. Oh, maybe some of us would be collecting Soda or Whiskey bottles, but, well, I'd probably better keep mouth shut there — somebody might stick an oversized nipple in it (one of them Calf feeding ones).

Which brings up my topic for the moment — Rubber Nipples. I recently obtained a new Civil War book — no, not on Rubber Nipples, but titled, *India-Rubber and Gutta-Percha In the Civil War Era*, ISBN 0-9670731-0-3, by Mike Woshner and published by O'Donnell Publications of Alexandria, Va. It is about 300 pages long, has a wonderful bibliography and even has an extensive section on all the related patents from 1813-1868 with Patent Number, Date, Patentee and Brief Description.

Rubber was first discovered by Columbus on his second voyage to the New World when he observed the natives of *Hispaniola* (now Haiti) playing a game with an elastic ball made from "goma de un arbol," or "gum of the tree." In 1615 Juan de Torquemada notes that waterproof capes and raincoats in Mexico made from the juice of the "....elastic milk tree ... melted in the rays of the sun." He also noted that they became brittle when subjected to the cold.

The name "rubber" was first noted in 1770 when a London instrument maker sold small pieces of this elastic substance to "rub out" marks made by a lead pencil and the substance became known as "India-rubber." In 1791, Samuel Peal was granted the first English rubber patent for the waterproofing of leather, cloth, etc. by using a treatment of a turpentine solution, but it didn't cure the instability problems of the India-rubber.

In 1834, Charles Goodyear began a ten year mission of trying to solve the problems of India-rubber and was obsessed with its improvements till his death. In 1834, he was visiting the Roxbury India Rubber Company store, and while inspecting a life preserver, he noticed the valve, which he believed he could improve upon. He did and the manager was impressed with the design. The manager advised Goodyear that the rubber industry was in its demise and downfall due to the instability of the Indiarubber. From that day until he died in 1860, Charles Goodyear had two goals the use of improved rubber for every conceivable purpose and the improvement of life preservers so that no person would ever drown again. As a result of his research he often spent time in debtor's prisons in the U.S. and abroad, and he and his family lived out the last of their lives in poverty.

In 1838, Nathaniel Hayward received Patent #1090 for the use of sulphur in the processing of India-rubber and sold it to Charles Goodyear. This was the first major step in the manufacture of what we now know as Rubber. In 1839, Charles Goodyear finally discovered the components for the cure of India-rubber's deficiencies - sulphur, white lead, and heat. In 1844, Patent #3633 was issued to Goodyear which defines the process known as "vulcanization." Some have implied, stated or written that his discovery was an accident - saying that he had carelessly dropped a glob of his material on a hot stove.



Whether this happening was an accident or not, the next nine years after 1839 were no accident.

The process of converting the unstable, crude substance into a stable, consistent product is described in Goodyear's introductory description in the United States Patent #3633 dated June 15, 1844.

The Patent Description is below:

"My principle improvement consists in the combining of sulphur and white lead with the India-rubber, and in the submitting of the compound thus formed to the action of heat at a regulated temperature, by which combination and exposure to heat it will be so far altered in its qualities as not to become softened by the action of the solar ray or of artificial heat at a temperature below that to which it was submitted in its preparation — say to a heat of 270° of Fahrenheit's scale — nor will it be injuriously affected by exposure to cold. It will also resist the action of expressed oils, and that likewise of spirit of turpentine, or other essential oils at common temperatures, which oils are in its usual solvents."



In our readings we are constantly barraged by comments that the early nipples and nipple-shields had a bad taste and were quite often rejected by the infants that were supposed to be using them. Think about it, have you ever drunk the water from Biloxi, Miss. or many locations in Fla.? It didn't taste very good did it? Even the Coca-Cola plant in Biloxi imports its water - their water has a high sulphur content and is only palatable when very cold.

Here I wish to quote a paragraph from p.37 of Mike Woshner's book:

"At a time when the effects of lead poisoning were being confirmed, at least

Bottles and Extras

one specific application of India-rubber raised a stir in the medical community. A medical report issued in 1862 stated that teats, nipple-shields, and stoppers of feeding bottles made of vulcanized Indiarubber caused vomiting and disturbances of the digestive organs in infants. According to the report, nothing but crude rubber and sulphur was necessary to produce vulcanized India-rubber but, since the processed rubber was sold by weight, manufacturers added compounds which included lead, zinc, antimony and arsenic, creating 'adulterated rubber.' The Royal Medical College of the Rhenish provinces denounced the use of vulcanized India-rubber containing oxides of lead as extremely dangerous. At Dusseldorf and Berlin, authorities threatened anyone making or selling these articles with severe penalties. The report suggested using only '...teats made of pure caoutchouc' [French for the Amazon native "cahuchu" or "tree that weeps"] (i.e. unvulcanized), further suggesting ways to identify these, the simpliest being that they were brownish, shiny and floated in water."



Even though Charles Goodyear is given the American credit for the vulcanization of India-rubber, which enabled the world to live better, credit cannot be denied to his brother, Nelson Goodyear, who was an inventor in his own right. One of Nelson's most notable inventions was the mixing of sand and rubber to make non-slip surfaces for steps and railcar tops. He also has the most visible patent in the rubber industry, "May 6, 1851" that will be seen on all "Hard-rubber" items made until about 1872, whether it be buttons, hair-combs, medical instruments or whatever. And these hard-rubber items do not deteriorate. I have seen lice combs and hair combs dug out of Civil War campfire and garbage pits that show absolutely no deterioration.



In *The Scientific American* on September 17, 1859, they took a tour of the American Hard Rubber Company and listed the following items that they observed being produced and shown to them:

"A vast assortment of druggist's articles, syringes, caustic-holders, medicine bottles. ear-trumpets, stethoscopes. brooches, bracelets, necklaces, shirt-studs, earrings, tidy-needles, thimbles, thread and needle cases, photographic apparatus, ... canes, combs. hairpins, bonnet-pins, napkin-rings, knife-handles, doormats, currycombs, rules and scales for the draughtsmen and surveyors, etc."

Our lives are still heavily touched by the invention of hard-rubber. Being a close brother to the vulcanized rubber, there are differences in their manufacturing process. In Brannt's, *A Practical Treatise on Caoutchouc and* *Gutta-Percha, pp.111-112,* "Hard rubber is formed by using a larger amount of sulphur and heating at a higher temperature than vulcanized 'soft' rubber. Its ultimate degree of hardness depends on modifications of these variables, from '86 parts caoutchouc and 14 parts sulphur for elastic and pliable articles ... well adapted for manufacturing combs' to '65 parts caoutchouc and 35 parts sulphur when great hardness and solidity are required, as in a material suitable for knife handles, buttons, door knobs, etc."

Have you ever noticed the beautiful cases that enclose the fine photos of the families and children of the middle-1800s? They are made out of either hardrubber or Gutta-Percha. Gutta-Percha comes from the latex of several Malaysian trees that quickly hardens when left untreated but resembles rubber or hardrubber when properly vulcanized (1842).

Genetically or botanically, guttapercha is not related to India-rubber, but they are chemically similar. Both are approximately seven-eighths carbon and one-eighth hydrogen, but the gutta-percha also contains oxygen, about 1 1/2 percent, which is lacking in the India-rubber. Unlike raw India-rubber, gutta-percha solidifies and remains hard soon after exposure to air. When it is heated or immersed in hot water it becomes soft and can be molded, retaining its shape when it cools off. This allowed it to be used for many of the applications attributed to hard rubber without being vulcanized. This state would not remain permanently without being vulcanized though, for it would eventually become brittle and turn to powder.

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Another application being advanced in the early 1850's was the use of vulcanized gutta-percha for gas and water pipes, for many of these were made out of lead for the smaller diameters. Gutta-percha was stronger, cheaper and more durable than the heavy metal, lead. Dr. Thomas Smith of Cheltenham, England stated:

"Many serious and alarming disorders, such as mania, epilepsy, sudden death, nervous affection, paralysis, consumption hydrocephalus, heart disease, etc. owe their origin in some instances, their intractable character in others, to the gradual and continuous infinitesimal doses of lead, copper, etc., introduced into the system through the channel of our daily drink."

While I have only just scratched the surface of Mike Woshner's book here, I can only say that I have learned much more of reality of what I have only suspicioned from my many years of collecting Civil War artifacts and now of Baby Bottles. At first Teresa drug me into collecting Baby Bottles kicking and screaming, but since she had been so patient with me for about the first 15 years of our married life while I was out digging Civil War artifacts I finally decided that it was in my best interests to at least show



an interest. Well, to say the least — I am hooked on it??!! Also, don't tell her, the Civil War relics are disappearing and/or getting too expensive to buy. Just the other day I even traded one of my prized Civil War belt buckles for a baby bottle for her. You probably saw it at the Fort Meyers convention. Oh, well...

PS: Mike Woshner recommends treating any old, or just slightly old, rubber, soft or hard, with ArmorAll© Protectant like you use on the dashboard of your car. It keeps the ozone, which causes a chemical change to rubber similar to rusting in metal, from getting to the rubber and deteriorating it. The ArmorAll does make it slick though, so be careful not to drop it, especially if it is attached to a valuable bottle. Also for curled up rubber that is supposed to be flexible he recommends setting it out in the warm sun for an hour. That will soften it enough to allow it to be uncurled and then laid in a cool place for it to take on its new or original shape. Sounds neat doesn't it?

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