

**“BLACK GOLD”:  
A PROVISIONAL GUIDE TO VULCANIZED RUBBER ORNAMENTS  
IN THE UNITED STATES, 1850–1898**

by  
Lanah Swindle

A thesis submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Master of Arts in American Material Culture

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## ABSTRACT

Ornamental hair combs and jewelry fabricated from the novel industrial-made material *vulcanite* emerged around 1850 as part of a growing market for vulcanized rubber goods manufactured in the United States. From roughly 1850 until the end of the century, dozens of rubber companies made ornaments in large quantities for mainstream consumption. Their vast output ranged from three-dimensional sculptural objects to flat, geometric pieces that appealed to fashionable consumers from Portland, Maine, to San Francisco, California. However, despite their high cultural value in mid-to-late nineteenth-century material culture, these objects have thus far been overlooked. The popularity of these adornments begs questions about their material origins, production, marketing, and consumption of hard rubber combs and jewelry. To answer these questions, this thesis offers a material and cultural guide to vulcanized rubber ornaments, ranging from bold cable chain necklaces to understated hair pins, that emerged during the first wave of the industrial production of ornamental hard rubber products. In essence, this thesis reintroduces the subject to students and researchers of Victorian America through surviving pieces in the holdings of the Butler Museum, Historic New England, and the Winterthur Museum, as well as textual and visual materials culled from the Beinecke Rare Book and Manuscript Library, the Library of Congress, and the New York Public Library.

## Chapter 1

### INTRODUCTION

A carte-de-visite, made between 1874 and 1877, preserves the image of a woman adorned by a heavy, black hard rubber cross suspended from a dark velvet ribbon (fig. 1, 2). Captured by Philadelphia-based photography studio, Henrici & Garns, the close crop of the portrait focuses on the woman's carefully considered dressed hair and bodice of rich textiles pinned by the sculptural cross. The woman's choice to present herself in vulcanized rubber is not unique. Contemporaneous portrait photographs capture the omnipresence of jewelry and hair accessories fabricated from hard rubbers in the United States in the mid-to-late nineteenth-century (fig. 3, 4, 5).<sup>1</sup> In conversation with these portraits are tireless advertisements in newspapers, fashion columns, department store catalogs, works of fiction, and other materials bent on illustrating the beguiling aura of *vulcanite* (fig. 6).<sup>2</sup> The abundance of textual and

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<sup>1</sup> My application of the term "ornament" classifies decorative objects designed with the intention of being worn on the body. This includes jewelry, and hair accessories used to ornament and maintain hairstyles (e.g., twist combs, back combs, side combs, and hair pins).

<sup>2</sup> The term "vulcanite" was used in the period indiscriminately. From 1850 until the end of the century, the material is marketed under a variety of terms including "India rubber," "vulcanized India rubber," "hard rubber," "rubber," "vulcanite rubber," and "vulcanite."

visual materials animate surviving pieces in public and private collections. Together and apart, these diverse sources affirm the significance of vulcanized rubber ornaments in the material culture of the mid-to-late nineteenth-century.

The popularity of these adornments, taking place during large scale expansion of the Euro-American rubber industry, begs questions about the material origins, production, marketing, and consumption of hard rubber jewelry. To answer these questions, this thesis offers both a material and cultural guide to vulcanized rubber combs and jewelry, ranging from bold cable chain necklaces to understated hair pins, that emerged during the first wave of the industrial production of ornamental hard rubber products. Beginning in 1850, buttons, combs, and simple finger rings, were mass-produced for mainstream consumption using hard rubber materials—the result of natural rubbers being industrially cured by the application of artificial heat and sulfur.<sup>3</sup>

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by 1865, the use of “vulcanite” as in “vulcanite jewelry” was popularized by retailers in urban centers such as Baltimore, Maryland, and Boston, Massachusetts.

<sup>3</sup>Depending on the heat and quantity of sulfur used, vulcanization can produce soft elastic materials or hard, nonelastic forms such as vulcanite. Typically, the term “hard rubber” is used when the amount of sulfur added during vulcanization exceeds five percent. Vulcanite is a specific compound of hard rubbers that can be up to forty-percent sulfur by weight. That is all to say, however, in the nineteenth century, vulcanite and vulcanization and even hard rubber had n fixed meaning; but in general, it refers to either a process or product produced by combination of rubber and sulfur in a manner producing chemical change that renders it more elastic and impervious to heat, cold, and solvents. See George B. Snow, “The Physical Properties of Vulcanite,” *The Dental Advertiser* 18 (1887): 3–5; Samuel Phillip Sadtler, *A Handbook of Industrial Chemistry: Adapted for the Use of Manufacturers, Chemists, and all Interested in the Utilization of Organic Materials in Industrial Arts* (Philadelphia: J. P. Lippincott, 1900); Y. Coran, “Vulcanization,” in *Science and Technology of Rubber*, ed. Frederick R. Eirich, 292–35 (New York: Academic Press, 1979). While it would seem that the manufacture of bracelets, earrings, necklaces, and rings, fell out of favor by the end of the 1890s, decorative hair combs and dress accessories such as buttons,

By the end of the 1860s, ornaments made from hard rubbers emerged from over ten manufactories in the United States alone.<sup>4</sup> Alongside the mass-production of ornaments by large companies, smaller jewelry firms diversified their lines to include *vulcanite* combs and jewelry.<sup>5</sup> The malleability of hard rubber made it a desirable medium for decorative hair combs and jewelry (fig. 6). Producers leveraged burgeoning industrial technologies to bend, mold, and stamp rubbers into variable designs ranging from flat, geometric shapes to audacious three-dimensional forms that were wrought into necklaces, chatelaines, pocket watches, watch fobs, earrings, rings, brooches, belt buckles, bracelets, buttons, back combs, twist combs, and hair pins (fig. 7). These objects were purchasable by wide audiences.

The survival of vulcanized rubber combs and jewelry in private and public collections is a testament to the scale at which they were disseminated, as well as to consumer desire for and attachment to hard rubber ornaments (fig. 8, 9). In order to

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belt buckles, and hat pins, continued to be produced. For example, see a pair of hat pins in the holdings of Historic New England: hat pins, 1934. 1289AB.

<sup>4</sup> These companies included the Beacon Dam Company (1852–1857); Butler Hard Rubber Company (1883–1898); Goodyear Curler Company (1873–1890); Goodyear’s India Rubber Glove Manufacturing Company (1847–1895); Goodyear’s Rubber Company (1873–1898); India Rubber Comb Company (1852–1898); La Perle Rubber company (1873–1895); Novelty Rubber Company (1855–1884); Rubber Clothing Company (1855–1892); Rubber Comb and Jewelry Company (1876–1882); and the Vulcanite Jewelry Company (1855–1888). I have identified these manufactures based on advertisements in newspapers, business directories, exhibition catalogs, trade catalogs, patents, and legal cases.

<sup>5</sup> I have identified three smaller jewelry firms engaged in the production of hard rubber ornaments. The firms include C. H. Flagg, Shiffer & Company, Rice & Brother, which were also based in lower Manhattan. Unlike most of the larger companies, the production of the ornaments happened locally, opposed to factories located in rural towns.



assess extant samples, this guide relied on surviving pieces housed in the collections of the Butler Museum, Historic New England, and the Winterthur Museum. Thanks to these collections, my survey of extant pieces, allowed me to study more closely the materialities of vulcanized rubber ornaments. As each of these pieces show evidence of different hard rubber compounds in different conditions, providing new insights and a better understanding of the complex physical characteristics of vulcanized rubber ornaments—qualities that have gone mostly unnoticed and understudied by researchers. A recovery project in principle, the main purpose of this thesis is to reintroduce vulcanized rubber ornaments as an important class of objects and vibrant material for further study by students and researchers of mid-to-late nineteenth-century material culture, as well as those interested in jewelry and early plastics histories. In the process of assembling this guide, my thesis asks additional questions about the staying power of hard rubber combs and jewelry, and what they have to impart today? Moreover, given the nature of the materials and cultural uses, I also address issues surrounding the collecting and documentation of objects deemed of lesser value by traditional histories of mid-to-late nineteenth-century jewelry.

### **Scope and Methodology**

Despite its high cultural and historical prominence and potential for historical investigation vulcanized rubber ornaments has been largely overlooked. To my knowledge, the only publication that touches upon the cultural and historical significance of this class of objects is the archeologist David R. Bush's study of rings, necklaces, and other ornaments repurposed from the vulcanized rubber buttons during the American Civil War. His book, *I Fear I Shall Never Leave this Island: Life in a Civil War Prison* (2011), offers a detailed case study of rubber ornaments excavated

on the grounds of the Union Prisoner-of-war camp for Confederate soldiers at Johnson's Island, Sandusky Bay, Ohio.<sup>6</sup> His work, however, is limited in its scope and fails to provide crucial historical context as to why the soldiers refashioned the buttons into other ornaments, or what it meant for these men to be able to work with hard rubber.

My thesis carries forward Bush's commitment to retracing the stories surrounding the rubber ornaments, with special mention to filling in the gaps that lay outside the scope of his research. In order to better understand the role of vulcanized rubber ornaments during the period under review, I turn to textual and visual information gleaned from mainstream as well as more exclusive sources, including, advertisements in newspapers, exhibition and trade catalogs, fashion columns and manuals, patents and trademarks, business directories and industry surveys, botanical research papers, vignettes in popular fiction, as well as surviving portrait photographs of sitters wearing hard rubber combs and jewelry.

The absence of a formal historiography on this subject has necessitated careful piecemeal work. To critically read the historical record, I have relied on many thinkers, who, very similar to the primary source materials, straddle different disciplines and ways of seeing. A concentrated effort in the field of conservation, has documented how to care for hard rubber objects in museum collections. As a "malignant plastic," conservators, consider hard rubber in terms of its potential for damaging other

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<sup>6</sup> David R. Bush, *I Fear I Shall Never Leave this Island: Life in a Civil War Prison* (Gainesville: University Press of Florida, 2011).

objects—especially metals.<sup>7</sup> Critical studies by Sharon Blank, Julia Fenn and R. Scott Williams, J. Morgan, Thea B. van Oosten, and Alazne Porcel Ziarsolo, to name a few, have informed my continued understanding of how this material degrades over time, including the insight that hard rubbers appear differently from object-to-object because hard rubbers are not homogenous, with variables emerging from the compounding of ingredients.<sup>8</sup> Conversations with objects conservator Lara Kaplan, emboldened my interest in this jewelry, and led me to imperative scholarship previously out of my line of inquiry. Emma Reuther's and Claire Taggart's conservation reports on select vulcanized rubber hair accessories in the Winterthur Museum's collections have also been invaluable.<sup>9</sup> In addition to the perspectives offered by conservators, I have found useful work examining the production of rubberized garments and footwear informative, most pressingly, articles by Manuel

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<sup>7</sup> R. Scott Williams, "Care of Plastics: Malignant Plastics," *WAAC Newsletter* 24, no.1 (2002). <https://cool.culturalheritage.org/waac/wn/wn24/wn24-1/wn24-102.html>.

<sup>8</sup> Sharon Blank, "An Introduction to Plastics and Rubber in Collections," *Studies in Conservation* 35, no. 2 (1990): 53-63; Julia Feen and R. Scott Williams, "Caring for Plastics and Rubbers," *Preventive Conservation Guidelines*, Canadian Conservation Institute, <https://www.canada.ca/en/conservation-institute/services/preventive-conservation/guidelines-collections/caring-leather-skin-fur.html>; J. Morgan, "A Survey of Plastics in historical collections," *Plastics Historical Society* (1994); Thea B. van Oosten, *Properties of Plastics: A Guide for Conservators* (Los Angeles: Getty Conservation Institute, 2022); and Alazne Porcel Ziarsolo, "Plastics in fashion: a Review of Plastic Materials in Modern and Contemporary Costume Collections and their Conservation," *Conservar Património* 43 (2023):113–143.

<sup>9</sup> Emma Reuther, Conservation report for 1958.1143 (unpublished report, 2024); and Claire Taggart, Conservation report for 2015.0009.010, 2015.0009.011.001, 2015.0009.011.002 (unpublished report, 2016).

Charpy, Sarah Levitt, and Arlesa J. Shepard.<sup>10</sup> I was further informed by more wide-ranging studies on the Euro-American rubber industry in the nineteenth century, including Pau Medrano-Bigas's work on the rubber industry in New Jersey and Cai Guise-Richardson's re-framing of Charles Goodyear's industrial control of this industry through patents.<sup>11</sup> Histories surrounding the scientific research, innovation, and the manufacturing of early plastics in the United States and Britain, such as W. E. Bijker's essay, "The Social Construction of Bakelite," have also been illuminating.<sup>12</sup> Pertinent rubber histories in Central and South America have strengthened my understanding of the significance of these objects, such as work done by Carolina Sá Carvahlo, Oliver T. Coomes and Bradford L. Barham, Heloisa Maria Betrol Domingues and Emilie Carreón, Susan B. Hecht, Stephen Nugent, Corey Ross, Jens Soentgen, and Barbara Weinstein.<sup>13</sup> Throughout my research, Cassie Newland's

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<sup>10</sup> Manuel Charpy, "Craze and Shame: Rubber Clothing during the Nineteenth Century in Paris, London, and New York City," *Fashion Theory* 16, no. 4 (2019): 433–60; Sarah Levitt, "Manchester Mackintoshes: A History of the Rubberized Garment Trade in Manchester," *Textile History* 17, no. 1 (1986): 51–70; and Arlesa J. Shepard, "L. Candee & Co. and the U. S. Rubber Shoe Industry," *Clothing and Textiles Research Journal* 38, no. 4 (2020): 255–69.

<sup>11</sup> Pau Medrano-Bigas, "The Forgotten Years of Bibendum: Michelin's American Period in Milltown: Design, Illustration and Advertising by Pioneer Tire Companies, 1900–1930" (Dissertation: University of Barcelona, 2015); and Cai Guise-Richardson, "Redefining Vulcanization: Charles Goodyear, Patents, and Industrial Control, 1834–1865," *Technology and Culture* 51 (2010): 357–87.

<sup>12</sup> W. E. Bijker, "The Social Construction of Bakelite: Toward a Theory of Invention," in *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, 159–87 (Cambridge: MIT Press, 1987).

<sup>13</sup> Carolina Sá Carvalho, *Traces of the Unseen: Photography, Violence, and Modernization in Early Twentieth-Century Latin America* (Evanston: Northwestern University Press, 2023); Bradford L. Barham and Oliver T. Coomes, "The Amazon

methodological approach in her 2022 article, “The Tools of Empire?,” has confirmed my impulse to focus on the interconnected stories that surround extractive industries.<sup>14</sup> Euro-American and British jewelry histories by Charlotte Gere, Martha Gandy Fales, Laura E. Johnson, Sarah Nehama, Judy Rudoe, have undoubtedly informed this project, too.<sup>15</sup>

Influenced and informed by perspectives of many disciplines, then, this thesis compiles diverse materials—textual, visual, and physical objects—in anticipation of a future digital guide and database. The surveyed materials and their interpretation are subsequently embedded in a series of primer-like entries, thematically organized into

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Rubber Boom: Labor Control, Resistance, and Failed Plantation Development Revisited,” *The Hispanic American Historical Review* 74, no. 2 (1994): 231–57; Heloisa Maria Betrol Domingues and Emilie Carreón, “Rubber,” in *New World Objects of Knowledge: Cabinet of Curiosities*, eds. Mark Thurner and Juan Pimentel, 51–6 (London: University of London Press, 2021); Susan B. Hecht, *The Scramble for the Amazon and the ‘Lost Paradise’ of Euclides da Cunha* (Chicago: University of Chicago Press, 2013); Stephen Nugent, *The Rise and Fall of the Amazon Rubber Industry: An Historical Anthropology* (London: Routledge, 2018); Corey Ross, *Ecology and Power in the Age of Empire: Europe and the Transformation of the Tropical World* (Oxford: Oxford University Press, 2017); Jens Soentgen, *Indigenous Knowledge and Material Histories: The Example of Rubber* (Cambridge: Cambridge University Press, 2024); and Barbara Weinstein, *The Amazon Rubber Boom: 1850–1920* (Stanford: Stanford University Press, 1983).

<sup>14</sup> Cassie Newland, “The Tools of Empire?” *Industrial Archaeology Review* 44, no.2 (2022): 80–95.

<sup>15</sup> Charlotte Gere and Judy Rudoe, *Jewellery in the Age of Queen Victoria: a Mirror to the World* (London: British Museum, 2010); Martha Gandy Fales, *Jewelry in America, 1600–1900* (Suffolk: Antique Collector’s Club, 1995); Laura E. Johnson, *Keepsakes and Treasures: Stories from Historic New England’s Jewelry Collection* (Boston: Historic New England, 2016); and Sarah Nehama, *In Death Lamented: The Tradition of Anglo-American Mourning Jewelry* (Boston: Massachusetts Historical Society, 2012).

sections similar to a working catalog. Each thematic section opens with a brief introduction to the topic explored, which is followed by entries on a select survey of objects. The materials are organized as followed; the section “Ornamental Rubber” retraces the material conditions for the emergence of hard rubber ornaments by the middle of the nineteenth century. Second, “Extracting and Processing Latexes” addresses the skills and expertise required to prepare natural rubbers for the export to companies in the United States. Third, “Fabricating Ornaments” considers the industrial processes required to chemically transform natural rubbers to semi-synthetic materials, and further the fabrication methods and techniques flexed by workers engaged in the fabrication of combs and jewelry. Fourth and final, “Wearing” turns our attention to the people wearing *vulcanite* ornaments to complicate and affirm the significance of hard rubber ornaments in the period. By structuring this project according to themes and related object studies allows us to critically engage with vulcanized rubber ornaments and their significance in mid-to-late nineteenth-century material culture.



Figure 1      Half-length portrait of a woman wearing a vulcanized rubber cross pendant. Philadelphia, Pennsylvania. Photography studio: Henrici & Garns, ca., 1874–77. Albumen and silver nitrate on photographic paper. Schomburg Center for Research in Black Culture, Photographs and Prints Division, The New York Public Library, <https://digitalcollections.nypl.org/items/510d47e1-cdc7-a3d9-e040-e00a18064a99>



Figure 2      Molded and carved cross pendant with bail and die-stamped jump ring. United States. Manufacturer once known, ca. 1870–90. Vulcanized rubber, enameled metal. 1.07 x 0.25 in. Courtesy of Historic New England. Gift of S. Alice Chase 1932.651.





Figure 3      110 molded beads strung on a cord with a metal clasp. United States. Manufacturer once known, ca. 1865–80. Vulcanized rubber, copper alloy, cotton. Courtesy of Historic New England. Gift of Mrs. Henry B. Spelman 1942. 260.



Figure 4 Three-quarter length portrait of a young woman wearing a vulcanized rubber beaded necklace, similar to figure 3. Binghamton, New York. Photography studio: S. Bullock, ca. 1869–75. Albumen and silver nitrate on photographic paper on card mount. Personal collection of the author. Photo courtesy of the author.



Figure 5 Three-quarter length portrait of two young women. The woman on the left wears a similar necklace to figure 3. Philadelphia, Pennsylvania. Photography studio: B. F. Reimer, ca. 1869. Albumen and silver nitrate on photographic paper on card mount. Schomburg Center for Research in Black Culture, Photographs and Prints Division, The New York Public Library. <https://digitalcollections.nypl.org/items/510d47e1-cde7-a3d9-e040-e00a18064a99>

### THE CONQUESTS OF INDIA RUBBER.

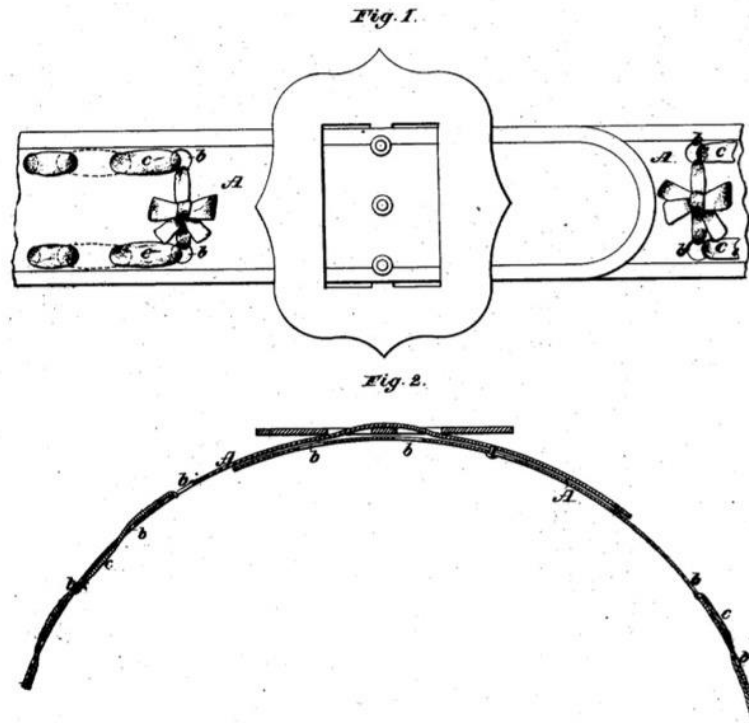
The india rubber department is bountifully supplied with everything imaginable from horse shoes to pictures. Yes, gutta percha has found its way into the artist's studio. The crowning glory of this booth is a large portrait of Good-year by Healey. Below is a smaller one of Webster by the same artist, and Carl Weber furnishes a landscape painted on the accommodating material. There are dolls and dolls' overshoes, swimming belts, and *slates* made out of a preparation of india rubber and emery! There are rings and vulcanite jewelry of every description, that can be worn, too, in the salt water without detriment. Think of it Newport belles! There is everything in india rubber but an india rubber conscience. Goodyear thinks that, in this one thing, he has been forestalled by nature.

Figure 6      A description of the products for sale at a rubber emporium. "The Conquests of India Rubber," *Springfield Weekly Republican*, April 16, 1864. Courtesy of the Library of Congress.  
<https://chroniclingamerica.loc.gov/lccn/sn83020847/1864-04-16/ed-1/seq-5/>

W. MULLEE.  
Assignor to the Vulcanite Jewelry Co.  
BELTS.

No. 7,879.

Reissued Sept. 11, 1877.



Attest.  
*Henry L. Fuller*  
*William C. Nelson*

Inventor  
*William Mullee*

Figure 7 A design by W. Mullee for a belt fabricated from vulcanized rubber. W. Mullee, Belts, US Patent no. 7,789, filed September 11, 1877.  
<https://patents.google.com/patent/USRE7879E/en?inventor=mullee&oq=mullee&sort=old>



Figure 8 Adjustable bracelet with a molded and carved panel depicting a sporting scene. United States. Manufacturer once known, ca. 1870–85. Vulcanized rubber. 2.0125 x 2.025 in. Courtesy of Historic New England, Bequest of Amelia W. Little, 1986.1506.





Figure 9      Half-portrait of a woman wearing a hard rubber twist comb likely made by the India Rubber Comb Company. Photographer once known, ca. 1870–80. Collodion and silver image on iron with lacquer, paper. 4 x 2.5 in. Personal collection of the author. Image courtesy of the author.



Figure 10 Detail of comb style no. 206 in a trade catalog for the India Rubber Comb Company. India Rubber Comb Company, Illustrated trade catalog (New York: Self-published, ca. 1880–85), 101. Courtesy of the Winterthur Museum, Garden & Library. Image courtesy of the author.



## Chapter 2

### ORNAMENTAL RUBBER

The expansion of the Euro-American rubber industry in the 1850s, unfurled commercial products made from hard rubbers—including breast pumps, dental plates, garter belts, industrial hose, matchboxes, penholders, and syringes. Hard rubber ornaments were also part of this expansion. The reference to the sale of ornamental hair combs, rings, and necklaces, as the decade progressed, documents the increasing popularity amongst consumers for decorative rubbers. An 1853 publication by Anglo-American capitalist, Charles Goodyear, includes a section on the “Fancy and Ornamental Uses” of vulcanized rubber.<sup>16</sup> Here, Goodyear enumerates ivory-colored hard rubber brooches, as well as enameled and metal inlaid cameos, shawl pins, and hair clasps and loops. This section sketches the application of vulcanized rubber for ornamental objects designed with the intention to adorn the body. Capitalist and the self-proclaimed inventor of *vulcanization*, Charles Goodyear, displayed fifteen pieces of “India rubber jewelry” at the 1855 world’s fair in Paris, captivating Western spectators.<sup>17</sup> From the first Paris world’s fair until the end of the century,

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<sup>16</sup> Charles Goodyear, *Gum-Elastic and its Varieties, with a Detailed Account of its Applications and Uses and of the Discovery of Vulcanization* (New Haven: self-published, 1853), 247–52.

<sup>17</sup> *Report Upon the Condition and Progress of the US National Museum During the Year Ended June 30, 1928* (United States Government Printing Office, 1928), 107.

vulcanized rubber charmed the heads, ears, necks, wrists, and fingers of fashionable consumers on both sides of the Atlantic. The emergence of “fancy rubber,” however, begs us to consider the creation of the industrial made material and its relationship to the Euro-American rubber industry. Thus, in this next section, I trace the origins of vulcanized rubber to highlight the development of the semi-synthetic substance.

### **Pará Rubbers**

The origin of vulcanized rubber combs and jewelry are seeded in Indigenous technologies. The rubber objects—including shoes, balls, bands, syringes, waterproof garments, atomizer bulbs, and dolls—that historically were made and exported by communities of diverse cultural and social histories across the Amazon River and its tributaries (fig. 11).<sup>18</sup> The trade in Indigenous rubber products was localized on tributaries near Belém, Brazil—the Mojú, the Acará, and the Bujaru—whose collective output generated, for example, a staggering 450,000 pairs by 1839, at a time when the United States population was just shy of 12 million.<sup>19</sup> These novel imports

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<sup>18</sup> By the early nineteenth century, Indigenous women and men from the Amazon created rubber objects for export to the United States, Britain, and continental Europe. It is very likely that a pair of nineteenth-century rubber shoes in Historic New England’s holdings (refer to figure 11) was made in the Amazon basin for export to Boston or Salem, Massachusetts. The stamped and incised ornaments—in the form of geometric and foliate designs—are characteristic of extant objects made and exported from Belém, Brazil. Period sources often attribute native women as the artists of the ornaments on shoes. See: Goodyear, *Gum-Elastic and its Varieties*, 47.

<sup>19</sup> Hecht, *The Scramble for the Amazon*, 262.

were coveted and valued for their physical properties—mainly, the fact that gum elastics are impervious to water. Upon the arrival of rubbers to port cities along the Eastern Seaboard—predominantly, Boston and Salem, Massachusetts; Providence, Rhode Island; New Haven, Connecticut; and New York—the unique physical and chemical properties of natural rubbers were shocking to those unfamiliar with plant genera that produced elastic gums.<sup>20</sup> Advertisements announcing “India rubber shoes” for sale was a common utterance in early nineteenth-century newspapers in the northeast, and by the 1830s, a small yet competitive rubber industry emerged in New England (fig. 12).<sup>21</sup> The Indigenous-made shoes served as a template for Euro-American manufactured shoes, as well as other products, predominantly rubberized textiles (fig. 13). In the process of manufacturing rubber goods, companies discovered that natural rubbers are extremely vulnerable especially in non-tropical climates where they suffer greatly from shifts in seasonal temperatures. As an emulsion of complex hyper-folded hydrocarbons, rubber draws remarkable elasticity in hot climates from its molecular structure of long, crinkled chains. In the temperate climate of the Eastern

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<sup>20</sup> Customs recorded from Belém, Brazil, between 1836 until 1841, detail the export of rubber (in the forms of shoes, flat pouches, balls, among other forms) to Salem, New York, and Boston. From 1836 to 1837, for all three cities noted above are recorded as receiving 113,037 pounds of rubber in the form of shoes, and 45,360 pounds of rubber in the form of flat pouches, balls, and pressed thin sheets. See: P.W. Barker, *Rubber Industry of the United States, 1839–1939* (Washington, DC: United States Government Printing Office, 1939), 11–16.

<sup>21</sup> The Roxbury India Rubber Company was established in 1833 in Roxbury, Massachusetts, influenced a flurry of other companies to form primarily, at first, in Staten Island, New York; Philadelphia, Pennsylvania; New Brunswick, New Jersey; Lynn, Salem, Easton, Woburn, Northampton, and Springfield, Massachusetts; Providence, Rhode Island; and Hamden and New Haven, Connecticut.

Seaboard, however, the natural elastomer, became stiff and split in cold temperatures, and when temperatures rose it became tacky, and sometimes even melted, as the crinkled molecules expanded.<sup>22</sup> Natural rubbers could not survive in this climate, prompting a flurry of experiments by industrialists to find a solution to the rapid degradation of natural rubber.

### **Metallic Rubber**

In the 1830s, rubber manufacturing was a competitive industry centralized to New England. During this period, “Rubber was a cheap industry to enter” remarks industrial historian Cai Guise-Richardson “but until the substance’s basic problems—stickiness when heated, breakability when cold, and vulnerability to sunlight and acids—were cured, it remained an easy business to exist as well.”<sup>23</sup> It would take incremental developments in rubber compounding and curing to make what become known as *vulcanization* a commercially viable process.<sup>24</sup>

These developments were made in a dynamic environment where ideas flowed amongst several thinkers working or managing companies based in Massachusetts, Connecticut, and New York, involving capitalists and entrepreneurs such as Horace

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<sup>22</sup> In the words of one contemporary uncured natural rubber “became hard and brittle in cold weather, and in warm weather adhered together, often in a worthless mass.” *Manufactures of the United States in 1860; Compiled from the Original Returns of the Eighth Census, under the Direction of the Secretary of the Interior* (Washington, DC: Government Printing Office, 1865), xxvi.

<sup>23</sup> Guise-Richardson, “Redefining Vulcanization,” 361.

<sup>24</sup> As late as 1915, Dr. Alice Hamilton remarks the “making of rubber is still in an experimental stage.” See Alice Hamilton, *Industrial Poisons used in the Rubber Industry* (Washington, DC: Government Printing Office, 1915), 5.

Day, Nathaniel Hayward, Edwin Marcus, Christopher Meyers, John Nash, Elisha Pratt; and Charles and Nelson Goodyear.<sup>25</sup> New Englander Charles Goodyear, received a patent in June of 1837 for the application of nitric acid to natural rubber, to divest the material of its adhesive properties.<sup>26</sup> Two years later, Nathaniel Hayward, determined that compounding sulfur with rubber produced a drying effect, which provided the foundation for Goodyear's 1844 patent, where he claimed the rights of the invention of "improving" the chemical and physical properties of natural rubbers.<sup>27</sup> The sulfur, however, was found to impart products with an offensive smell due to the pungent odor of sulfur, and a tendency to become ridged in colder temperatures.<sup>28</sup> By further experimenting with Hayward's sulfurizing process, Goodyear found that rubber combined with sulfur and certain salts of lead, when exposed to a high degree of heat, lost its sulphureous smell and its liability to be

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<sup>25</sup> Guise-Richardson, "Redefining Vulcanization," 382–84.

<sup>26</sup> Charles Goodyear, Improvement in the Process of Divesting Caoutchouc, Gum-Elastic, or India-Rubber of its Adhesive Properties, and also of Bleaching the same, and Thereby Adapt it to Various Useful Purposes, US Patent 240, June 15, 1837, <https://patentimages.storage.googleapis.com/4c/ec/72/bd0d4bc79d9bb0/US240.pdf>

<sup>27</sup> Charles Goodyear was an assignee of Hayward's patent. See: Nathaniel Hayward, Improvement in the Mode of Preparing Caoutchouc with Sulphur for the Manufacture of Various Articles, US Patent 1,0909, February 24, 1839, <https://patentimages.storage.googleapis.com/43/77/f2/62d3955b163e03/US1090.pdf>

<sup>28</sup> A contemporary user of early vulcanized rubber goods recorded the "disadvantages of not only creating very unpleasant warmth on the skin, but also of evolving copious streams of sulphuretted gases." The user also lamented that the "clothes become saturated with these: the articles of gold and silver blackened by them; and for days after the removal of a bandage or stocking the skin itself remains much of the fetid odor." Stephen O' Ryan, "Inconveniences of India-Rubber Stockings and Kneecaps," *The Lancet* (1848): 405.

affected by changes in temperature. Goodyear's contribution to the development of the industrial-made substance, *vulcanite*, resulted in patents surrounding the application of chemically altered rubbers in June 1844, which was then reissued in 1849 and extended in 1858, and reissued again in 1860.<sup>29</sup> The method of heat recorded in his 1844 patent was dry heat, which resulted in the inconsistent curing of the compounded material. By 1848, most manufactories in the United States vulcanized with steam, allowing them to work with sulfur and rubber instead of other substances (as the white lead described in Goodyear's first patent).<sup>30</sup> Steam under pressure held advantages over heating in ovens: it spread heat more evenly throughout curing chamber, thereby controlling variation in the extent of vulcanization. Steam curing also required less sulfur, and no other ingredients were absolutely required. Equally important, steam vulcanization was less expensive than earlier methods. Seven years after the issue of Goodyear's first patent, his brother, Nelson Goodyear, made further developments in the compounding and curing of natural rubbers. In 1851, Nelson Goodyear received a patent for the "Improvement in the Manufacture of India-Rubber." The patent is based

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<sup>29</sup>Goodyear secured a patent in France and the United Kingdom in 1844. Charles Goodyear, Improvement of India-Rubber Fabrics, US Patent 3,633, United States Patent Office, June 15, 1844. <https://patentimages.storage.googleapis.com/1a/13/8e/18751846ded131/US3633.pdf> The patent entails the chemical transformation of rubber to a semi-synthetic material. Goodyear records the proportions of the materials as twenty-five parts rubber, five parts sulfur, and seven parts white lead. Charles Goodyear, Improvement in India Rubber Fabrics, US patent no. 3, 633, filed June 15, 1844. Goodyear and his peers, at first, were fixated on securing a process to produce waterproof textiles. Waterproof textiles were manufactured primarily, at first, for the United States Navy and Military. The 1849 and 1860 patents were reissues and amendments to his original 1844. In both reissues, Goodyear reconceptualizes the vulcanization process.

<sup>30</sup>Guise-Richardson, 380.

on the application of “sulphur, the flowers of sulphur or sulphur in fine powder” to thoroughly washed, masticated, and ground natural rubbers.<sup>31</sup> The action of heated metal cylinders to ensure the even distribution of sulfur through the mass of material is also advised. The end result was the semi-synthetic, hard substance, *metallic* or *vulcanized* rubber, which was compared to a superior substitute to horn, ivory, metal and wood.

Additional patents surrounding the “improvement in the manufacture of hard rubber” would ensue.<sup>32</sup> However, the release of Nelson Goodyear’s patent in 1851 stimulated an immediate response in the production of hard rubber goods, and specifically, the manufacture of combs and jewelry. First, the organization of the Beacon Dam Company in 1852.<sup>33</sup> This company was likely manufactured the fifteen

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<sup>31</sup>The term “vulcanization” was introduced from England. Nelson Goodyear, Improvement in the Manufacture of India-Rubber, US patent 8075, May 6, 1851. <https://patents.google.com/patent/US8075A/en> Here, Nelson Goodyear recommends that the natural rubber and sulfur should be used in equal parts. The addition of “Rosin, oxides or salts of lead or zinc of all colors, and other similar substances, both mineral and vegetable, may be added in small quantities to either of the compounds for the purposes of polish, color, making the mixture work more easily, &c., no precise rule for which can be given or is necessary.” Goodyear, Improvement in the Manufacture of India-Rubber, 1. He also recommends the curing of the compounded rubbers at 260 to 275 degrees Fahrenheit.

<sup>32</sup>There are too many patents to enumerate here, however, over the course of the century, much of these patents addressed compounding, dyes to alter the color of the material, and even how to use vulcanized rubber as an enamel for metals.

<sup>33</sup>*Transactions of Connecticut State Agricultural Society, for the Year 1855* (Hartford: Tiffany and Company, 1856), 212; and Abbott Brothers, *Reports of Practice Cases, Determined in the Courts of the State of New York* (New York: John S. Voorhies, 1861), 206. [https://www.google.com/books/edition/Reports\\_of\\_Practice\\_Cases\\_Determined\\_in/YagHbWeXvrgC?hl=en&gbpv=1](https://www.google.com/books/edition/Reports_of_Practice_Cases_Determined_in/YagHbWeXvrgC?hl=en&gbpv=1)

pieces of jewelry that were on exhibited at the 1855 world's fair.<sup>34</sup> The Goodyear-operated company was followed by the India Rubber Comb Company in 1853.<sup>35</sup> By 1855, the Novelty Rubber Company joined in the manufacture of hard rubber ornaments and was followed by the formation of the Vulcanite Jewelry Company in 1858. These early companies were all licensed under a Goodyear patent.<sup>36</sup>

### **Fancy Rubbers**

The increased dissemination of compounding and curing processes supported the growth of the industry in the 1850s and 1860s, which in this period, was centralized in Connecticut, Massachusetts, New York, New Jersey, and Rhode Island. With Nelson Goodyear's procedure for the manufacture of vulcanized rubber in hand, companies began to broaden the field of production, specifically, the application of hard rubbers for ornamental purposes. No longer only conceived in the terms of practical goods such as waterproof rainwear and shoes, as well as the application of

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<sup>34</sup> *Official Descriptive and Illustrated Catalogue of the Great Exhibition of the Works of Industry of all Nations, 1851* (London: Spicer Brothers, 1852), 1453. See also: "Vulcanite and its Uses," *The Vulcanite* 4 (1860): 5. The Beacon Dam Company folded in 1857 and was renamed "The American Hard Rubber Company." In 1860, Henry Goodyear sold the company to Conrad Poppenhusen, the founder of the India Rubber Comb Company. See Abbott Brothers, "The Hard Rubber Company," in *Reports of Practice Cases, Determined in the Courts of the State of New York*, 206.

<sup>35</sup> The Beacon Dam Company was managed by Charles Goodyear's brother, Henry Goodyear.

<sup>36</sup> The manufacturers in operation between 1851 to 1872 were licensed under a Goodyear patent. The constraints and threats of litigation tied to these patents is best illustrated by the surge of new producers in the expiration of the patents. In 1873, three new producers of ornaments were established: the Goodyear Rubber Company (1873–1898); Goodyear's Curler Company (1873–1893); and La Perle Rubber Company (1873–1890).



vulcanized rubber for “Fancy and Ornamental” purposes introduced consumers to hardened rubber objects for fashionable bodily adornment. (fig. 14, 15, 16).

Out of the twelve producers of hard rubber ornaments, the Vulcanite Jewelry Company (1855–1888) was one of the only companies that exclusively focused on the production of combs and jewelry. From the 1860s until the 1880s, this company is recorded fabricating belts, bracelets, combs, watch cases, as well as jewelry that incorporated both jet and vulcanized rubber.<sup>37</sup> Unlike the Vulcanite Jewelry Company, many of the other manufactures cited above produced a variety of products that were classed by the rubber industry under the categories of hard rubber, mold work, or druggists’ sundries.<sup>38</sup> For example, in addition to decorative buttons, Novelty Rubber Company (1855–1884) also produced crochet hooks, knitting pins, tobacco pipes and stems, as well as stationary goods such as jeweler checks, key tags, and business cards.<sup>39</sup> The fabrication of medical instruments alongside ornamental twist combs and jewelry was common, and the Butler Hard Rubber Company(1883–1898) manufactured combs (including hair pins), “horse embroidery rings, match boxes, carded goods, stationers’ goods, and druggists’ sundries.”<sup>40</sup>

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<sup>37</sup> Most of what can be found about this company is located in US patents between 1869 and 1881.

<sup>38</sup> For an overview of the different sectors of the Euro-American rubber industry, refer to: Henry C. Pearson, *Crude Rubber and Compounding Ingredients: A Text-Book of Rubber Manufacture* (New York: India Rubber Publishing Company, 1899), 34–42.

<sup>39</sup> For an overview of the goods manufactured by the Novelty Rubber Company refer to *New Brunswick and its Industries* (New Brunswick: A. E. Gordon, Times Printing House, 1873), 56.

<sup>40</sup> Butler Hard Rubber Company, “Royal Hard Rubber Syringes,” *The Western Druggist* (1892): 35. Butler Hard Rubber Company, Illustrated catalog (New York:

At first, ornaments would be limited to hair combs and pins. One of the first companies in the United States to produce and market hair combs was the India Rubber Comb Company (1852–1898) (fig.17).<sup>41</sup> Conceived by Conrad Poppenhusen, a German immigrant with capital and training as a comb maker, opened an office and showroom in Lower Manhattan in the early 1850s, with a factory in College Point, Queens.<sup>42</sup> The Beacon Dam Company and the Novelty Rubber Company followed Poppenhusen’s lead but sought to offer consumers products outside of combs. The Beacon Dam Company operated between 1852 and 1857 yet produced jewelry during this brief period.

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Self-published, 1894). This catalog is available at the Butler History Museum in Butler, New Jersey.

<sup>41</sup> Period advertisements in newspapers point to the India Rubber Comb Company establishment sometime between 1851 and 1853. An 1896 advertisement claims that the company had been operational for more than forty years. See: *American Druggist’s Circular and Chemical Gazette* 40 (1896): 41. [https://www.google.com/books/edition/American\\_Druggists\\_Circular\\_and\\_Chemical/Op\\_EldTIRY4C?hl=en&gbpv=1&bsq=india%20rubber](https://www.google.com/books/edition/American_Druggists_Circular_and_Chemical/Op_EldTIRY4C?hl=en&gbpv=1&bsq=india%20rubber). A comprehensive biography of Conrad Poppenhusen states that it wasn’t until the 1854 the company was operational. See: James E. Haas, “Conrad Poppenhusen: A biographical Sketch of the ‘Benefactor of College Point,’” *Long Island Historical Journal* 16, nos. 1-2 (2003/2004): 135–45. However, despite Haas’s claim advertisements from the 1850s display that the company was operational in the 1850s. The first advertisement I have located by the company is in 1853. See: India Rubber Comb Company, Advertisement, *New Orleans Daily Crescent*, April 12, 1853.

<sup>42</sup> During the 1850s, the retail and warehouse, as well as the office for the India Rubber Comb Company was located on 44 Cliff Street, New York, which is located at the southern tip of Manhattan. At some point in the 1860s, the company relocated to 9, 10, and 11 Mercer Street, in Lower Manhattan. The factory would remain in College Point, Queens. India Rubber Comb Company, *Illustrated catalogue* (New York: Self-published, ca. 1880–85), 1.

Meanwhile, the Novelty Rubber Company, which first built a factory in 1855 in Naugatuck, Connecticut, adjacent to the Beacon Dam Company, manufactured ornamental buttons, canes, and other accessories. Between 1856 and 1859, the company shifted production to New Brunswick, New Jersey, and held a retail space and office in Lower Manhattan.

Inspired by the formation of other companies and increasing demand for “fancy rubbers,” the Vulcanite Jewelry Company set up shop on Mercer Street in New York, not far from the India Rubber Comb Company’s office and wareroom. Unlike the other companies mentioned thus far, the Vulcanite Jewelry Company had a factory and workshop locally, in the city, versus a factory outside of the city or in a different state entirely.

The 1860s and 1870s saw intense growth in consumer demand for and production of ornamental hard rubber combs and jewelry. Six companies joined the industry producing ornaments but were ultimately plagued by instability. Nearly 20 years later, only 3 companies remained.<sup>43</sup>

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<sup>43</sup> In the 1870s, Goodyear’s Curler Company (1870–1890); Goodyear India Rubber Glove Manufacturing Company (1847–1896); Goodyear Rubber Company (1870–1898); La Perle Rubber Company (1873–1890); Rubber Comb and Jewelry Company (1876–1882); and the Rubber Clothing Company (1860–1888), joined in the production of ornaments. Based on advertisements and patents, it would seem that several of these companies would engage in the production of vulcanized rubber ornaments seasonally. For example, the India Rubber Glove Manufacturing Company consistently includes advertisements specifically highlighting the availability of “vulcanite jewelry” appropriate for holiday gift exchanges. between November through January. Besides a trend in advertising, more research needs to be done to prove the argument for seasonal production of products. See India Rubber Glove Manufacturing Company, Advertisement, New York Herald, November 25, 1867. The 1880s welcomed the Butler Hard Rubber Company (1883–1898), but the Novelty Rubber Company, Rubber Comb and Jewelry Company, and Vulcanite Jewelry Company all folded. By 1898, the only remaining companies cite above were the

Overall, most manufacturers cited above had factories in Connecticut, Massachusetts, New York, and New Jersey. Each company—no matter which state or city the ornaments were made—had a warehouse or retail space located in Lower Manhattan where they sold the jewelry wholesale, and in a few instances, directly to the consumer.<sup>44</sup> However, period advertisements suggest that the combs and jewelry were purchased wholesale by retailers invested in the sale of rubber goods of all types or specialty gift shops that marketed the sale of “fancy goods,” stationers goods, or druggists’ sundries.<sup>45</sup> On a few occasions, jewelers not invested in the fabrication of rubber ornaments purchased a lot of vulcanized rubber combs and jewelry to satisfy consumer demand. The rapid development of the railway allowed interested retailers to travel to view the jewelry in warerooms on Broadway in New York or elect having stock shipped directly to them. The increased visibility and accessibility of vulcanized rubber jewelry in the 1860s and 1870s was made possible not only through printed

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Butler Hard Rubber Company, Goodyear Rubber Company, India Rubber Comb Company. There are a few companies not mentioned here that were formed in the 80s and 90s. I have not included these companies in this survey because they represent a different wave of production that would increasingly become concerned with the manufacture of tires. For example, Goodrich Company, which would become known with the manufacture of tires, also produced a selection of hair combs.

<sup>44</sup> Verbiage used in an 1880s India Rubber Comb Company catalog suggests that the showroom accommodated window-shoppers as well as retailers interested in purchasing a lot of the objects. India Rubber Comb Company, *Illustrated trade catalog* (New York: Self-published, ca. 1880–85), 1. Classified advertisements placed by the Vulcanite Jewelry Company for the sale of display cases suggests that the retail space encouraged consumers to come purchase jewelry by the piece.

<sup>45</sup> For example, W. G. Maxwell was a retail store located in Baltimore, Maryland, from roughly 1858 until 1876. This retailer frequently referenced the sale of “fancy goods” or “novelties.” The fancy articles included vulcanite jewelry.

sources (advertisements in newspapers) but through the rapid development in transportation systems (railways and steamships). The advancement in transportation through the mid-to-late nineteenth century, allowed rubber manufactories to ship ornaments to be put on display in warerooms in and outside of Manhattan.<sup>46</sup> Many of the companies employed traveling sales agents—men and women—who circulated new designs and styles, further extending the reach of vulcanized rubber jewelry to a wide public ( fig. 18).<sup>47</sup>

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<sup>46</sup> In an 1873 article on the subject of the development of New Brunswick, New Jersey, as an industrial hub is centered upon the “waterpower and railroad facilities of the city.” The railroad allowed companies to ship products regionally, while water or rather *steam*, powered the automated machines in use by most large rubber manufactories at this time: “Consequently, various factories of various descriptions and other places of industry are numerous. The manufacture of shoes, paper hangings, rubber fixing and fruit jars compose the principal mainstay of the artisan class. A few thousand hands of both sexes are engaged in this industry.” “New Jersey: A Hopeful Prospect in New Brunswick, No Alarm Felt by Capitalists, A wonderful Recuperation,” *The New York Herald*, November 14, 1873.

<sup>47</sup> The use of traveling sales agents is recorded by several companies. The call for men and women to canvas for rubber goods in the “Western country” is a common utterance by the 1870s. For instance, the Goodyear Curler Company is recorded as using a “traveling agent” to market goods in the Southeast. *Biographical Sketches of the Class of 1863: Dartmouth College with historical Memoranda of the College, 1859–1863*, ed. John Scales (Dartmouth: Self-published, 1903), 350. A classified advertisement by a rubber goods manufactory in Chicago seeks “a few energetic men to canvass our rubber goods throughout the Western country. Good men can make a handsome thing. Northwestern Novelty Rubber Press Company, *Chicago Daily Tribune*, May 18, 1873. The same issue of the *Chicago Daily Tribune* and by the same manufactory placed a call to “Ladies to Canvass for Our Initial letters, rubber bosoms, and ladies’ rubber goods generally; can make good wages.”

## Export and Import of Ornaments

In addition to the circulation of the jewelry on a national scale, companies like the India Rubber Comb Company, Novelty Rubber Company, Vulcanite Jewelry Company, and Rubber Comb and Jewelry Company, exported their products to Britain and Canada.<sup>48</sup> On the topic of export, it is also important to note that the concept, labor, and machinery behind the Scottish Vulcanite Company (1861–1910) located in Edinburgh, Scotland, was a Euro-American “export.”<sup>49</sup> The company relied on technology and skilled labor from the United States, and was at first managed by

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<sup>48</sup> At the start of the 1880s, records indicate that the India Rubber Comb Company and the Vulcanite Jewelry were engaged in exporting products to Britain. See: Wright’s *Improved Handbook of the Principal Manufacturers, Exporters, Agents, Merchants, and Warehousemen of Great Britain, 1871–1872* (London: Wright, Song & Co: 1872), 154. The Rubber Comb and Jewelry Company also engaged in the export trade. See: “The New Urethral Syringe,” *The London Medical Record* (1881): 260. 1877 a duty for “jewelry, imitations of, called ‘rubber jewelry,’ and made of rubber.” Lewis Heyl, *United States Duties* (New York: 1877), 35. Additionally, an article published in *The New York Herald* traces the development of this duty, and states “the raise of duty upon rubber and vulcanized jewelry, which the government claimed should be made dutiable as imitation jet jewelry. The plaintiff claimed that it was not an imitation of jet jewelry.” “Jewelry, Laces and Fans,” *The New York Herald*, October 25, 1877. See also: “Proposed Tariff Changes,” *New York Tribune*, January 29, 1878. More research is required to ascertain the costs and potential benefits of importing vulcanized combs and jewelry versus manufacturing the products locally.

<sup>49</sup> Based on research by W. Woodruff on the development of the rubber industry in Scotland in the mid-nineteenth century, it would seem that the Scottish Vulcanite Company was first established in the United States (under a different name) and moved to Scotland due to a patent lawsuit. See W. Woodruff, “The American Origins of a Scottish Industry,” *Scottish Journal of Political Economy* 2, no. 3 (1955): 20. I have not identified the Euro-American company that would become the Scottish Vulcanite Company. However, Christopher Meyers, a rubber capitalist with stakes in the early rubber industry in New Brunswick, New Jersey, and later Scotland, was a backer of the Scottish Vulcanite Company.

Douw Williamson, one of the founders of the Novelty Rubber Company.<sup>50</sup> In addition to local production, companies in England and Germany imported vulcanized rubber combs and jewelry to the United States. These companies included the Britannia Rubber & Kamptulion Company, the Harburg India-Rubber Comb Company, and the New York Hamburg India Rubber Company.<sup>51</sup> It is hard to ascertain the scale and impact these companies had on locally manufactured combs and jewelry.

All of the companies cited above were dependent on a supply of rubbers, for the most part, extracted and exported from South America. In the next section, I will roughly sketch the technical expertise and knowledge flexed by tappers in the Amazon rubber industry to broaden our understanding of vulcanized rubber ornaments as a product of the Americas.

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<sup>50</sup>A. E. Gordon, *New Brunswick and its Industries* (New Brunswick: A. E. Gordon, Times Printing House, 1873), 51.

<sup>51</sup> *The Handbook to the Manufacturers & Exporters of Great Britian*, ed. G. T. Wright (London: Wright & Co., 1870), 247.  
[https://www.google.com/books/edition/The\\_Export\\_merchant\\_shippers\\_of\\_London\\_a/WtsNAAAAQAAJ?hl=en&gbpv=0](https://www.google.com/books/edition/The_Export_merchant_shippers_of_London_a/WtsNAAAAQAAJ?hl=en&gbpv=0) ; *The Export Merchant Shippers of London* (London: Self-published, 1873) 333; 887.  
[https://www.google.com/books/edition/The\\_Export\\_merchant\\_shippers\\_of\\_London\\_a/ONoNAAAAQAAJ?hl=en&gbpv=1&dq=export+and+merchants+lists+1873&printsec=frontcover](https://www.google.com/books/edition/The_Export_merchant_shippers_of_London_a/ONoNAAAAQAAJ?hl=en&gbpv=1&dq=export+and+merchants+lists+1873&printsec=frontcover)



Figure 11 Rubber shoes. Probably Brazil. Makers once known, ca. 1830–50. Rubber. Courtesy of Historic New England. Gift of Mrs. Janet Campbell, 1929.1106AB.



**GUM ELASTIC—R**  
*India Rubber Shoes and Over-Shoes.*

**T**HE subscriber respectfully informs the public, that he has constantly on hand, a full and very general supply of Gum Elastic, or India Rubber Shoes and Over-Shoes, which he will dispose of on the most accommodating terms. Having made arrangements to import the Gum Elastic directly from Para, he is enabled to sell it at lower rates than any other person in New-England, and invites dealers to make him a call.

The utility and great benefits derived from the use of these Shoes, has been fully tested by many of the most respectable citizens of this country, and as a preventive against the cold and wet, are esteemed decidedly superior to leather. In a climate like ours, subject to great changes, it is important to keep the feet warm and dry; and nothing, thus far, has been found equal to the Gum Elastic. The shoe is light, elastic, pleasant to the foot, and particularly calculated for ladies.

Orders from any part of the country, will be promptly attended to, if directed to  
**STEPHEN C. SMITH,**  
**No. 79, Westminster-st. Providence, R. I**

Figure 12 In this advertisement, a retailer promises customers a supply of footwear imported from “Pará.” Belém, Brazil, the central port city and hub for the Amazon rubber industry, was in the northern state, Pará. The Western use of “Pará” in this period signified the grade of rubber and plant genera (*Hevea brasiliensis*). Stephen C. Smith, Advertisement, *Literary Cadet and Rhode-Island Statesman*, January 25, 1828.  
<https://www.loc.gov/item/sn83021389/1828-01-19/ed-1/>

**Boots, Shoes, and Rubbers.**  
**DOWN AGAIN.**  
**T**HOMAS C. WALES will sell at GREATLY  
REDUCED PRICES all kinds of BOOTS & SHOES  
by the dozen, or package at his "*Entire Cash Boot and  
Shoe Store,*" No. 19 and 21 Broad and  
46 and 48 CENTRAL STREET, BOSTON.  
T. C. W. would also inform his old customers, and all  
purchasers of INDIA RUBBER SHOES, that he has been ap-  
pointed *Selling Agent* for the largest importers of PARA  
RUBBERS, and for all the principal manufacturers of Pa-  
tent Rubbers in this country, making the most extensive  
assortment of RUBBER SHOES to be found in any one  
Store in America, all of which he is authorized to sell for  
CASH OR CREDIT at the lowest market prices and on liberal  
terms. 1dlw2m—Aug. 25.

Figure 13 The classification of "Para Rubbers" and "Patent Rubbers" in this advertisement record the overlap in the sale and demand for goods imported from Brazil alongside products made in factories locally. Thomas C. Wales, Advertisement, The Daily Spy, August 25, 1848. <https://chroniclingamerica.loc.gov/lccn/sn84023643/1848-04-25/ed-1/seq-4/>

Get up in handsome style, with silk lined Collars, &c. &c.

Black Alpaca Versible Sock Cuts, short.....	\$7.00
" " " " long and heavy .....	8.00
Colored " " " " fine and light .....	9.00
Silena Socks and Baglines .....	10.00
Kilt Reversible Socks and Baglines .....	16.00
Fine Merino Socks and Baglines .....	7.00
Fine Muslin Caps, no Slivers .....	7.00
Fine Muslin Caps, with Slivers .....	7.00
Black Alpaca Capes, with Slivers .....	6.00
Black Alpaca Capes, extra long, with Slivers .....	7.00
Black Alpaca Ponchos .....	10.00
Black Alpaca Baptizing Pants—Rubber inside .....	6.00
Muslin Hoses for Capes, (see pages 4 and 5) .....	per doz., 9.00
" Riding Leggings .....	3.50
" Walking " .....	2.50
" " " " .....	2.25



MADE on stout Drilling, with neat fitting Boots. The California Pants are the best article made for Miners. The Lumberman's Pants are double thickness to the thigh. A neat, light and well finished article is made for the use of Clergymen.

SIZES OF BOOTS--6 to 13.

Lumberman's Pants.....	\$10 00	per pair.
California Mining.....	7 00	"
Fisherman's.....	7 00	"
Baptismal, Lustre.....	7 00	"
" Fine Alpaca.....	9 00	"



Or various styles and patterns, printed or plain : an excellent article for the House-keeper, &c. or the Nursery.

Blk. Vol. Printed, \$9 00 pr. doz  
White " " 9 00 "

For Cracker Machines, made to order.  
For Paper Machines, do.  
For Tobacco Machines, do.  
For Paper Printers' Blankets, do.

KIT CARSON.

	Per Dozen.
Black or White, Vulcanized (See fig. 1, page 7).....	\$12 00

Black, Vulcanized (See figure 2, page 7).....	\$9 00
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Black or White, Vulcanized (See figure 1, page 3).....	\$2 00
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Black or White, Vulcanized (See figure 1, page 2).....	\$2 00
Black Lustre, " " " .....	9 00
Silesia Cape, with or without Capes.....	12 00

Lustre, Vulcanized (See figure 1, page 6) .....	\$9.00
Elcherman's Note .....	0.00

White or Black, Vulcanized, per dozen.....	\$9 00
Pistol Cases " .....	7 50

<https://onedrive.live.com/?authkey=%21AKbUD2afGgepuoc&id=F387115BA584FEBB%21308211&cid=F387115BA584FEBB&parId=root&parQt=sharedby&o=OneUp>

**INDIA RUBBER HOSE, FINGER**  
Rings, Belts, Blubbers, Combs, Toys, &c., for sale at  
**WM. D. RUSSELL'S Warehouse, 406 Broadway.**  
j04

Figure 15 This advertisement displays the sale of hard rubber ornaments, like “Finger rings” and “combs,” alongside the sale of hose, blubbers, and toys. WM. D. Russell’s Warehouse, Advertisement, *Albany Evening Journal*, June 5, 1857. <https://infoweb-newsbank-com>

**THE ORIGINAL**  
**RUBBER STORE,**  
**UNDER GOODYEAR'S PATENT.**  
ESTABLISHED IN 1839.




The Subscriber offers a large assortment of Rubber Goods at reduced prices.

AMONG THE VARIETY OF WATER-PROOF AND AIR-TIGHT GOODS, ARE



Officer's Coat.

**Among the variety of water-proof and air-tight goods, are:**

Air Beds and Pillows,  
Air Cushions for Chairs,  
Aprons for Ladies,  
Aprons for "Tricksters,"  
Bathing Mats and Caps,  
Baptismal Pants,  
Carriage and other Cloths,  
Caps, Capes, and Cloaks,  
Caps and Sou'westers,  
Camp Blankets,  
Crumb Cloths,  
Cookstove and Garden Hose,  
Drinking Cups and Canteens,  
Game and Fish Bags,  
Gun Covers,  
Gloves and Mittens,  
Horse Covers,  
Horse Boots and Penders,  
Hunting and Fishing Boots,  
Leggins, long and short,  
Life Preservers and Jackets,  
Ladies' Elastic,  
Overshoes,  
Overalls and Pants,  
Rubber Canes and Combs,  
Paper Bands,  
Parlor and Foot Balls,  
Seamen's Bags,  
Suspenders and Elastics,  
Syringes and Breast Pumps,  
Travelling Bags,  
Table Covers,  
Tobacco Wallets,  
Teething Rings and Toys,  
Wagon Covers,  
Undersheeting for Beds,  
Urinal Bags, &c., &c.

**Horse Covers,**  
**Gents' Heavy Boots,**  
**Gents' Overshoes,**  
**Ladies' Boots,**  
**Ladies' Shoes,**  
**Misses' Overshoes,**  
**Boys' Boots,**  
**Youths' Boots,**  
**Heavy Black Rubber Coats,**  
**Heavy White Rubber Coats,**  
**Leggins,**

**Door Mats,**  
**Bathing Tubs, inflated,**  
**Spitoons,**  
**Chest Expanders,**  
**India Rubber Pencils,**  
**Thumbies,**  
**Card Baskets,**  
**Ladies' Mourning Chains,**  
**Ladies' Bracelets,**  
**Breast Pins,**  
**Ear Rings,**  
**Hair Pins,**  
**Crosses, and other India Rubber Ornaments.**



Pea Coat.

N. B. A beautiful article of Gentlemen's silk Reversible Coats, weighing only 12 oz. Also, a superior article of Reversible Macintosh Coats.

**C. HAYES, 26 School St., Boston.**  
UNDER REV. A. A. MINER'S CHURCH.

Figure 16 This advertisement provides a snapshot of the jewelry for sale by 1861. "Ladies' Mourning Chains," "Ladies' Bracelets," "Breast Pins," "Ear Rings," "Hair Pins," and "Crosses, and other "India Rubber Ornaments," are enumerated by the retailer. C. Hayes, Advertisement, ca. 1861. Courtesy of the Library of Congress.  
<https://www.loc.gov/resource/rbpe.06802500/>



NEW ADVERTISEMENTS.

**THE INDIA RUBBER COMB CO**

Nos. 9, 11 & 13 Mercer Street,

**NEW YORK,**

Sole manufacturers, under Goodyear's  
and Meyer's Patents,

OF

**INDIA RUBBER COMBS,**

Dressing Combs.

Long Combs.

Twist Combs.

Fine Tooth Combs,

[A variety of Elegant Fancy Patterns.]

Pocket Combs.

Ridding Combs.

Hair Pins.

ALSO, SOLE MANUFACTURERS

OF

**COMBINATION SIDE COMBS**

[MADE UNDER FAULT'S PATENT.]

The sale of any Combination Side  
Combs, no matter of what material  
made, unless sold under a license  
from us, is prohibited by law.

Figure 17 This advertisement by the India Rubber Comb Company details the different styles of combs available on the market at the beginning of the 1870s. India Rubber Comb Company, Advertisement, *Semi-Weekly Louisianan*, September 17, 1871. <https://chroniclingamerica.loc.gov>

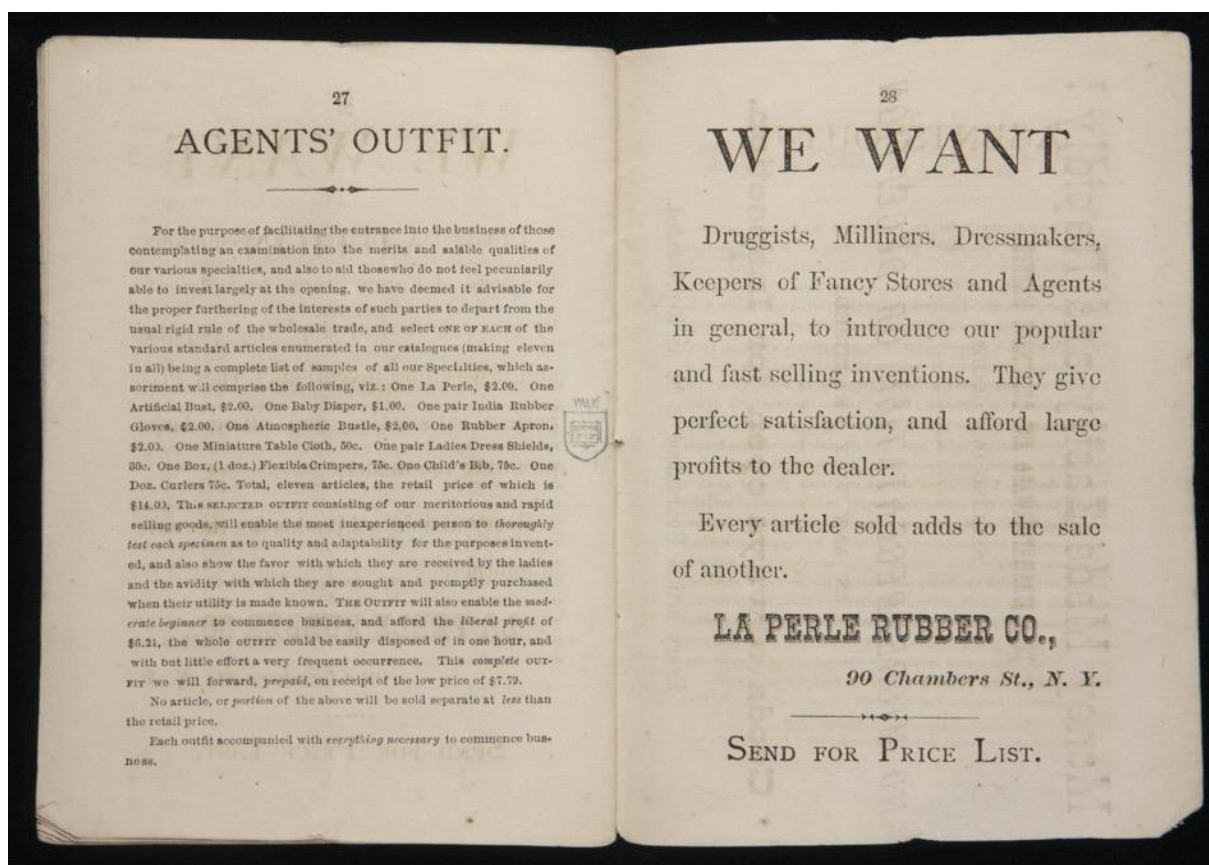


Figure 18 This a spread from an illustrated catalog by La Perle Rubber Company. Page 27 (spread left) enlists agents and canvassers to sell La Perle rubber goods. The company's call to women is important. La Perle Rubber Company, Sales catalog (New York: Self-published, 1876) 27–28. Courtesy Beinecke Rare Book and Manuscript Library.  
<https://collections.library.yale.edu/catalog/10052556>

## Chapter 3

### EXTRACTING AND PROCESSING LATEX

The producers of vulcanized rubber ornaments were dependent on the import of rubbers from South America.<sup>52</sup> The reference to the arrival of rubbers in various forms—including flat bottles, balls, sheets—to rubber factories in Connecticut, Massachusetts, New Jersey, and New York, records not only the grades of rubbers used for the fabrication of combs and jewelry, but the plant genera—*Castilla* and *Hevea* trees (fig. 19).<sup>53</sup> The extraction, collection, and processing of latexes was

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<sup>52</sup> *India Rubber and Gutta Percha: Being a Compilation of All the Available Information Respecting the Trees, Yielding These Articles of Commerce and Their Cultivation, with Notes on the Preparation and Manufacture of Rubber and Gutta Percha* (Colombo, Ceylon: A. M. & J. Ferguson, 1887); *Manufactures of the United States in 1860; Compiled from the Original Returns of the Eighth Census, under the Direction of the Secretary of the Interior* (Washington, DC: Government Printing Office, 1865); and *P. W. Barker, Rubber Industry of the United States, 1839–1939* (Washington, DC: United States Government Printing Office, 1939).

<sup>53</sup> In *Transactions of Connecticut State Agricultural Society*, a description of the manufacturing processes at the Beacon Dam Company, and other manufactories in Connecticut, includes a reference to the imported rubbers “in the shape of bottles or flasks, just as it was moulded on clay by the natives of the country which it came.” *Transactions of Connecticut State Agricultural Society, for the Year 1855*, 209. Other references to the grades of rubbers imported from the Amazon basin include a reference to the use of imported rubber “bottles” at the Novelty Rubber Company in *New Brunswick and its Industries*, 56–57; and the reference to the arrival of rubbers from Central and South America at the Rubber Comb and Jewelry Company in *History of Morris County, New Jersey: with Illustrations and Biographical Sketches of Prominent Citizens and Pioneers* (New York: W. W. Munsell & Co., 1882), 397.



select viable trees for tapping, navigating forests, grading quality, and moving production. The labor of tappers (*seringueiros*) is thus in many ways sealed to hard rubber combs and jewelry.

### **Export Industry (at a glance)**

The latex industry dominated the Amazonian export sector for most of the century and changed its geographic focus, forms of economic integration, the ways labor was organized, and latexes were harvested.<sup>54</sup> The industry was widespread and did not require any single mode of extraction. Historian Susan Hecht characterizes the material conditions of labor in this industry as informed by the local conditions, which she claims structured the relations of production throughout “Amazonia’s rubber century.”<sup>55</sup> The localities embedded in the Amazon and its tributaries varied in distance to cities, river geographies, and social histories. Thus, the extraction of rubber during this period took on different modes of labor regimes.<sup>56</sup> This included collection

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<sup>54</sup> For comprehensive histories of the Amazon rubber industry in the nineteenth century, see: “In the Realm of Rubber,” in Hecht, *Scramble for Amazon*, 251–77; and Barbara Weinstein, *The Amazon Rubber Boom: 1850–1920* (Stanford: Stanford University Press, 1983).

<sup>55</sup> Most historians of the Amazon export industry identify the dates of the “boom” between 1850 to as late as 1920. Hecht, *Scramble for the Amazon*, 265.

<sup>56</sup> Ibid., 266. Hecht and others have recognized that the systems of latex extraction changed through the period and was dependent on the region. In the eastern Amazon and closer to main urban areas, it was often less violent. However, father up into the headwater and tributary forests, especially where access to a river could be controlled, coercive systems of labor reverberated through the region. There was also a difference between dominant labor regimes depending on which plant was exploited. While I cannot speak to the degrees of bondage and the conditions of unfreedom for all those who were tied to the Amazon rubber export industry during the nineteenth century, I can point you to a scholar who can. I have found Carolina Sá Carvalho’s *Traces of the*

carried out by family and tribute systems. It also included slavery, chattel slavery, and “terror slavery,” and debt peonage.<sup>57</sup> In contrast to unethical labor, there was also labor organization: some tappers could be paid wages.<sup>58</sup> In a nutshell, rubber extraction could be part of smaller scale collecting and farming based on familial labor, or rubber could be the product of brutal large-scale labor coercion. The distinct conditions and experiences bound to this industry cannot be recounted here, but they are embedded in the material that arrived at factories that produced hard rubber ornaments.

The tappers were men, women, and children who belonged to complex and diverse backgrounds—including *quilombos* (descendants of enslaved people who escaped from bondage), forest workers, agriculturists, yeomen—as the rubber economy provided, as had gold elsewhere in Brazil, a lucrative means of exchange to support autonomous and insurgent communities. Scholars have recounted the presence of formerly enslaved peoples living in communities along the Trombetas River, who

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*Unseen: Photography, Violence, and Modernization in Early Twentieth-Century Latin America* (Evanston: Northwestern University Press, 2023), to be illuminating.

<sup>57</sup> Debt peonage in this sense refers to the exploitative and coercive system whereby patrons traded a day’s latex-gathering for food, lodging, and tools, effectively enslaving tappers through debt, imprisoning them within a vicious cycle of poverty. Slavery and debt peonage were most rampant in the extraction of *Caucho* rubber in the upper Amazon tributaries.

<sup>58</sup> Bradford L. Barham and Oliver T. Coomes and, *Prosperity’s Promise: The Amazon Rubber Boom and the Distorted Economic Development* (Boulder, Westview Press, 1996), 65–80.

tapped “black gold” but relied on small-scale traders for their transactions.<sup>59</sup> Historian Barbara Weinstein’s research like David Pretel’s and Stephen Nugent’s, emphasize that while tappers did not necessarily control the exchange or trade of rubbers, which was usually left to intermediaries, the extraction and processing rested on their skills and relative agency in inaccessible environments.<sup>60</sup>

### Amazon Latexes

*Rubber* includes a wide variety of different latexes that came from several different plant genera and had different ecologies, properties, and processing methods.<sup>61</sup> Although rubber is today a generic term, there were many terms for the varied latexes in commerce in the nineteenth century. There were four main genera that occurred in the Amazon trade—*Hevea*, *Castilla*, *Manilkara*, and *Sapium*—and each included different species with varying qualities of latexes and many names, which were further differentiated by how the gum was handled and the form which it was sold.<sup>62</sup> The two species that dominated the trade, however, were *Hevea* and *Castilla*. The species deemed most valuable by the market was *Hevea brasiliensis*, or

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<sup>59</sup> Warren Dean, *Brazil and the Struggle for Rubber: A Study in Environmental History* (Cambridge: Cambridge University Press, 1987), 70–94; Coomes and Brahams, *Prosperity’s Promise*, 65; Hecht, *Scramble for the Amazon*, 274.

<sup>60</sup> David Pretel, “Hidden Connections: The Global History of Jungle Commodities, *Technology and Culture* 64, no. 1 (2023): 215; Weinstein, *The Amazon Rubber Boom*, 14–17. Stephen Nugent, *The Rise and Fall of the Amazon Rubber Industry*, 25–40.

<sup>61</sup> John Tully, *The Devil’s Milk: A social History of Rubber* (New York: Monthly Review Press, 2011), 23.

<sup>62</sup> Hecht, 252.

“Pará rubber,” largely found on the southwestern tributaries of the Amazon.<sup>63</sup> *Heveas* were usually tapped on a weekly schedule except during the wet season, when access to the trees were challenging and the latex would be diluted by rainwater and of poor quality.<sup>64</sup>

While *Caucho* rubbers came from “caucho negro” (*Castilla ulei*) or “blanco” (*C. elastica*) and was also widely marketed in the Amazon export trade. These trees grew predominately in the upper northwestern region of the Amazon.<sup>65</sup> *Caucho* came to rubber factories in varying forms—slabs or sheets, balls, scrapings, and “rabos,” large rolls of rubber.<sup>66</sup>

### Processing Latexes for Export

During the dry season, tappers made transverse, perpendicular incisions on trees (fig. 20).<sup>67</sup> Tappers were aware of where to cut the tree to yield the most latex.

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<sup>63</sup> Historians have underscored the mobility in some tapping systems. Hecht, 252. Euro-American technical journals record the export numbers for “Pará” rubbers, overshadowing the other grades of rubbers imported to the United States.

<sup>64</sup> *Ibid.*, 253–55.

<sup>65</sup> The widespread exploitation of *caucho* for nineteenth-century international markets occurred in the 1870s in what is now known as Panama (then a province of Colombia), and the latex was known as “Panama Rubber. During this period, extraction performed on *Caucho* trees by the export industry was to simply destroy the tree and bleed the latex.

<sup>66</sup> Pearson, *Crude Rubber and Compounding Ingredients*, 36–50.

<sup>67</sup> The steps for extracting, collecting, and processing latexes are gathered from the following sources: Pearson, *Crude Rubber*; James Collins, “India-Rubber: Its History, Commerce, and Supply,” *Journal Society of the Arts* (1869): 81–91. The sources I was dependent on for the extraction, collection, and smoking of latexes were provided by

As it takes several hours for latex to submerge to the outer layer of bark, vessels affixed to the tree collected the latex as it fell. The latex gathered from several trees was often poured into a single vessel to make for easier transportation to a processing site. Ammonia was sometimes added to preserve latex and postpone the coagulation if the processing site was at a distance.<sup>68</sup> The addition of salt water to preserve the latex, is also recorded as a way to preserve latexes as tappers collected latex from several trees at a time.

Given latexes degrade rapidly due to their high protein, salt, and water content, it was essential to coagulate and stabilize latexes through a smoking process to ensure it did not rot during export. Latexes were smoked and prepared in several different ways, resulting in different dried forms. In figure 24, a man is smoking latex on a mold over a smokey fire. The smoking process was a technical and labor-intensive process. Scholar Jens Soentgen conceives that the smoking of latex as an organic equivalent to industrial curing process (vulcanization).<sup>69</sup> The heat and smoke of the fire are integral to the curing process, and most often, smokers repeatedly dipped thin films of latex over a clay mold affixed to a wooden handle or stick. During the

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British and Euro-American capitalists and imperialists. Thus, I have tried to remove any information that seemed conjectural and based in racial prejudices.

<sup>68</sup> “L’ Empire du Brésil à L’Exposition Universelle de 1867, á paris,” cited in Collins, “India-Rubber: Its History, Commerce, and Supply,” 83.

<sup>69</sup> Jens Soentgen argues that the smoking or curing of rubber is akin to the industrial vulcanization process. “The Indigenous rubber technology has been discussed and it has been shown that the indigenous people possessed a functional equivalent to vulcanization. They possessed a technological method to enhance the elasticity and durability of their rubber products.” Jens Soentgen, *Indigenous Knowledge and Material Histories: The Example of Rubber*, 82.

smoking process, the color of the latexes—which are described as ranging in color from off white to yellow, even light gray—darken as they coagulate and are exposed to intense contact with the reactive smoke.<sup>70</sup> The use of an oily nut or plant was a way to further preserve the material and ensure its longevity during transport.<sup>71</sup> When the smoking process was completed, a wet knife, was used cut the coagulated rubbers from the mold and set out to dry before they would be collected and sold to intermediaries. In the end, rubbers emerged from a long commodity chain—from tappers to boaters and dozens of middlemen, patrons and barons, before it reached the centers of export, marketization, industrial transformation by rubber workers in factories along the Eastern Seaboard.

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<sup>70</sup> Pearson, 24.

<sup>71</sup> Ibid., 56. The native oily palm nut, *Auicuri*, is often referenced in period sources.



Figure 19     Sheets of *Caucho* rubbers prepared for the Amazon export industry. Brazil. Photographer once known, ca. 1895–1920. Silver print on photographic paper. Dimensions not available. Courtesy of the Library of Congress. <https://www.loc.gov/item/2001705615/>

### Rubber Movement at Pará.

ONE of the Pará journals publishes detailed statistics of the rubber movement at that port for the first six months of 1890, compiled by the Companhia Mercantil do Pará, from which THE INDIA RUBBER WORLD has gleaned some figures which may be of interest to the American trade. Quantities are expressed, in the Pará tables, in kilograms, which are here converted into pounds. The list of exporters given, with the amount of their shipments, is as follows:

	To United States.	To Europe.	Total Pounds.
Pustnelli, Prisse & Co.....	1,531,305	1,266,186	2,797,491
Companhia Mercantil do Pará.....	1,842,801	606,696	2,539,497
La Rocque da Costa & Co.....	1,366,739	677,085	2,043,824
Robinson & Norton.....	1,450,522	.....	1,450,522
J. Vianna & Co.....	931,302	488,659	1,419,961
R. F. Sears & Co.....	758,648	57,752	816,400
Singlehurst, Broekelhurst & Co.....	550,275	191,514	721,789
W. Brambeer & Co.....	346,764	150,880	497,644
Denis Crouhan & Co.....	.....	297,900	297,900
Sundry shippers.....	245,399	293,717	539,116
Shipped direct from Manaus.....	2,074,195	3,221,389	5,295,584
Total.....	11,077,950	7,341,868	18,419,818

It will be seen that the United States absorbed 60 per cent. of the total exportations from Pará and Manaus, and about 70 per cent. of the shipments from Pará alone. A comparison of the quality of rubber imported by the United States and by European countries from Pará is shown in this table:

	United States.	Europe.	Total.
Fina (fine).....	5,750,716	4,541,919	10,292,635
Entrefina (medium).....	1,140,757	877,263	2,018,020
Sernamby (coarse).....	3,483,646	1,500,673	5,053,319
Caucho.....	702,831	353,014	1,055,845
Totals.....	11,077,950	7,341,868	18,419,818

Figure 20 By 1890, the United States imported sixty percent of the total exports from Belém (referred to as "Pará" above) and Manaus, Brazil. Detail from "Rubber Movement at Pará," *The India Rubber World* (1890): 64.





Figure 21 The title of this stereograph speaks to the racist and imprecise terminology applied to a diverse plant types. *India Rubber Tree*. New York, New York. E & H. T. Anthony, ca.1870. Albumen image printed on card. Dimensions not available. Courtesy of the New York Public Library. <https://digitalcollections.nypl.org/items/510d47e2-6985-a3d9-e040-e00a18064a99>



FIG. 13.—Spiral Tapping.

FIG. 13A.—Injurious Effect of Careless Tapping.

Figure 22     Illustrations of the “correct” and “incorrect” ways to tap a tree for latex.  
Page 85 from W. J. Johnson, *The Cultivation and Preparation of Para Rubber* (London: Crosby Lockwood and Son, 1909).



Figure 23 Two men tapping a tree for latex. Photographer once known, ca. 1911/1912. Detail from *India Rubber World*, (1912): 522.  
<https://archive.org/details/indiarubberworld45phil/page/521/mode/1up>

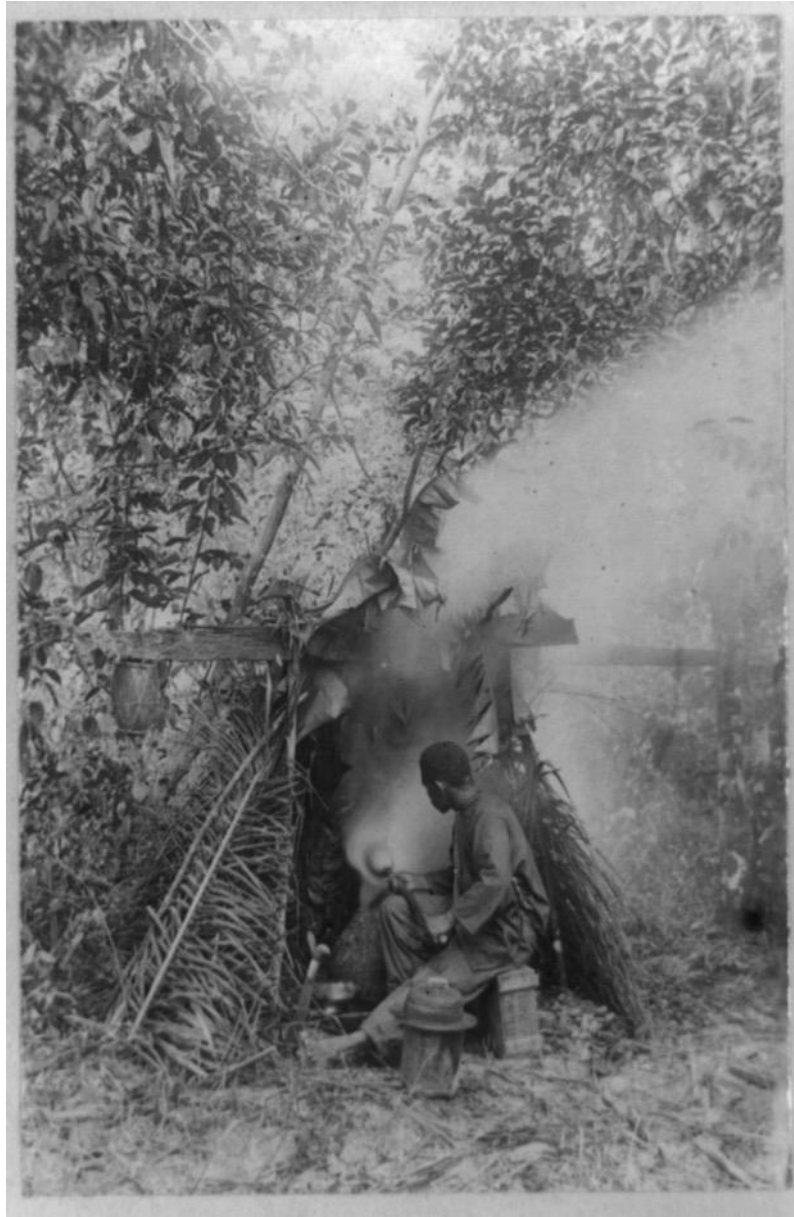


Figure 24 A man smoking latex on a mold. Brazil. Photographer once known, ca.1890–1900. Silver gelatin image printed on photographic paper. Dimensions not available. Courtesy of the Library of Congress.  
<https://www.loc.gov/item/91483207>



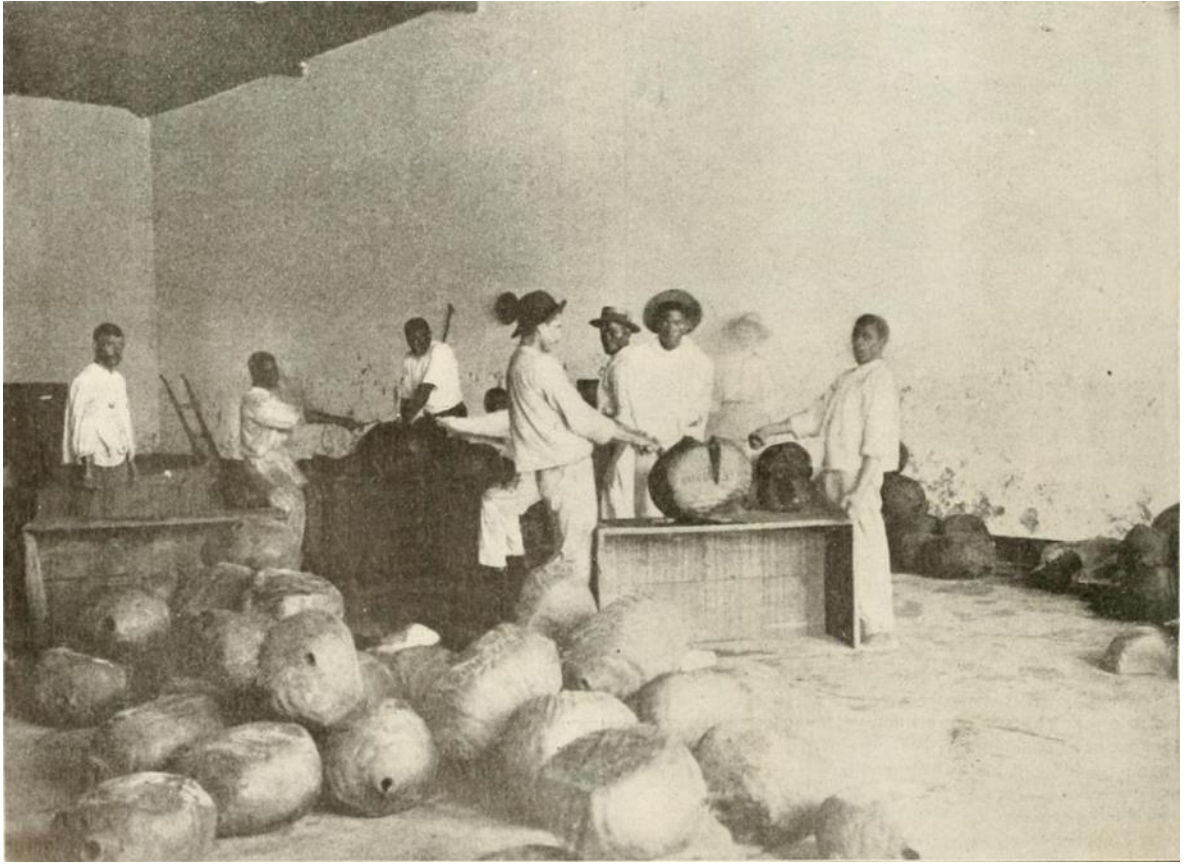


Figure 25      Photograph of export workers grading large bottle-shaped *Pará* rubbers in Manaus, Brazil. Photographer once known, 1909/1910. Detail from *India Rubber World* (1910): 322.

## Chapter 4

### FABRICATING ORNAMENTS

Rubber manufacturing in the nineteenth-century industrial contexts was labor-intensive and involved many workers of varying skills and expertise. A completed comb or piece of jewelry may have passed through as many as sixteen processes, each one carried out by a different person or a department, all of which were supervised by a department head. Gum elastics are not homogenous and informed the limits and possibilities of industrial production. There were also production constraints and chronic supply crises (in quantity or price) of rubbers, due to ecological limitations, inaccessibility, logistics, and overexploitation, encouraged the reclamation of used or faulty rubbers.<sup>72</sup> As shipments varied due to shortage, workers had to remain adaptable and bend their skills to the materials available—learning as they went how to identify and treat different rubbers based on texture, color, smell, and processed form—exposing them to the wide range of materialities of gum elastics native to the Amazon basin.

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<sup>72</sup> Natural rubbers remained a high-priced commodity prone to market instability due to regular shortages. Western dependence on rubber from the Amazon basin changed entirely in the 1900s, when botanical experts and tire manufacturers shifted to cheaper and labor-intensive rubber plantations. Rising demand led to overexploitation and, in some cases, aggressive tapping techniques that killed off large populations of trees. The supply crisis explains the gradual shift to cultivation in the Andes and the Amazon to Asia, with Dutch plantations in Indonesia dominating production by the end of the nineteenth century. Barham and Coomes and, *Prosperity's Promise*, 77–83.

## Division of Labor

The manufacture of hard rubbers in the mid-to-late nineteenth century was performed by men, women, and children, many of which immigrated from Germany and Ireland, and often brought skills from other trades. Numerous steps were involved to make a comb or piece of jewelry which were arduous and bound to compounding rubber. Each step along the production line was integral to the creation of even a simple object, like a bracelet or a hair comb. Most factories were organized by the different production processes, displayed by the factory layout for the Rubber Comb and Jewelry Company in figure 26. Each department was responsible for one step in the production process—from thoroughly cleaning, grinding, and compounding the imported rubber into a homogenous mass to curing the compounded sheets of rubbers in ovens or steam-heated molds, to the finishing of a piece. Most companies engaged in the manufacture of ornaments would have employed die-makers, engineers, metalsmiths, compounders, cutters, molders, turners, stampers, polishers, and varnishers, as well as people tasked with weighing rubbers when they first arrived to the factory to the shipment of the manufactured items to distributors around the country and abroad.<sup>73</sup>

The division of labor between men and women on the factory floor is often emphasized in trade literature. Workers, unlike managers and department heads, were paid by the piece and week. Men are cited as making anywhere from \$8 to \$10 a

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<sup>73</sup> Virginia Penny, *The Employments of Women: An Encyclopedia of Women's Work* (Boston: Walker, Wise & Company, 1863), 276. Due to a lack of primary source material, I have not highlighted the potential presence of workers employed to monitor washed and rolled sheets of rubber. Based on period sources, it is hard to ascertain if the grinders, the men tasked with grinding and rolling the rubber into a homogenous sheet, cared for the rubber as it dried. More research is required.

week, plus an additional sum for a day of work. Women and girls, however, are recorded as making anywhere from \$2 to \$6 per week.<sup>74</sup> The disparity in wages is not unique and underscores the value placed on what has historically classified as skilled labor (fig. 27). Men were engaged in the chemical and technical aspects of the manufacturing process, such as weighing, grinding, compounding, molding, heat joining and treating, as well as turning, carving, and varnishing. Men also held positions as metalsmiths, tinsmiths, and die-makers, who were involved which involved the design and fabrication of the tools, molds, dies, and machinery. As a result, men mainly designed combs and jewelry exclusively for female consumers. Women and girls are usually illustrated operating die-presses, assembling jewelry, polishing combs and jewelry, checking for quality, and finally, packing the items for shipment. Some women also engaged as washers, which was an integral step at the beginning of the manufacturing process. Washers were knowledgeable about how different grades of rubber were processed, which informed how long rubbers needed to be soaked and further “masticated” or ground to remove alkalis used during the processing of latex for export.

### **Methods of Vulcanization**

Hard rubbers used in the fabrication of ornaments were achieved by heat curing, which usually requires sulfur to be mixed with rubber and either dry heat or steam was applied with or without mechanical pressure.<sup>75</sup> Heat curing was most often

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<sup>74</sup> Girls are also referenced as being employed to mend imperfections in vulcanized rubber goods. Penny, *The Employments of Women*, 275–76.

<sup>75</sup> Heat or “hot” vulcanization differs from cold vulcanization which are reliant on sulfur monochloride. Sulfur monochloride is extremely toxic. The use of these



achieved in three different methods: dry heat, steam, and press-curing. Dry heat relies on dry hot air in an oven or vulcanizer (often a table-sized cylindrical vessel not unlike a mold) heated by steam pipes. Vulcanization by this method was slow and tedious unless an accelerator was added during the compounding process. The use of steam required the rubber to either be wrapped or placed in a lubricated mold. This method was faster than dry-heat and was not dependent on the addition of an accelerator. In the third method, press-curing (the period term for compression-molding), steam heat and mechanical pressure are applied simultaneously in a steam-heated press, which molds and cures the rubber at the same time. The molding process could take anywhere from two to ten hours, in which, the molder monitored the object, increasing the temperature of the mold as time progressed.<sup>76</sup>

The curing system informs the fabrication of a given object. Dry- and steam-heated rubbers can be bent and stamped, like this pair of wrap bracelets whose adjustable style formed to the wearer's wrist without a closure or clasp (fig. 28). While the substantial links of a necklace (fig. 29), were made with a die and pressure in the form of a die-press. A similar style of necklace (fig. 30) provides another example of what is possible with a sheet of hard rubber and a die-press during this period.<sup>77</sup> Two

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methods was not as prevalent by manufactories in the United States, and thus, it is very unlikely that the pieces surveyed here relied on this process.

<sup>76</sup> Thomas Bolas, "The India-Rubber and Gutta-Percha Industries," *Journal of the Society of Arts* 28, no. 1449 (1880): 793.

<sup>77</sup> A description of the process of die-stamping a sheet of hard rubber is illustrated in the following description by a contemporary observer of the process: "In a similar manner a vulcanite disc, when slightly warm, may have a device struck upon it coin fashion. This can be very well illustrated by means of the small striking press which is now before you. Notice how readily the warmed ebonite takes an impression of a die,

styles of buttons manufactured by workers at the Novelty Rubber Company (fig. 31, 32) differ from the stamped links of the necklaces.

The use of a die and press to cut and punch out desired forms required less time and expertise than molding. Compression-molded rubbers are formed to the desired shape and ornament during the molding process. For example, a pair of symmetrical prism-shaped brooches were made in a crisp mold (fig. 33). At the same time, the beads of a necklace vary in size and shape (fig. 34). During this period, many manufacturers relied on lead molds (with a tinned interior). Brass, steel, and iron molds were a financial investment, and the more expensive metals were applied for objects of simpler shapes not dictated by consumer trends.<sup>78</sup> A soft metal like lead cut production costs and lent itself to ornate shapes and designs, where the fashion was likely to change. The bulbous beaded border of a twist comb displays the fashion for prominent and accentuated shapes to draw attention to hair styling (fig. 35). In contrast to the comb, a hairpin (fig. 36) lacks embellishments; however, the overall scale of the pin suggests it was intended to be seen.

An ornament's finish and surface design could range from a high polish to applying inlaid metal. Recovering a comb or piece of jewelry with a high finish is rare. Over time, oxidation and environmental factors cause the surface of vulcanized rubber to become dull and sometimes chalky. A handful of the pieces surveyed here, however, retain glossy surfaces (see fig. 35, 39, 45). Turners and polishers grind and

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but the pressure required is considerable." Bolas, "The India-Rubber and Gutta-Percha Industries," 749.

<sup>78</sup> Hamilton, *Industrial Poisons Used in the Rubber Industry*, 50.

polish with granular stones, like pumice, to remove imperfections or flaws. Using granular stones smooths the surface and prepares it for further polishing, which could be done with a whiting and soft brush or on a lathe with rotten stone and oil.

Sometimes, polishers used lampblack and oil to emphasize the material's dark color.<sup>79</sup>

In addition to a slick surface finish, some producers applied copper alloys, silver alloys, and base metals on the presentation surface of jewelry. A highly polished black signet ring with an inlaid piece of sheet metal affirms the harmful effect of sulfur on most metals (fig. 38). In contrast, a waist clasp with gold-inlaid stars and Greek Key designs offers another case study of the interaction between hard rubbers and metals (fig. 39). The presence of sulfur in vulcanized rubber tarnishes most metals, except for high karat gold.<sup>80</sup> Thus, it is common to find tarnished or blackened inlaid metal on hard rubber ornaments and blackened ear wires, clasps, catches, hooks, and other prefabricated components incorporated in jewelry as functional securing parts. Producers also applied carving and engraving to the presentation surface of an ornament (refer back to fig. 8).

Now that I have touched upon the working conditions, methods of vulcanization, fabricating techniques, and surface treatments, I will transition to short

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<sup>79</sup> Bolas, "The India-Rubber and Gutta-Percha Industries," 793.

<sup>80</sup> An 1868 fashion column devoted to vulcanite jewelry mirrors Mott's assertion about 18-karat gold: The gold used in vulcanite jewelry is eighteen carats fine and does not tarnish." "Vulcanite Jewelry," *Memphis Daily Appeal*, September 28, 1868. An advertisement for "vulcanite rubber jewelry" with "mounting 18-carat gold" in 1873 further elaborates the need for a specific purity of gold to avoid the metal turning black in reaction to the sulfur used in the vulcanized rubber. Swayne's, Advertisement, *The Sun*, December 3, 1873; See also "India Rubber Goods," *The New York Herald*, December 27, 1868.

entries that provide additional context and interpretation of a given object. The first two entries refer to visual and textual materials providing additional insight into working conditions (fig. 26, 27). These entries prepare us to look at individual combs and pieces of jewelry. The entries in Figures 28 through 39 further examine the styles, designs, and fabricating techniques of extant pieces to not only survey what types of ornaments were available to consumers but also underscore the aptitude of the workers who fabricated these pieces.

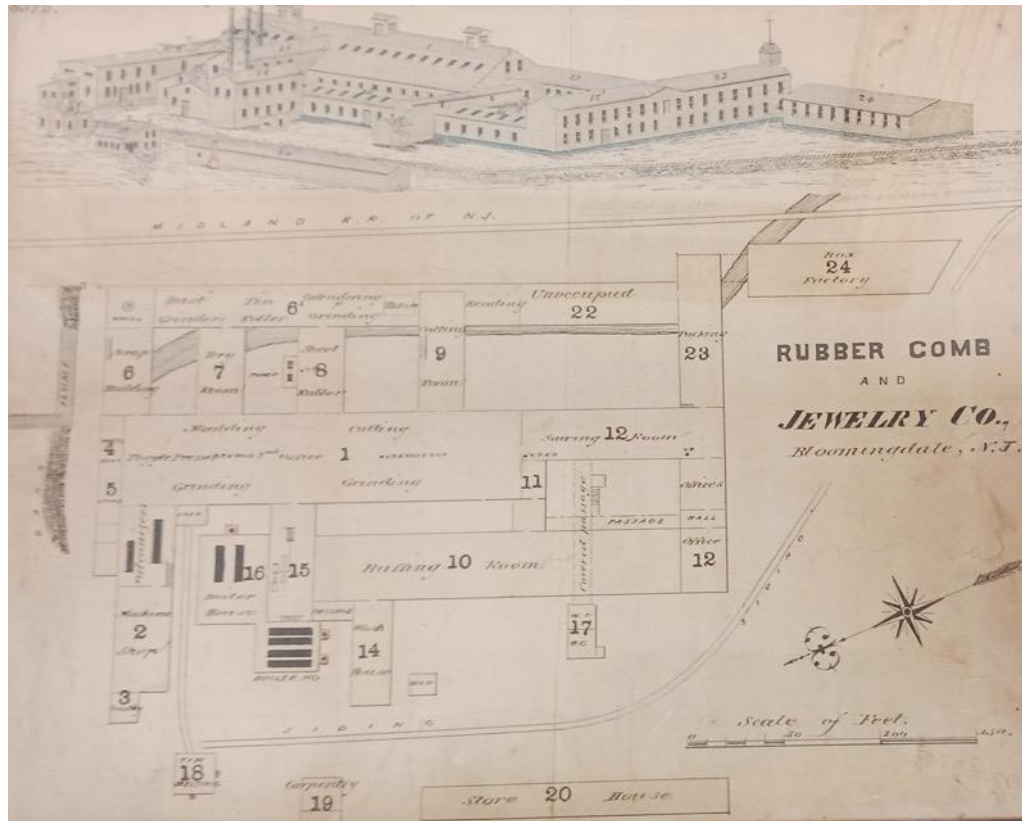


Figure 26 Floor plan of the factory for the Rubber Comb and Jewelry Company. Butler, New Jersey. Rubber Comb and Jewelry Company, ca. 1876–80. Courtesy of the Butler Museum.

The factory floor plan for the Rubber Comb and Jewelry Company was likely made between 1876 and 1881. The plan illustrates different departments—vulcanizers (molding), calendaring and grinding; cutting, bending, buffing, toggle presses (die-stamping presses), soap stone (used for grinding down the material before polishing and other surface treatments)—illuminating the complexities of the manufacturing processes, and the different forms of trained and skill expertise enacted by men, women, and children employed by the company. Contemporary accounts of working conditions allow us to consider the labor conditions of this factory and others engaged

in the production of hard rubber ornaments. A typical shift could range from ten to twelve hours, and the work no matter the department, was physically taxing. Most workers likely spent the duration of their shift standing up and performing repetitive motions and gestures. The physical toll of labor was meant with the exposure to toxic dusts and fumes, as well as extreme temperatures. The reliance on steam-powered machinery—steam-heated molds and presses, hot plates, and curing ovens— used to cure compounded rubbers made for warm working conditions. Additionally, the workshops also required “steampipes through all the place” to prevent natural rubbers from hardening during the multi-step industrial procedures.<sup>81</sup> The steamy workshops accentuated the pungent aromas of rubbers that had been packed and remained in crates from the Amazon to Butler, New Jersey. The smell of the rubbers was coupled by the harsh odors of toxic chemicals and metals (like sulfur).

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<sup>81</sup> A detailed account of the working conditions of a Scottish Vulcanite Company records the stifling heat of the factory. David Bremer, “Manufactures in India-Rubber,” in *The Industries of Scotland: Their Rise, Progress, and Present Condition* (Edinburgh: Adam and Charles Black, 1869), 367. This description provides crucial context that can be extended to the conditions of hard rubber factories in the United States. Additionally, most workers engaged in the production of hard rubbers would have likely been exposed to litharge or lead oxide, sublimed lead or lead oxysulphide, white lead or carbonate of lead, red lead or lead oxide, golden sulphide, aniline oil, carbon disulfide, carbon tetrachloride, coal-tar benzol, naphtha, and benzine. Hamilton, *Industrial Poisons Used by the Rubber Industry*, 6.

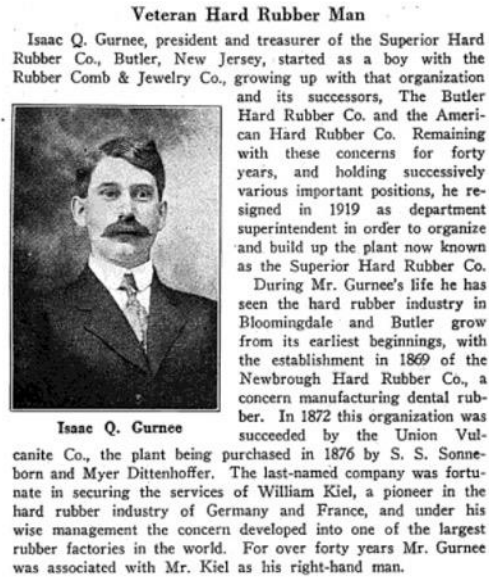


Figure 27 Isaac Q. Gurnee was employed by three rubber manufactories in Butler, New Jersey. Gurnee was in the industry for forty-five years. Detail of the “Veteran Hard Rubber Man,” in *The India Rubber World* (1926): 35.

The biography of Isaac Q. Gurnee, a rubber worker turned superintendent, preserved in an issue of *The India Rubber World*, offers insight on how some workers ascended to positions of power. Gurnee began working at the Rubber Comb and Jewelry Company as a child and would work at its successors, the Butler Hard Rubber Company and then finally, the American Hard Rubber Company. His biography is not unique. During this period, the department heads and superintendents usually had several years of experience manufacturing hard rubbers.<sup>82</sup> It is hard to assess if people who were not men or white were offered opportunities to grow in their positions.

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<sup>82</sup> See the entries for Dennis Bowden, William Kiel, Joesph F. McClean in *Biographical and Genealogical History of Morris County, New Jersey* (New York: The Lewis Publishing Company, 1899).



Figure 28    Pair of adjustable cuff bracelets. United States. Manufacturers once known, ca. 1860–80. Vulcanized rubber. 1 x 2.5 in. Courtesy of Historic New England. Gift of Miss Helen B. Gilman. 1933. 1707AB.

By the mid-century, rubber companies placed advertisements in newspapers targeting ivory and horn workers, carpenters, and metalsmiths.<sup>83</sup> The knowledge of turning thermoplastic materials and heat treating them could be transferred to the production of hard rubber jewelry, like this pair of wrap-style cuff bracelets (often referred to by the French word *manchette*). A worker trained in turning or molding hard rubbers likely made these bracelets.<sup>84</sup> To achieve the wrap style of these

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<sup>83</sup> See Horace H. Day, Advertisement, *The New York Herald*, March 13, 1860; and Rubber Comb and Jewelry Company, Advertisement, *The New York Herald*, March 5, 1880.

<sup>84</sup> One contemporary describes the finishing of vulcanized rubber as similar to working ivory: “vulcanite may be turned or carved in the same way as ivory, with the advantage that it may be moulded to the required form without the great waste which attends ivory carving. It is also much less liable to fracture.” Ernest Spon, *Workshop Receipts for the Use of Manufacturers, Mechanics, and Scientific Amateurs* (London: E. & F. N. Spon, 1882), 383.



bracelets, the maker heat-treated, bent, and formed each bracelet from a piece of vulcanized sheet rubber.<sup>85</sup>

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<sup>85</sup> Bolas, “The India-Rubber and Gutta-Percha Industries,” 796.



Figure 29     Anchor chain necklace with molded and carved pendant. United States. Manufacturer once known, ca. 1865–80. Vulcanized rubber. Courtesy of Historic New England. Gift of S. Alice Chase. 1932. 650.

“Rubber chains” for sale was a common utterance in period newspapers.<sup>86</sup>

Black vulcanized rubber cable chain necklaces, like this example here, were made and

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<sup>86</sup> For example: Advertisement, *Memphis Daily Appeal*, May 26, 1874; and Wm. A. Turner, Advertisement, *The Wheeling Daily Intelligencer*, August 5, 1875.

consumed in masses. Circulating widely, the presence of the imposing chain-link necklace in period photographs, attests to the mainstream use and favor of the form from the middle of the 1860s onward (see fig. 46, 48, 49, 50).

Thirty-four hard black links form this necklace. The links are graduated and are roughly an inch in diameter and range in length from 0.5” of an inch to 2.5 inches at the largest size. The exterior of each link is smooth and polished bright. While the interior, is rough. The contrast between the presentation and interior surfaces beg as to ask how these links were made, and by whom.

Period sources suggest that women and girls operated die-presses and assembled jewelry (among other tasks). A contemporary manufacturer details the steps behind the manufacture of “ladies’ chain necklaces,” like this example here.<sup>87</sup> The source describes women and girls feeding sheets of vulcanized rubber into die-presses, in which they “punched out at in two operations, first making the opening in the centre [of the cut out piece of hard rubber], and the second cutting out the circumference.”<sup>88</sup> The “punched edges [of the links] were rough” and would need to be polished. Once a batch of links was ready to be polished, men operating buff wheels received the links, which they turned on an “iron rod, ground down to a standard size, and polished.”<sup>89</sup> As this necklace preserves, the polishing was limited to the links' presentation surface. Women operating hot plates received the polished links and softened the links by placing them at a time upon the heated plate. Once the links were malleable, every

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<sup>87</sup> Bremer, *The Industries of Scotland*, 368–40.

<sup>88</sup> Bremer, 369.

<sup>89</sup> Ibid.

other link was cut open at one end with a damp knife and attached to a corresponding link. The woman who formed this necklace did this action seventeen times.

From the women and girls who made the links to the women who assembled the necklace and, finally, the women involved in checking and sending the pieces, this necklace and others like it are a testament to the chain of people involved in its survival. The woman who wore and owned this necklace recognized the skill of the women who made it, so much so that she took care to pass down the necklace to women in her family, who ensured its safekeeping.



Figure 30     Anchor chain necklace with charms. Butler, New Jersey. Rubber Comb and Jewelry Company, ca. 1876–82. Vulcanized rubber, enamel. 40 in. Courtesy of the Butler Museum. Photo courtesy of the author.

Unlike the necklace represented in figure 29, the circular links of this necklace are flat and one-dimensional, and each measure no more than 0.5 inches in length and is less than 0.5 inches wide. This 40-inch chain is accented by a molded padlock, enameled hollow ball, and die-stamped stars.<sup>90</sup> The 120 links were individually punched out with a die-press and then assembled by hand. It would have taken a considerable amount of time to assemble the necklace, and more specifically, it necessitated patience and mechanical dexterity to manipulate the tediously small links in alignment and to ensure each link was secure. The women and girls who collectively made this necklace—whose names were once known—worked in the damp, warm workshops of the Rubber Comb and Jewelry Company (1876–1882). While it would only remain in operation for six years, hundreds of immigrants from

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<sup>90</sup> It appears the enameled hollow ball was added later.

predominantly Germany and Ireland sought employment at the Rubber Comb and Jewelry Company.<sup>91</sup> Amongst them, were Euro- and Anglo-Americans who also worked rubber for a living.

The lack of biographical details on the young women and girls employed at the Rubber Comb and Jewelry Company and elsewhere makes it challenging to retrace their stories. However, a statement by a rubber company superintendent provides further context on the reality for many women working at rubber factories.

We prefer [women] on account of their small fingers. It is piece work, and women are paid from \$4 to \$6 per week, ten hours a day. Our women could not do the work of men, who have to be mechanics, having learned a trade. Men receive about thirty-three cents more per day than women. The time required for men to learn our business it is impossible to answer. Women can learn sufficient in four weeks to earn seventy-five cents per piece. Carefulness and nimble fingers are necessary.<sup>92</sup>

To be careful, nimble, and underpaid. For most companies, and arguably, the Rubber Comb and Jewelry Company, these characteristics were the defining features of many women's roles. While this characterization of women's labor is reductive, it illustrates how women and girls were particularly skilled in making and assembling die-pressed ornaments. Most of the women employed by the Rubber Comb and Jewelry company would have had years of training their mechanical dexterity through domestic labor, like sewing and darning. In this necklace, it is possible to observe how its makers transferred their skills for working with textiles to a semi-synthetic material.

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<sup>91</sup> *History of Morris County, New Jersey*, 394.

<sup>92</sup> Penny, *The Employments of Women*, 286.

This necklace has remained in Butler, New Jersey, since it was made in the late nineteenth century. It has been cared for by two generations of women who sought to preserve local history and the women and girls who contributed to the financial success of the Rubber Comb and Jewelry Company.



Figure 31 Button. New Brunswick, New Jersey. The Novelty Rubber Company, ca. 1865–80. Vulcanized rubber, base metal. 0.5 x 0.5 in. Personal collection of the author. Photo courtesy of the author.

In 1853, engineer, A. G. De Wolfe, at that time, a fresh face to the rubber industry, developed a method of pressing hard rubber goods out of the dust, scraps, and from hard sheet sheets.<sup>93</sup> He was not alone in this development as others in the

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<sup>93</sup> The underside of this button is stamped: “N. R. Co./ 1851 GOODYEAR/ P=T.” *History of New Haven County*, 598. De Wolfe would design and build machines for several companies and would transition to finding effective ways to insulate wires with vulcanized rubber. See also: Adolphe Lambermont, “An Improved Machine for Making Buttons,” December 1879. De Wolfe did not work alone. The impetus for this pressing buttons and other hard rubber objects was explored further in an 1859 patent by Parisian, Charles Morey. However, Morey’s method involves compress-molding rubber “shavings, scraps, filings, dust, powder, or sheet, by a means of a high degree



industry were experimenting with different technologies to effectively and precisely produce homogenous forms quickly. De Wolfe was asked to “arrange” and build die-presses for the Novelty Rubber Company.<sup>94</sup> This button, made between 1865 and 1880, is an example of how hard rubber was manipulated into geometric forms by a die-press. The use of a die and pressure in the form of a die press to shape and cut a sheet of hard rubber was instrumental in the fabricating process. It allowed manufacturers to punch out objects ranging from gaskets to buttons and, in some cases, links for necklaces or earrings. For this button, the survival of the production process at the Novelty Rubber Company animates the labor behind this object:

The caoutchouc [rubber] is received in bottle form and washed by being rolled between iron rollers, supplied with a stream of water. It is then ground between other rollers and sulfur is incorporated during the operation, which prepares it for vulcanizing hard and black. It is then rolled in a calendar, cut into squares and these squares laid between tin plates, in order to prevent them from becoming porous during the vulcanizing process. These squares are set in the pans and placed in a large boiler, where they are subject to a steam heat of three hundred degrees, from which they emerge hard, black sheets of rubber. From there are made buttons. The sheets, after being sorted in various thicknesses, are taken upstairs, and heated to partial softness and then cut out by steam dies into round flat pieces at the rate of five hundred a minute. In the machine shop above skilled workmen are constantly engaged in getting up designs on steel dies for buttons and checks, being fancy patterns for the former and inscriptions to order for the latter. The flat pieces are taken to the press room, heated on the stove and pressed in the dies, both sides at once coming out shapely buttons.<sup>95</sup>

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of heat and pressure.” Charles Morey, Improvement in Reworking Hard-Rubber Compounds, US Patent 12, 212. US Patent Office. January 9, 1859.

<sup>94</sup> *History of New Haven County*, 598.

<sup>95</sup> *New Brunswick and its Industries*, 56.



Figure 32 The surface of this button is dull and discolored likely from oxidation and other environmental stressors. The button has lost its finish and color over time. Button. New Brunswick, New Jersey. United States. Novelty Rubber Company, ca. 1865–80. Vulcanized rubber, brass. 0.5 x 0.5 in. Personal collection of the author. Photo courtesy of the author.

Faceted like a rose cut diamond, this black button was made from Amazonian labor and materials, refined and pressed by workers at the Novelty Rubber Company.<sup>96</sup> Diamonds were mined and exported from Brazil beginning in the first

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<sup>96</sup> Rose cuts were fashioned from diamond rough that easily lent itself to a flat-bottomed dome-topped design. The main characteristic of a rose cut are the triangular facets. Recognized by jewelry historians Ginny Redington Dawes and Olivia Collings, when enslaved gold miners in Brazil found a source of diamonds in a river gravel in the 1720s, the discovery of the natural resource would come to supplant the dwindling supply of diamonds mined and exported from India. The diamonds mined and exported from Brazil offered a cheap supply of the commodity for Western consumption. Ginny Redington Dawes and Olivia Collings, *Georgian Jewellery: 1714–1830* (Suffolk: Antique Collector's Club, 2007), 72. By 1880, out of the 450

quarter of the eighteenth century, and as this faceted button demonstrates that rubber could imitate this rarified luxury. The establishment of the Novelty Rubber Company in 1855 was, in part, reliant on the social capital of one of its backers, Douw Williamson, who had established connections with export houses in Belém, Brazil, and Ecuador.<sup>97</sup> Williamson's ties to the export of commodities would have proven useful for securing a supply of rubbers. The mass-production of buttons, canes, pipes, pipe stems and bowls, cigar-cases, matchboxes, crotchet-hooks, and knitting-pins, by the Novelty Rubber Company, were dependent on the people who extracted and processed rubbers for the export market.<sup>98</sup>

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people employed by the Novelty Rubber Company, at least two-third were women. *Nation Repository Devoted to General and Religious Literature, Criticism, and Art*, ed. Daniel Curry (New York: Phillips and Hunt, 1880), 60.

<sup>97</sup> Douw Williamson worked for James Bishop & Company, a New York shipping merchant See the obituary for Douw Williamson on page 92 of *The Pharmaceutical Era*, January 21, 1897; and "Obituary," *New-York Tribune*, January 5, 1897. Williamson would leave the Novelty Rubber Company in 1860 to manage to the North British Rubber Company, a Euro-American run and operated rubber company in Edinburgh, Scotland. By 1866, Williamson was part of establishing the Scottish Vulcanite Jewelry, which was known for its buttons, combs, and jewelry. James Bishop of James Bishop & Company inherited the company from his father who established the firm in New Jersey during the late eighteenth century. In addition to being a merchant, Bishop was a member of congress. Some records enumerate his net worth as being close to 20,000,000. See W. Woodruff, "The American Origins of a Scottish Industry," *Scottish Journal of Political Economy* 2, no. 3 (1955): 21.

<sup>98</sup> Pearson, *Crude Rubber*, 6.



Figure 33     Pair of molded brooches. United States. Manufacturer once known, ca. 1870–90. Vulcanized rubber, base metal. 1.25 x 0.5 in. Courtesy of Historic New England. Gift of Miss Mary Frye. 1938.418AB.

The shifting trends in jewelry design required companies to have die-makers on hand to adapt and design tools, dies, molds, and fixtures, ensuring the production of uniform products. The steam-heated mold used to cure and form this pair of brooches was likely constructed from a soft metal, like lead. The lead's ductility allowed the die-maker to carve and perfect the architectonic, prism-shaped mold that would produce these brooches and others like them.

As early as 1860, diemakers and engineers at rubber factories secured US patents for molds used to make solid vulcanized rubber objects.<sup>99</sup> These patents range

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<sup>99</sup> Patents concerning molds used for vulcanized rubber goods include but are not limited to: Charles Goodyear and Robert Haering, Improvement in the Manufacture of Gutta-Percha and India-Rubber, US Patent 9,668, filed April 12, 1853; Du Bois D. Parmelee and John A. Greene, Improvement in the Manufacture of Hollow Molded

from the metals used to make the molds to the design of the vessels. These patents also enumerate the inadequacies of the available technology and the challenges of molding gum elastics from different plants.<sup>100</sup> This pair of brooches speaks to the circulation and transfer of knowledge through printed documents and amongst die-makers and molders working at rubber factories, who learned from one another how to work hard rubber ornaments.

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Rubber Goods, US Patent 26, 286, filed November 28, 1859; Hayden A. Alden, Improvement in Molds for Vulcanizing Rubber, &c. US Patent 41, 347, filed January 19, 1864; Parmelee, Dubois D. Improved Mold for Vulcanizing Rubber. US Patent 53, 034, filed March 6, 1866; and James S. Carew and Caleb Swan, Improvement in the Manufacture of India-Rubber, US Patent 11, 608, filed August 29, 1854, reissue no. 3,531, July 6, 1869. In addition to patents, pertinent information on the materiality of molds and molding processes associated with rubber can be found in dentistry manuals from the late nineteenth century. S. Eldred Gilbert, *Vulcanite and Celluloid: Instructions in their Practical Working for Dental Purposes* (Philadelphia: S. S. White Dental Manufacturing Co., 1884).

<sup>100</sup> These patents detail the materials used to make the molds (e.g., plaster of Paris, tin, type metal, brass, and iron) to substances used to slick the interior of the mold to prevent the rubber from sticking to the mold. Some of the substances used to coat the interior of the mold include but are not limited to soapstone, plumbago, lamp-black, oxide of zinc, talc, and olive oil.



Figure 34    Molded beads strung on a piece of ribbon. United States. Manufacturer once known, 1860–75. Vulcanized rubber, cotton. 8 in. Courtesy of Historic New England. Gift of Mrs. James Hayden Wright. 1924. 314.

Like the necklace represented in Figure 3, this necklace is comprised of spherical beads that were made in a mold. The fifty black rubber beads vary in size and condition. Many of the beads are dull, except for one that has retained a high finish. A fine seam line—an artifact from the mold—can be found on each bead.



Figure 35 Twist comb. New York, New York. India Rubber Comb Company, ca. 1880–90. Vulcanized rubber. 3.75 x 3.5 in. Courtesy of Historic New England. Bequest of Mrs. Waldo O. Ross. 1938.940.

Previously, vulcanized rubber ornaments have been discredited because they are often molded and mass-produced. In these conservations, molded objects are usually equated with a lack of skill, therefore, lacking value. However, wielding steam-heated molds that cure and simultaneously mold rubber, were far from simple from simple and required aptitude. For example, this beaded twist comb,

manufactured by men and women in College Point, Queens, for the India Rubber Comb Company, is a testament to the artistry of rubber workers.

This comb is comprised of a molded beaded border of twenty bulbous semi-spheres creating a curved or rounded three-dimensional halo of ornament. Twelve graduated teeth are applied at the base of the crown. Categorized as a twist comb in an 1880s illustrated catalog trade by the India Rubber Comb Company (1851–1898), this style of comb was designed to maintain a twisted or coiled hairstyle.<sup>101</sup> To achieve the symmetrical and precise angles of the teeth as well as the globular, bulbous beads, the molder was attendant to several moving parts during the process.<sup>102</sup> First, the molder received sheet of hard rubber cut to the specifications of the comb by a person employed to cut hard sheets of vulcanized rubber for different manufacturing purposes. Before the sheet could be placed in the mold, it was placed on a hot plate to soften the material.<sup>103</sup> As the sheet warmed and softened on the plate, the molder ensured the interior of the mold was lined with liquid silex, collodion, tinfoil, or talc,

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<sup>101</sup> India Rubber Comb Company, *Illustrated trade catalogue* (New York: Self-published, ca. 1880–85), 110.

<sup>102</sup> See: Gilbert, *Vulcanite and Celluloid: Instructions in their Practical Working for Dental Purposes*, 359; and William T. Bryant, *A Practical Treatise on Caoutchouc and Gutta-Percha* (Philadelphia: Henry Carey Braid & Co., 1883), 66. It is unclear how long a comb would have remained in a mold. Period references to the duration of the molding process are inconsistent. Given the fact that combs are small and does not consist of a lot of material, it would seem it would need an entire ten to twelve hours to ensure its completion. If that were the case, it would take too long to mass-produce these items and a lot less would have been made. William T. Bryant, *A Practical Treatise on Caoutchouc and Gutta-Percha* (Philadelphia: Henry Carey Braid & Co., 1883), 66.

<sup>103</sup> Bremer, “Manufactures in India-Rubber,” in *The Industries of Scotland*, 370.



to prevent the rubber from adhering to the interior surface once placed in the mold.<sup>104</sup> The softened sheet was removed from the plate and pressed into the mold. Taking the softened rubber, the molder lightly pressed the material into the mold, and added water which would turn to steam during the molding process. Any excess material was removed as rubber expands under pressure and heat. The mold having been packed, the two parts of the mold were placed together and closed, either by a clamp or screw bolts. The molder would gradually raise the heat of the mold, and the curing and molding process could take anywhere between two to ten hours.<sup>105</sup> When the comb was taken out of the mold, the molder poked a small hole in the comb allowing the air to pass into the interior of the comb, thus preventing it from collapsing while cooling off.<sup>106</sup> After cooling, the comb would be taken to be ground and polished.

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<sup>104</sup> Other materials used to line the interior surface of a mold include soapstone, plumbago, lamp-black, oxide of zinc, and olive oil.

<sup>105</sup> Joseph Richardson, *Vulcanite and Celluloid: Instructions in their Practical Working for Dental Purposes* (Philadelphia: The S. S. White Dental Manufacturing Co., 1884), 359. Bremer, 370; William T. Bryant, *A Practical Treatise on Caoutchouc and Gutta-Percha* (Philadelphia: Henry Carey Braid & Co., 1883), 66. It is unclear how long a comb would have remained in the mold. The references to the duration of the compression-molding process are inconsistent and often imprecise. Given the fact that the comb is fairly small item and does not consist of a lot of material, it would seem it would need an entire ten to twelve hours to ensure its completion. If that were the case, it would take a lot long to produce these items and a lot less would have been made. Bryant, *A Practical Treatise on Caoutchouc and Gutta-Percha*, 66.

<sup>106</sup> There would have also been gas holes in the mold to allow for the release of steam during the curing/molding process.



Figure 36 Molded hair pin. United States. Manufacturer once known, ca. 1870–90. Vulcanized rubber. 5. 125 x 0.625 in. Bequest of Henry Francis du Pont. Courtesy Winterthur Museum, Garden & Library. 1958. 1143.

Many of the ornaments included in this guide present evidence of degradation caused by oxygen, ozone, heat, light, pro-oxidant rich metals, and chemical reactions.<sup>107</sup> Because most rubbers involve vulcanization with sulfur, rubbers continue to age and dry out long after the vulcanization process. When this molded hair pin was acquired by the Winterthur Museum in 1958, the material of the pin was classified as

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<sup>107</sup> C. M. Blow, *Rubber Technology and Manufacture* (Cleveland: CRC Press, 1971), 12.

tortoiseshell.<sup>108</sup> In 2008, it was reclassified as horn.<sup>109</sup> It is only in a recent study of the degradation of the presentation surface that has revealed that the material is vulcanized rubber.<sup>110</sup> Chemicals in the rubber can migrate to the surface creating a “bloom,” which we see on the presentation surface of this molded hair pin. Over time,

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<sup>108</sup> Object file, 1958. 1143, Registration, Winterthur Museum, Garden & Library, Winterthur, Delaware.

<sup>109</sup>This hair pin appeared in 2008 Winterthur exhibition *Vanity and Virtue: Personal Grooming in America*. In this exhibition, it was interpreted as a horn. The irony of this misidentification is during the period of its manufacture vulcanized rubber was marketed as being a better more durable material to “Buffalo Horn” and “Buck Horn. . . and is destined to supersede these materials—most of which are becoming scarce—in an endless.” “Vulcanite or Hard Gum,” In *Illustrated and Descriptive Catalogue and Trade-Price List of India Rubber and Gutta Percha Goods, manufactured for and Sold by Geo. N. Davis & Brother* (Boston: Self-published, 1855), 75. The misidentification of vulcanized rubber for horn, bone, jet, onyx, glass, gutta-percha, or plastic (celluloid) is a common occurrence in public and private collections. While completing research in Winterthur Museum’s collections for a separate project, I visually identified that the hair pin was vulcanized rubber. Emma Reuther, a graduate student in the Winterthur/UD master’s program in Art Conservation, was able to confirm the material was vulcanized rubber through XRF. Emma Reuther, Conservation report for 1958.1143 (unpublished report, 2024).

<sup>110</sup> Formation of the bloom is driven by an inherent incapability between the rubber and additive. It was recognized early on that rubber rapidly oxidized in air and stabilizers were developed to prevent degradation. Unfortunately, many of the early stabilizers were volatile-colored materials. It is very common to find bright yellow stains on tissues and plastics used for wrapping and storing early rubber objects, especially dark colored ones where the yellowness of the stabilizer was not so apparent. R. Scott Williams coined the term “malignant plastics.” William attributes vulcanized rubber as a malignant plastic. “As they degrade, all these plastics produce harmful degradation products that cause damage to other plastic and non-plastic objects in the vicinity. I call these plastics that damage their neighbors, malignant plastics. Because of their malignancy, conservation strategies must deal with these plastics as a first priority.” R. Scott Williams, “Care of Plastics: Malignant Plastics,” *WAAC Newsletter* 24, no. 1 (2002).

the oxidation of sulfur compounds in hard rubbers produces sulfur oxides which react with atmospheric moisture to eventually form sulfuric acid. The sulfuric acid presents as a crystalized substance or droplets (bloom on the surface of the hard rubber) in addition to the bloom, the discoloration of the pin from black to brown further expresses its degradation.



Figure 37 Molded ring with inlaid metal. United States. Manufacturer once known, ca. 1865–90. Vulcanized rubber, silver alloy.  $\frac{3}{16} \times \frac{13}{16}$  in. Courtesy of Historic New England. 1938. 1112.

This ring is an example of the inlay of metal on a hard rubber surface. The black tapered band, which is enhanced by the finish. The bezel includes a rectangular-shaped piece of sheet metal that is inlaid on the ground. An 1863 patent for a tool reliant on pressure and heat to inlay hard rubbers sheds light on how this ring's surface was decorated:

The apparatus which may be adapted for use by heating that portion of the tool only which presses or forces the ornaments into the gum. This tool is provided with an anvil, to receive and support the ring or other article while it is exposed to the pressure of the jaw. The tool may also be provided with a punch, to punch out the letters or ornaments to be

interested in the gum, or a separate punch or die may be used for this purpose.<sup>111</sup>

The maker of this ring likely relied on a similar tool to fabricate to inlay the surface of the band.

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<sup>111</sup> Norman Lanphear, Apparatus for Ornamenting Gum Jewelry, &c., US Patent 40, 053, filed September 22, 1863



Figure 38    Waist clasp with inlaid metal designs. United States. Manufacturer once known, ca. 1860–80. Vulcanized rubber, copper alloy, base metal. 2 x 2.75 x 0.25 in. Courtesy of Historic New England. Gift of Caroline Barr Wade. 1987.978AB.



Figure 39 Detail of undersides of the clasps. The base metal bars, hook, and catch have tarnished. In addition to the tarnished metals, the surfaces are crazing. Courtesy of Historic New England. Gift of Caroline Barr Wade.1987. 978AB.

This 1860 waist clasp displays the use of a high karat gold as an inlaid surface ornamentation of vulcanized rubber. Playing on the popularity of sentimental iconography of the 1860s, the inclusion of the stars at the center of each, framed by a Greek Key border would have made this a fashionable accessory for customers who could afford to pay more for the inclusion of gold. The desire for a bright metal against a dark ground became popular mid-century due to piqué, tortoiseshell jewelry inlaid with gold typically manufactured in France. Unlike tortoiseshell, vulcanized rubber however, degrades when exposed to pro-oxidant metals, as seen on the underside of the waist clasp (fig. 39). One feature of this jewelry” laments a



contemporary observer of the application of inlaid metal on vulcanized rubber “is that only fine gold can be used, lower golds turn black.”<sup>112</sup>

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<sup>112</sup> “India Rubber Goods,” *The New York Herald*, December 25, 1868.

## Chapter 5

### WEARING

On June 30, 1865, a subscriber of the *New York Herald* placed a notice in the “Lost and Found” column to recover a “vulcanite rubber Bracelet” (fig. 40). Trying to recall from memory when they last felt the hard rubber against their wrist, the anonymous owner lists off rough coordinates to make others who frequent the streets aware of the missing *keepsake*. Was the bracelet a gift? Was the ornament tied to a specific memory, or perhaps a memory of a loved one? This subscriber was not alone in their sentimental attachment to vulcanized rubber adornments. A pair of earrings, a locket, and a ring (fig. 42, 43, 44) record the ways wearers formed connections to their vulcanized rubber ornaments. While sitters in period portrait photographs articulate the same affection as they carefully apply hard black rubber bracelets, brooches, combs, earrings, necklaces, and rings before the camera. Even with the development of photographic technologies that made the medium more accessible and affordable as the period progressed, it was still a novelty to have one’s portrait taken. The choice to present oneself in “vulcanite rubber” ornaments in a formal studio portrait meant something to the sitter and the people with whom they shared their portrait. This last and final section considers the weight of this genre of personal adornment. The use of vulcanized rubber ornaments as a medium to communicate and record the memory of loved ones complicates the existence of these objects in the nineteenth century and how we make sense of them moving forward.

## Sentiment

Several retailers offered customers the repair and polishing of vulcanized rubber ornaments (fig. 41).<sup>113</sup> Consumers invested value in vulcanized rubber combs and jewelry that transcended their mass-produced status. Diverse users enjoyed vulcanized rubber's visual and physical qualities and found ways to invest profoundly personal and meaningful memories and meanings.

## Visibility

In photographs, vulcanized rubber ornaments are visually disruptive. Black and indiscreet, vulcanized rubber ornaments stood out upon its wearers' heads, necks, ears, wrists, fingers, and chests. The eye-catching black cable chain necklace is the most common form of jewelry preserved in American period portrait photographs between 1870 to 1880 (fig. 46, 48, 59, 50). Tintypes and carte-de-visite show how sitters styled and played with the material qualities of vulcanized rubber, including its prized visual qualities of contrasting darkness and a polished, glossy shine. These portraits record the styling of hard rubber ornaments that individualize the mass-produced items that would have otherwise been undocumented. More specifically, these portraits offer insight into how mid-to-late nineteenth-century women chose to represent themselves

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<sup>113</sup> These retailers included Hall's Rubber Emporium located in Portland, Maine, from the 1860s through 1880s. See: Hall's Rubber Emporium, Advertisement, *The Portland Daily Press*, November 20, 1865. The use of rubber cement to repair jewelry is specifically recorded in *Watchmakers' and Jewelers' Practical Receipt Book: A Workshop Companion* (Chicago: Geo. K. Hazlitt & Co., 1892), 11. The use of rubber cement for general repair of rubber goods as well as jewelry is also mirrored in the 1875 catalogue for La Perle Rubber Company. See: La Perle Rubber Company, Sales catalog (New York: Self-published, 1875), 21–22.  
<https://collections.library.yale.edu/catalog/10052556>

and articulated their positions in and around social hierarchies through their adoption of vulcanized rubber ornaments.

**L**OST—ON TUESDAY, ON GOING FROM MERCAN-  
tile Library to 224 Lexington avenue, by way of Fourth  
avenue, Seventeenth street, Third avenue, &c., a vulcanite  
rubber Bracelet, a keepsake.

Figure 40     A plea from an anonymous subscriber in the “Lost and Found” column of *The New York Herald*. *The New York herald*, June 30, 1865. Courtesy of the Library of Congress.  
<https://chroniclingamerica.loc.gov/lccn/sn83030313/1865-06-30/ed-1/seq-7/>

**PARASOLS, SUN, AND RAIN UMBRELLAS, in  
all the latest styles: TRUNKS, SATCHELS,  
TRAVELING BAGS, and SHAWL STRAPS: VUL-  
CANITE JEWELRY.  
RUBBER JEWELRY REPAIRED AND REPOL-  
ISHED.  
W. G. MAXWELL,  
319 West Baltimore street.**

Figure 41 The Baltimore-based retailer, W. G. Maxwell, was a prolific retailer of vulcanized rubber jewelry (among other goods) from the late 1850s through the 1870s. In this advertisement, the retailer offers the repair and repolishing of “rubber jewelry.” W. G. Maxwell, Advertisement, *The Sun*, April 3, 1874. <https://infoweb-newsbank-com>



Figure 42    Pair of earrings. United States. Manufacturer once known, ca. 1876–80. Vulcanized rubber, copper alloy. 15/8 x 1 3/8 x 1/8 in. Courtesy of Historic New England. Gift of the Misses Cummings. 1934.1825AB.

Sisters Harriet “Alma” and Emma Cummings gifted these die-stamped hoop earrings to Historic New England in the 1930s.<sup>114</sup> They came with a written tradition indicating they were worn during mourning. At the time these earrings were purchased and worn, they were black.

During the nineteenth century, the mourning practices observed by Anglo-American and English cultures became more prescriptive, with more detailed and

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<sup>114</sup> Object file, Jewelry, GUSN-101042, 1934.1825AB, Historic New England, Haverhill, Massachusetts.

specific behaviors expected for clearly demarcated states of mourning. Color rules were especially strict for both clothing and jewelry and dictated what types of materials would be appropriate, since some could be deemed too luminescent for a given period of mourning.<sup>115</sup> All are determined by the griever's relationship to the deceased.<sup>116</sup> Typically, the four stages of mourning dress ranged from "full," and "deep," to "second," and "half mourning," as well as "light mourning."<sup>117</sup> Most commonly, full mourning ordered all black clothing and jewelry, which led to the use of materials with dark colors that lacked luster during full and deep stages of mourning.<sup>118</sup>

These earrings, likely purchased in the winter of 1877 after the death of their younger brother, Edwin S. Cummings, may have been selected to represent the sisters'

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<sup>115</sup> For example, a whole department devoted to "Mourning Costumes" in an 1879/1880 catalog for New York department store, B. Altman. B. Altman and Company, Fall and Winter Catalogue (New York: Self-published, 1879), 5. This department store also sold a selection of vulcanized rubber sleeve buttons, back combs with "jet tops," and chatelaines. Refer to page 62 in the catalog cited above.

<sup>116</sup> Sonia A. Bedikian, "The Death of Mourning: From Victorian Crepe to the Little Black Dress," OMEGA 57, no.1 (2008): 39.

<sup>117</sup> Nehama, *In Death Lamented: The Tradition of Anglo-American Mourning Jewelry*, 150.

<sup>118</sup> Beginning in the early nineteenth century, jet was employed by elite cosmopolitan circles in Britain and continental Europe. The material was favored for its physical properties which allowed for a matte, dull appearance to a high finish. The popularity for jet ornaments expanded after several impressive displays of jewelry in the Great Exhibition 1851. In the period, vulcanized rubber was sometimes marketed as a superior substitute to jet.



grief visually.<sup>119</sup> They remained with the Cummings for nearly fifty years. Insistent on their brother's memory, they entrusted the earrings to the holdings of Historic New England to ensure their survival.

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<sup>119</sup> Object file, Historic New England. Edwin S. Cummings died on February 1, 1877. Massachusetts Death Records, U.S., 1841-1941, accessed via Ancestry.org. In addition to the vulcanized rubber hoops, the Cumming sisters also gifted a pair of jet drop earrings. These earrings are attributed to the same period as the hoops. See Pair of earrings, 1934.1823AB, Historic New England.



Figure 43 Locket. United States. Manufacturer once known, ca. 1865–80. Vulcanized rubber, enamel, enameled metal, glass, base metal.  $1 \frac{3}{16} \times 1 \frac{3}{8}$  in. 1922. 640. Courtesy of Historic New England. Estate of Miss Frances Greely Stevenson. 1922. 640.



Figure 44 Detail of the interior of the locket. Courtesy of Historic New England. Estate of Miss Frances Greely Stevenson. 1922. 640.

As photography became more accessible during the second half of the nineteenth century, portraits began to be exchanged as tokens of affection and remembrance. Vulcanized rubber suited the rise and demand for studio portrait photographs, as it was molded into highly ornamental cases and lockets, like the example here. This perfectly round locket contains an internal compartment where a

gem size tintype studio portrait (fig. 44).<sup>120</sup> The unidentified young woman in this portrait, is preserved with tidily plaited hair and adorned further by a printed plaid bodice.<sup>121</sup> The stamped embellishments applied to the interior surfaces frame the woman in a beautiful setting. An “A” at the front of the locket bears traces of black enamel paint and tool marks.

Hard rubber lockets, like this one, would have been available for sale in urban centers by the late 1860s, and by mail-order catalogs by the late 1870s.<sup>122</sup> The locket may have been customized and presented to a loved one as a gift by the woman depicted in the tintype. It is also possible that the locket was purchased later and used to house the memory of the young woman when she was no longer present. Furthermore, it is unclear if this locket is a mourning item or a sentimental token. However, in an era when individual portrait photographs were still considered novel, any photograph could become a memorial once a loved one passed away.

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<sup>120</sup> The popular “Gem” size, about 0.75 x 1 in. This size tintype was often used to place in jewelry compartments, like this example here, or displayed in small gem album. This size portrait was popularized in the United States by 1862.

<sup>121</sup> Lisa Hodgkins, “The 1860s–Beauty in Austerity,” in *Everyday Fashion in Found Photographs: American Women of the Late 19th Century* (Bloomsbury: London, 2022), 50–51.

<sup>122</sup> In the Spring/Summer sales catalog for Lord & Taylor, consumers could purchase a vulcanized rubber pendant for \$1.00 and have “Any initial” engraved at the front of the locket. See: Lord & Taylor, *Spring and Summer Catalogue* (New York: Self-published, 1877), 27.  
<https://libmma.contentdm.oclc.org/digital/collection/p16028coll13/id/849/rec/2>



Figure 45 Mourning ring with inlaid, stamped, and carved details. United States. Manufacturer once known, ca. 1870–90. Vulcanized rubber, silver alloy. 1/4 x 1 1/16 in. Courtesy of Historic New England. Gift of Inez M. Pierce. 1938. 111.

This memorial ring, a gift to Historic New England from an estate outside of Boston, was commissioned to commemorate *Ella*. Across the straight, thick black band, “Ella” is stamped and carved, framed by an inlaid silver-toned metal cartouche. While the black hard rubber band has worn well over time, the inlaid metal has tarnished. Like the locket (fig. 43, 44), this ring displays how contemporaries chose hard rubber ornaments to record significant life events. When worn, this ring turned death from a private event to a public one, which this ring and others like it were used to publicize and externalize the wearers’ grief. As a marker of time, the survival of this ring recalls what has since passed.



Figure 46      Portrait of a seated woman wearing a vulcanized rubber cable chain necklace with a cross pendant. Probably Baltimore, Maryland. Photographer once known, 1870–85. Collodion and silver image on iron with lacquer. 3. 6 x 2.5 in. Black portrait photograph collection. University of Delaware Library, Museum and Press.  
<https://www.jstor.org/stable/community.29695974>

This late nineteenth-century studio portrait of a woman wearing a black vulcanized rubber necklace adorned by a three-dimensional cross pendant. This woman's necklace is similar to the graduated anchor chain necklace studied above

(see fig. 28). The wearer activates this type of necklace by styling the ornament and its relationship to her other dress items. Apart from the white fichu around her neck, the sitter is enveloped by the color black. Her adaptation of a black vulcanized rubber anchor chain necklace is highly symbolic: black cable chain necklaces made from either hard rubber or jet, were favored by an era consumed by sentimental exchange and communication. In the period, this style of cable chain necklace was classified as an anchor chain due to the shape of the links.<sup>123</sup> The anchor chain necklace is a poetic message that communicates the wearer's stability, security, and hope during a period of bereavement or transition. This stability is anchored by her faith which is represented by the crucifix pendant.

The devotional undertones of the woman's necklace and her dress present her as a respectable middle-class women literate of the codified language of mourning, or more broadly, the politics of respectability. Her use of the black anchor chain is not unique. This style of vulcanized rubber jewelry is animated in the portrait photographs included under Figure 48, 49, and 50. The other wearers contrast the black angular statement necklace against a light-colored textile. The uniform appearance is beguiling. The woman pictured here relies on other dress items to caption her portrait. Her reliance on a single black kid leather glove further accentuates absence or loss. As this woman and the other sitters who chose to adorn themselves in a hard rubber anchor chain, use the sacred rubber form to impress a message or memory to viewers then and now.

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<sup>123</sup> The shape of the links that comprise the sitter's necklace resemble the links of the chains used to raise and lower a ship's anchor.



Figure 47     Detail of necklace from Figure 29. Courtesy of Historic New England.  
Gift of S. Alice Chase. 1932. 650.





Figure 48    Half-length portrait of a young woman wearing a vulcanized rubber cable chain necklace with a cross pendant. Bridgeport, Connecticut. Photography studio: Wilson, ca. 1870–80. Albumen and silver nitrate on photographic paper. 4 x 2.5 in. Personal collection of the author. Photo courtesy of the author.



Figure 49    Half-length portrait of a woman wearing a vulcanized rubber cable chain necklace with a cross pendant. Haverhill, Massachusetts. Photography studio: A. W. Anderson, ca. 1870–80. Albumen and silver nitrate on photographic paper. 4 x 2.5 in. Personal collection of the author. Photo courtesy of the author.



Figure 50 Full length portrait of Agnes Marion Edward wearing a vulcanized rubber cable chain necklace with a cross pendant. United States. Photographer once known, ca. 1875–80. Albumen and silver nitrate on photographic paper. Beinecke Rare Book and Manuscript Library. <https://collections.library.yale.edu/catalog/16794055>.



Figure 51 Detail of portrait showing the vulcanized rubber cable chain necklace with a cross pendant. Beinecke Rare Book and Manuscript Library.

This studio portrait of Agnes Marion Edwards preserves yet another styling of the black vulcanized rubber cable chain necklace decked by a cross pendant.<sup>124</sup>

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<sup>124</sup> This is one of several photographs of Agnes Marion Edwards preserved in James Weldon Johnson and Grace Nail Johnson Papers at the Beinecke Rare Book and Manuscript Library. Agnes Marion Edwards was a teacher at Stanton Elementary School in Jacksonville, Florida. Stanton School, sometimes referred to as Stanton Institute, provided a grammar school education for Black children, and is often cited as one of the first formal schools for Black Americans in Florida. Edwards played an active role in her community and contributed to her family's commitment to social uplift. Her adopted mother, Helen Louise Johnson, was an activist, educator, and musician, who was connected to the Black communities in Jacksonville, Florida. Her adopted brother, James Weldon Johnson (1871–1938), is the celebrated civil rights activist, writer, composer, politician, educator, lawyer, and one of the leading figures of the Harlem Renaissance. Refer to: Manuscript Library, Box 104, folder 888, James Weldon Johnson and Grace Nail Johnson Papers, Yale Collection of American Literature, Beinecke Rare Book and Manuscript Library, Yale University, New

However, unlike the other examples, we have the name of the person depicted in this portrait. The little biographical information available on Agnes Marion Edwards, challenges us to interpret this necklace beyond the realms of mourning codes or sentiment. Edwards was an educator and prominent social figure in Jacksonville, Florida, at the end of the nineteenth century. Here, her attention to the sartorial displays her consumer power and taste. Edwards's decision to represent herself as such in a visible, prominent rubber chain necklace needs to be read within the socio-political climate of this period.

As scholar Leigh Raiford remarks, portraits like the example here, display Black individuals as they “navigated the complex visual terrain at the end of the nineteenth century and participated in the construction of a ‘new visual language for ‘reading’ black subjects.”<sup>125</sup> Thus, Edwards's decision to have her portrait taken, and specifically, her use of a black rubber necklace must be understood beyond the aesthetic or sentimental realms of this type of jewelry. Post-reconstruction, the production and dissemination of demeaning depictions of Black people could be found in most quotidian print sources consumed in the north and south. One example is the *India Rubber Yaller Girl* (1871), a popular minstrel song and dance that repackages

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Haven, Connecticut. This portrait of Edwards's of one of several portraits available in this collection.

<sup>125</sup> Leigh Raiford, “Ida B. Wells and the Shadow Archive,” in *Pictures and Progress: Early Photography and the Making of African American Identity*, eds. Maurice O. Wallace and Shawn Michelle Smith (Durham: Duke University Press, 2012), 238.



lampoons Black women's sexuality and bodies.<sup>126</sup> The subject of the song is light-complected Black woman, who is able to pass as white until her lips are revealed to the narrator which he compares to a "catfish mouth like a busted rubber shoe."<sup>127</sup> The damaged rubber shoe is a metaphor, in part, for the subject's sexual looseness and promiscuity. During this period, a common stereotype repackaged and presented in popular fiction, music, and other types of media was the insatiable sexual appetitive of Black women. Edwards's day-to-day life was punctuated by popular media that sought to contort her image like the *India Rubber Yaller Girl*. Nonetheless, she persisted. Whether it was through her commitment to the Black communities of Jacksonville, Florida, as an educator and mentor or flaunting an *India Rubber* chain in her portrait. Her application of the anchor chain signifies her self-possession.

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<sup>126</sup> H. A. Marshall, *India Rubber Yaller Girl* (Philadelphia: Lee & Walker, 1871), <https://www.loc.gov/item/2023814397/>. The song recirculates popular stereotypes of Black American women. The "India Rubber Yaller Girl" draws on stereotypes of Black women, specifically, the figure of the domestic laborer or cook. The subject of the song is imagined as the daughter of an enslaved Black woman and her father, a white enslaver. Her "gingham dress," lack of a surname, and reliance on a well-worn of comfortable and practical rubber shoes signify the women's social status as a domestic laborer. Her status as free or enslaved person is unclear. The giveaway to the woman's racial identity is her "catfish mouth" which is compared to a "busted rubber shoes." Marshall, *India Rubber Yaller Girl*, 4. This metaphor has several layers, but most importantly, the subject's gapping rubbery mouth is an innuendo for the woman's genitalia—a dark vulva which exposes her racial identity. She is an "India Rubber Yaller Girl" because of her exaggerated physical attributes that liken her to the commodity upon her feet, as well as her perceived sexual looseness and promiscuity as a woman of color bound to domestic labor.

<sup>127</sup> Marshall, *India Rubber Yaller Girl*, 4.

Her choice to wear the necklace, might be interpreted as how a fashion choice can be a form of consumer resistance to white cultural dominance.<sup>128</sup> Her styling of the necklace as a form of resistance is enacted and dispersed in the form of this printed portrait photograph. While there are inherent limits of both identity politics and consumerism in creating long term structural and political transformation, Agnes Edwards's taste for and use of a prominent black could be read as one domain through which she, as a consumer, and more importantly, as a Black woman and a leader of her community, she articulates a subversive political position. She is the author of her image. As cultural critic and theorist Stuart Hall famously stated, "popular culture is one of the sites where this struggle for and against a culture of the powerful is engaged. It is the arena of consent and resistance."<sup>129</sup>

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<sup>128</sup> Krista Thompson recognizes the limits of identity politics and consumerism in *Shine: The Visual Economy of Light in African Diasporic Aesthetic Practice* (Durham: Duke University Press, 2015), 39. This line of thought is inspired by Isabel Flower and Marcel Rosa-Salas's interpretation of gold nameplate jewelry. See "'Worth more than just its weight in gold': Nameplate Jewellery and the Practice of Oppositional Respectability," *Journal of Marketing Management* 36, no. 13 (2020): 1333. See also: David Crockett, "Paths to Respectability: Consumption and Stigma Management in the Contemporary Black Middle Class," *Journal of Consumer Research* 44, no. 3 (2017): 575, <https://doi.org/10.1093/jcr/ucx049>.

<sup>129</sup> Stuart Hall, "Notes on Deconstructing the Popular," cited in Flower and Rosa-Salas's "'Worth more than just its weight in gold': Nameplate Jewellery and the Practice of Oppositional Respectability," 1334.

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