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# A Myth Has Persisted

*Revising the Origins Narrative of the American Wood Pulp Paper Industry*

BY STEPHEN CERNEK

*Once a myth becomes accepted truth, it is hard to correct the record, as one historian discovered.*

The origin of the modern paper industry arguably dates to the mid-nineteenth-century invention of technologies for making paper from wood pulp. The transition from cotton rags as the principal material for paper was a critical development in the industry.<sup>1</sup> Wood pulping sharply reduced the cost of paper, improved the print quality of newspapers, and prompted the industry to relocate to regions with abundant water power and timber. The expanding demand for pulpwood affected forests in the Northeast and Upper Midwest, and especially New York State, the leading manufacturer of wood pulp and paper between 1880 and 1920.<sup>2</sup> Pulpwood consumption by New York paper mills increased by five hundred percent between 1882 and 1891 alone, and New York pulpwood harvests increased by a factor of four between 1890 and 1899. Declining supplies of Adirondack timber then forced paper mills to turn to Canada for their raw material.<sup>3</sup> Although the general outlines of the transition to wood pulping in the United States are well known, critical details are often omitted—and, consequently, a myth has persisted.

The mythmaking begins with Albrecht Pagenstecher's 1897 article, "Ground Wood. The Story of Its Introduction to This Country,"

published in the industry's *Paper Trade Journal*.<sup>4</sup> Pagenstecher's involvement in the history, coupled with his resulting wealth and fame, enabled him to create a narrative that was accepted as gospel, and, yet, at the same time, misleading. Lyman Horace Weeks's 1916 book covering that early history, which relied unquestioningly on Pagenstecher's account, subsequently became the basis for many versions, further spreading the myth. Yet missing from every history of the industry are these three points: how Heinrich Voelter's mechanical wood-pulping technology came to the United States from Germany, how Alberto Pagenstecher gained control over Voelter's wood grinder patent, and how Pagenstecher and his associates exploited Voelter's technology to expand the wood pulp paper industry.<sup>5</sup> A more complete origins narrative of the industry requires studying the documents related to Voelter's patent.<sup>6</sup>

### RAGS AND A WASP'S NEST

Heinrich Voelter developed his mechanical wood-pulping technology in the mid-nineteenth century, when demand for paper was causing shortages and raising prices for the cotton rags that were then the primary material of paper pulp. In just a two-year period in the 1850s, the importation of rags to the United States doubled. Paper scarcities led some newspapers to reduce the size of their issues; others ceased publication.<sup>7</sup> The American Civil War created strong demand for newspapers, and the price of paper rose from eight to seventeen cents per pound in 1862 alone. By 1864 paper cost twenty-eight cents a pound. Although prices leveled off and then declined after 1865, the competition to devise an alternative to cotton rags was under way.<sup>8</sup>

Both chemical and mechanical wood-pulping technologies appeared in the middle decades of the nineteenth century. A "soda pulp" process, which heated wood chips in sodium hydroxide, was patented in the United States in 1854 by Englishmen Charles Watt and Hugh Burgess and developed commercially in 1866 by the American Wood Fiber Company at Manayunk, Pennsylvania.<sup>9</sup> A chemical method that dissolved wood fibers into pulp using sulfuric acid was patented by Pennsylvanian Benjamin Tilghman in 1867.<sup>10</sup> Of the mechanical technologies, the approach developed by the German Friedrich Keller in the 1840s and patented by Heinrich Voelter in the United States in 1858 produced the first commercial American ground wood pulp at Curtisville, Massachusetts, in 1867.<sup>11</sup> The Voelter process reduced wood to fiber by pressing lumber against a rotating grindstone flooded with water.<sup>12</sup>

The earliest patented wood-pulping technologies prompted a flurry of innovation. Charles Thomas Davis, in his 1886 study *The Manufacture of Paper*, listed more than three hundred U.S. patents issued between 1854 and 1885 for chemical and mechanical processes.<sup>13</sup> Davis, who attributed the large number of patents largely to "the general introduction of the machine for disintegrating blocks of wood and assorting the fibers so obtained into classes according to their different degrees of fineness, invented by Mr. Henry Voelter," devoted eighteen pages to the Voelter process.<sup>14</sup> Although Davis found fault with some aspects, he generally considered Voelter's wood pulp grinder the catalyst for the subsequent development of both mechanical and chemical pulping technologies.

Among the earliest accounts of the origins of the wood pulp industry written by participants in it were by two owners of the Voelter patent, who were also partners in the

**In the 1850s, Heinrich Voelter worked with J. M. Voith to construct a grinder like this one that would mechanically produce wood pulp used in paper production. Voelter's patent on the grinder transformed the paper manufacturing industry in Europe and the United States.**

Hudson River Pulp Company, the Manufacturer's Paper Company, and other early pulp and paper industry ventures. Albrecht Pagenstecher wrote his article in 1897 for the *Paper Trade Journal*, and Warner Miller published his account in 1917 in *Paper*. Their writings have been taken at face value by industry historians throughout the twentieth century, despite their inherent biases.<sup>15</sup>

Albrecht Pagenstecher arrived in the United States from Germany in 1863 at the age of twenty-four, and by 1870 he was operating an import business in New York with his older brother, Rudolph. Both self-identified as "importers of drugs" as late as 1880, but sometime in the 1880s Pagenstecher & Co. acquired a new line of business: the company was described in major newspapers as the "largest exporters of petroleum in this country," with John D. and William Rockefeller reported to be their clients. But financial difficulties under Rudolph's management led to bankruptcy in 1889. Twenty years earlier, Albrecht had been a founding partner of the Hudson River Pulp Company, along with Rudolph, their cousin Alberto, and Warner Miller, and now his primary business interest shifted to the paper industry. He organized the Manufacturer's Paper Company around 1886, and by the 1890s the firm controlled several pulp and paper companies whose combined production provided two-thirds of all print paper and supplied the newsprint for nearly all large daily newspapers in the United States. By the time Pagenstecher's article was published in 1897, the Hudson River Pulp and Paper Company mill at Corinth, New York, was considered the country's largest.<sup>16</sup>

Warner Miller was an early partner to the Pagenstecher enterprises. Originally from Herkimer, New York, Miller taught Greek and Latin at the Fort Edward Collegiate Institute in New York State after graduating from

Union College in 1860. He served briefly in the Civil War and was taken prisoner but later paroled. Back in Fort Edward, Miller entered the paper industry, first working at the Pulser and Howland paper mill in 1863; with partners, he then purchased his own mill in Herkimer in 1865. Miller was trying to convert from cotton to wood pulp when he met Alberto Pagenstecher and bought a share of the Voelter patent in 1869, and with him became a founding partner of the Hudson River Pulp Company. Miller oversaw the startup of the company's mill at Palmer Falls in 1869 and was active in securing injunctions against pulp mills whose grinders infringed on the Voelter patent. His effort against one offender resulted in the decision *Miller v. Androscoggin Pulp Co.* (1872), which became a precedent for defending the Voelter patent until it expired in 1884. Miller served two terms in the New York State legislature in the 1870s and one term in the U.S. Senate in the 1880s. He joined Albrecht Pagenstecher as a director of the Manufacturer's Paper Company before becoming the secretary of International Paper Company, founded in 1898. Although Miller suffered a humiliating bankruptcy in 1908, he remained an admired figure in the American Pulp and Paper Association until his death in 1918.<sup>17</sup>

As a historical resource, the 1897 Pagenstecher article is both incomplete and misleading, yet it has been influential in propagating a myth. Pagenstecher asserted that Friedrich Keller's observation of a wasp nest led to his invention of the wood pulp grinder: "While strolling through a forest he found a deserted wasp's nest, and examining it discovered that it was composed of small fibres of wood knitted together like coarse wrapping paper. After some crude attempts to reproduce such fibre by rubbing wood on a stone he communicated with Henry Voelter,

... who constructed a machine and invented a process of grinding it ..."<sup>18</sup> Lyman Horace Weeks included this wasp account in his widely cited *A History of Paper-Manufacturing in the United States, 1690-1916*.<sup>19</sup> The myth reappeared in elaborate detail in a 1917 *Munsey's Magazine* essay about the origins of the wood pulp industry<sup>20</sup> and was retold by Carl Wurtzbach of Stockbridge, Massachusetts, in a popular 1938 memoir that recalled the early days of pulp making at Curtisville.<sup>21</sup> It also appeared numerous times in newspapers across the country through the first four decades of the twentieth century.<sup>22</sup> The myth even made it into the *Congressional Record* in 1947, when a *New York Sun* article about the origins of the wood pulp industry was read on the floor of the U.S. House of Representatives and entered into the session's proceedings. In this account, Voelter and Keller studied wasps' nests together to come up with the wood pulp grinder.<sup>23</sup> Retellings of the wasp myth often included other elements of Pagenstecher's origins narrative as well, indicating that his 1897 essay was the likely original source for the tale.

### CONFLICTING ACCOUNTS OF TECH TRANSFER

The idea that wood might serve as the raw material for paper originated in a 1719 essay by a French scientist, Rene Antoine de Reaumur.<sup>24</sup> De Reaumur's theory was advanced by Jacob Christian Schaffer, who wrote in 1765 that paper might be made from several fibrous materials, including wood.<sup>25</sup> Matthias Koops was perhaps the first to apply de Reaumur's ideas when he produced a book with paper made mostly from wood in 1800.<sup>26</sup> By the 1830s the idea of making paper pulp from wood had found its way into popular literature.<sup>27</sup> Friedrich Keller then developed a mechanical wood grinder, for which he earned a German patent in 1840.<sup>28</sup> Successful

## GROUND WOOD.

### THE STORY OF ITS INTRODUCTION TO THIS COUNTRY.

How the Article Was Discovered by Keller. The Orderer Secured by Voelter—The First Machines in This Country—The Curiousities of the Voelter Patent and the Attempts to Evade Them—The Growth of the Industry.

BY A. PAGENSTECHER.



IMPORTANT discoveries are frequently made by men who do not derive any material benefit from their discoveries, and sometimes even their names are forgotten. The men who succeed in making such discoveries commercially valuable, in constructing machines and apparatus, and who take out patents to protect their inventions, acquire both material benefit and fame.

The name of Professor Gauss, of Göttingen, is known to every few people as a man who operated an electric telegraph in his native town as early as 1833, while the name of Professor Morse is known to everybody as the suc-

cessful inventor of apparatus for transmitting electric signals, for which he took out his first patent in this country in 1842, and whose system and instruments are still employed in the United States, Canada and several European countries.

A similar relation exists between Friedrich Gottlieb Keller, the discoverer of wood pulp, and Henry Voelter, the inventor of the best machine to produce it. Very few of the fraternity of paper makers have heard the name of Keller, while they all know the name of Voelter.

How Keller made the discovery is interesting. While strolling through a forest he found a deserted wasp's nest, and examining it discovered that it was composed of small fibres of wood knitted together like coarse wrapping paper. After some crude attempts to reproduce such fibre by rubbing wood on a stone he communicated with Henry Voelter, a paper maker and practical machinist, who constructed a machine and invented a process of grinding it, which are known by his name wherever wood pulp is made.

INTRODUCTION OF WOOD PULP TO THE UNITED STATES. The introduction of the Voelter machine and process of grinding wood into the United States, in which I became interested, is the subject of this article.

In the summer of 1868 I discussed with my cousin, Alberto Pagenstecher, who had made some money in South America building railroads, the subject of an investment in this country. A friend of ours, Theodore Steinway, of the well-known piano-manufacturing firm, had mentioned to him that paper was being made in Germany out of wood, and as my brother Rudolf was at that time in Germany, correspondence on the subject was opened with him, and after investigation it was decided to import two machines for grinding wood pulp, and to engage a competent man to set them up and start them. A water power was secured at Curtville, near Stockbridge, Mass., and the construction of the mill building commenced. The two machines arrived in December, 1868, in charge of Frederick Woertzbach, who went immediately to work to set them up. The first pulp was made on March 5, 1867. The Smith Paper Company, the paper mills of which are located only a few miles from Curtville, consented to use the pulp, and on March 9, 1867, the first trial was made at its mill. The trial proved entirely satisfactory and induced the company to contract to use every pound

manufactured at Curtville, and for more than a year that concern enjoyed the monopoly of using this new raw material, keeping the knowledge strictly to itself. To Hon. Wellington Smith and the Smith Paper Company therefore belongs the honor of having used the first wood pulp successfully in this country. Mr. Woertzbach, who was the first pulp maker in this country, is now superintendent of one of the Smith Paper Company's pulp mills.

During the summer of 1869 I stayed with my family in Stockbridge, and had a chance to become thoroughly acquainted with the process of pulp making, and was very much impressed with the importance of the new material, and with the simplicity of its manufacture. When, therefore, we received a notice from Louis Prang, of Boston, who was Mr. Voelter's American agent, that the machines which we had imported from Germany were an infringement on a patent taken out in this country by Mr. Voelter, I immediately induced my cousin and my brother to buy the patent on joint account. This was done in the autumn of 1869. I then tried to interest paper manufacturers in this country in this new process, but I got no encouragement from them, and one of the most prominent men in the trade told me "Mr. Pagenstecher, we shall not take an interest in shoddy." Mr. Prang had also tried to interest paper makers, especially those whose mills produced news paper in the new product, but he was told that as the profits in making news paper were ample there was no need of introducing the then called "inferior stock."

It is a remarkable fact that none of the American visitors to the World's Exposition in 1867, and in Paris 1867, where Mr. Voelter had exhibited full working plants, had noticed this invention, which was going to revolutionize the paper making of the whole world.

#### EARLY WOOD-PULP MILLS.

We succeeded, however, in interesting some other people, mostly not paper makers, and several small mills were started in 1868 and early in 1869 in Lawrence, Finchburg and Lee, Mass., Norway, Me., and Leesville, Conn., and, besides, we bought another water power at Laurens, N. Y., and started a mill on our own account. This mill in Laurens was the first mill using pulp machinery made in America, and this mill became the starting point of the Hudson River Pulp and Paper Company. All of these early mills were located on small water powers, which later on could not compete with the larger mills, and have not proven a profitable investment.

Through the mill in Lawrence, started by Mr. Maynadier, a friend of Alberto Pagenstecher, Hon. William A. Russell became acquainted with the value of this new material, and he immediately saw the importance of becoming interested in it. He obtained the right to build two large pulp mills, one in Franklin, N. H., and one in Bellows Falls, Vt., and afterward bought the rights for the New England States, excepting such licenses as had been previously granted.

About the same time I made the acquaintance of Hon. Warner Miller, who took an interest with us in the rest of the territory, and a large mill at Palmer's Falls was immediately planned and the construction began.

Alvah Crocker, of Finchburg, had also secured the rights to build a large pulp mill at Turner's Falls, which was later on merged into the Montague Paper Company. So the year 1869 marks the starting point of most of the large mills which today are still in successful operation.

It is well to pay a tribute here to Mr. Russell and Mr. Miller for their effective cooperation to maintain the patent and keep the new industry in a flourishing condition. My cousin returned to Germany in 1870 for family reasons, and as my brother was attending to his legitimate export business I left the management of the pulp business entirely in my hands. With the help of the two friends named I succeeded in surmounting many obstacles, and everybody prospered who took an interest under our management of the patent.

The Voelter patent expired in 1876, but the inventor had no trouble in having it extended for another seven years, up to 1877. In that year we succeeded in extending it again, through act of



The myth of the origin of the modern paper industry can be traced to this article published in 1897 in the *Paper Trade Journal* from Internet Archive. The three men at the center of the myth: Heinrich Voelter (pictured above), who held the patent; Alberto Pagenstecher (far left), who purchased Voelter's American patent; and Albrecht Pagenstecher (center column), who wrote the article that removed Voelter from the story.



A. PAGENSTECHER.



ALBRECHT PAGENSTECHER.

Had the manufacturers of the fifties been told that before the close of the century a machine requiring a wire 184 inches by 68 of 45 feet and running 10 feet a minute could be built and run successfully, such a visionary mortal would have been considered in the bosom of his family if seen with Anatole on one side and Sapphira on the other, if not at all subject for an insane asylum.

However, this is now a reality, and such a machine, requiring a wire of this size, is now running at the Stamford Falls Paper Company, Stamford Falls, Me.

The longest wire of which I know, and probably the longest in the world, is used by the Niagara Falls Paper Company, Niagara Falls, N. Y., being 72 feet long by 184 inches wide.

To meet the changed conditions of increased speed, quality and preparation of stock, larger percentage of clay and ground wood, etc., the Fourdrinier manufacturers are constantly studying wherein the wires may be improved that they may give satisfactory service, for, as may be imagined, wires to-day are being subjected to more severe tests than they did years ago.

I have sometimes heard paper manufacturers say they wish they could obtain as good wires as they did years ago.

However, I believe, were some of those wretched-for wires, which doubtless did give excellent service under the then existing conditions, put onto the greyhounds of to-day with changed conditions they would often be found wanting, and there would be weeping and wailing and gnashing of teeth, while the wires would be cast into outer darkness—or elsewhere.

During the past two or three years the Fourdrinier wire manufacturers have not generally been obliged to burn much midnight oil to fill orders, but several of us have a few barrels which we would not be loath to consume.

From present indications the paper industry and therefore the Fourdrinier and allied trades will soon feel the rising tide of returning prosperity, and we have reason to believe that the good old days of a few years ago will soon again be a reality instead of a memory.

WILLIAM BOUGHMAN.

William, Joseph C., Edward and Elijah Cabble came from England in 1843. They were all skillful and practical workmen. Going to Belleville, N. J., they entered the employ of William Stephens & Son, and remained there for several years.

In 1845 they returned to New York, and William formed a partnership with David Woods, and they established a wire factory at Hester and Elizabeth streets, Joseph C., Edward and Elijah being in the employ of the new firm as journeymen. The partnership between William Cabble and David Woods lasted until 1854, when Mr. Woods retired, and in the same year William Cabble removed the business to Brooklyn, where it has remained ever since, and where it has grown to immense proportions.

William Cabble died in 1876, and after his death the surviving brothers formed a stock company. Since then Joseph C. and Edward Cabble have died, and now Elijah Cabble, the youngest of the four brothers, is at the head of the business, being the president and general manager of the company. It is interesting to note that the first paper machine operated in Japan used an American wire, it being made by the William Cabble Excelsior Wire Manufacturing Company.

#### A Few Early Patents.

Up to 1860 only four patents in the paper line were granted by the United States Patent Office.

The first patent granted in this country in this line of industry was that to John Carlos, Jr., whose address is not recorded. It was for a paper mangle, and was granted April 11, 1790.

The second was to John Bidell, of Pennsylvania, to whom letters patent were issued on March 31, 1794, for a paper machine.

On December 4, 1798, Cyrus Austin, of New Jersey, was granted a patent for the manufacture of paper, and on October 25, 1798, Robert R. Livingston, of New York, was granted a patent for paper manufacturing.



ALBRECHT PAGENSTECHER.

in making paper from wood pulp but unable to secure funding to advance his technology, Keller sold a share of his invention to Heinrich Voelter, a papermaker from Saxony. A patent was issued to both men in 1845, but Voelter soon bought Keller's share and further developed the technology on his own.<sup>29</sup> Although the mechanical grinder had originated with Keller, ironically, Voelter in later years was reluctant to credit him, writing in 1870 that "I believe myself to be the first whoever succeeded in

producing satisfactory paper stock from wood by mechanical reduction of the fibre."<sup>30</sup> Voelter continued to improve the technology in the 1840s and 1850s while managing paper factories, first at Bautzen, then at Heidenheim.<sup>31</sup> His experiments focused on the positioning of wood in relation to the rotating grindstone: he determined that the grain had to be parallel to the stone's surface for the fiber to remain intact. Voelter also worked on filtering wood splinters from the

pulp and scaling up production. In the early 1850s he collaborated with J. M. Voith, a Heidenheim machinist, to construct a grinder that held four wood presses against a single rotating stone, increasing capacity. Voith manufactured twenty-one of the improved grinders between 1852 and 1860 for installation in Germany and other European countries, but by 1864 Voelter had turned to the Brothers Decker and Company to manufacture his machines.<sup>32</sup> By 1867 more than ninety Voelter machines

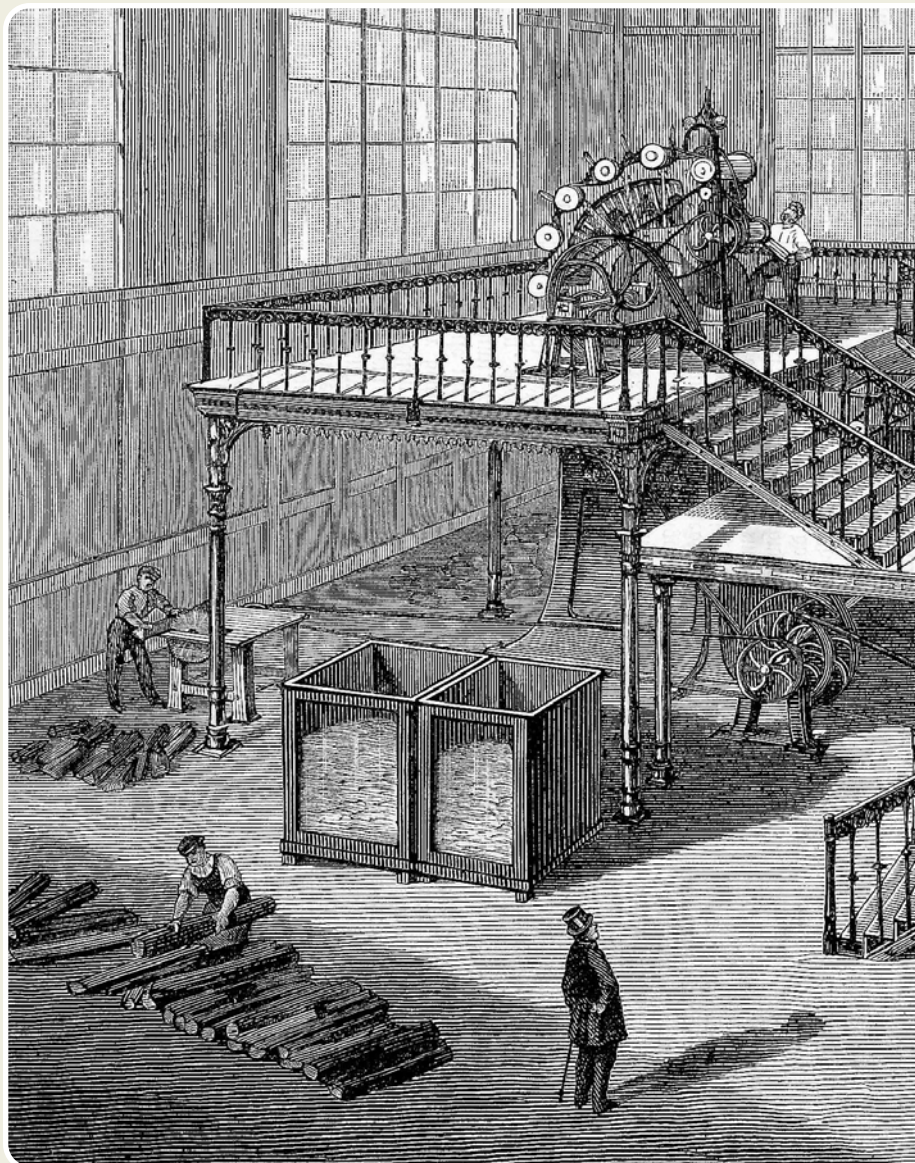
from ten to sixty horsepower were being used in European pulp mills.<sup>33</sup>

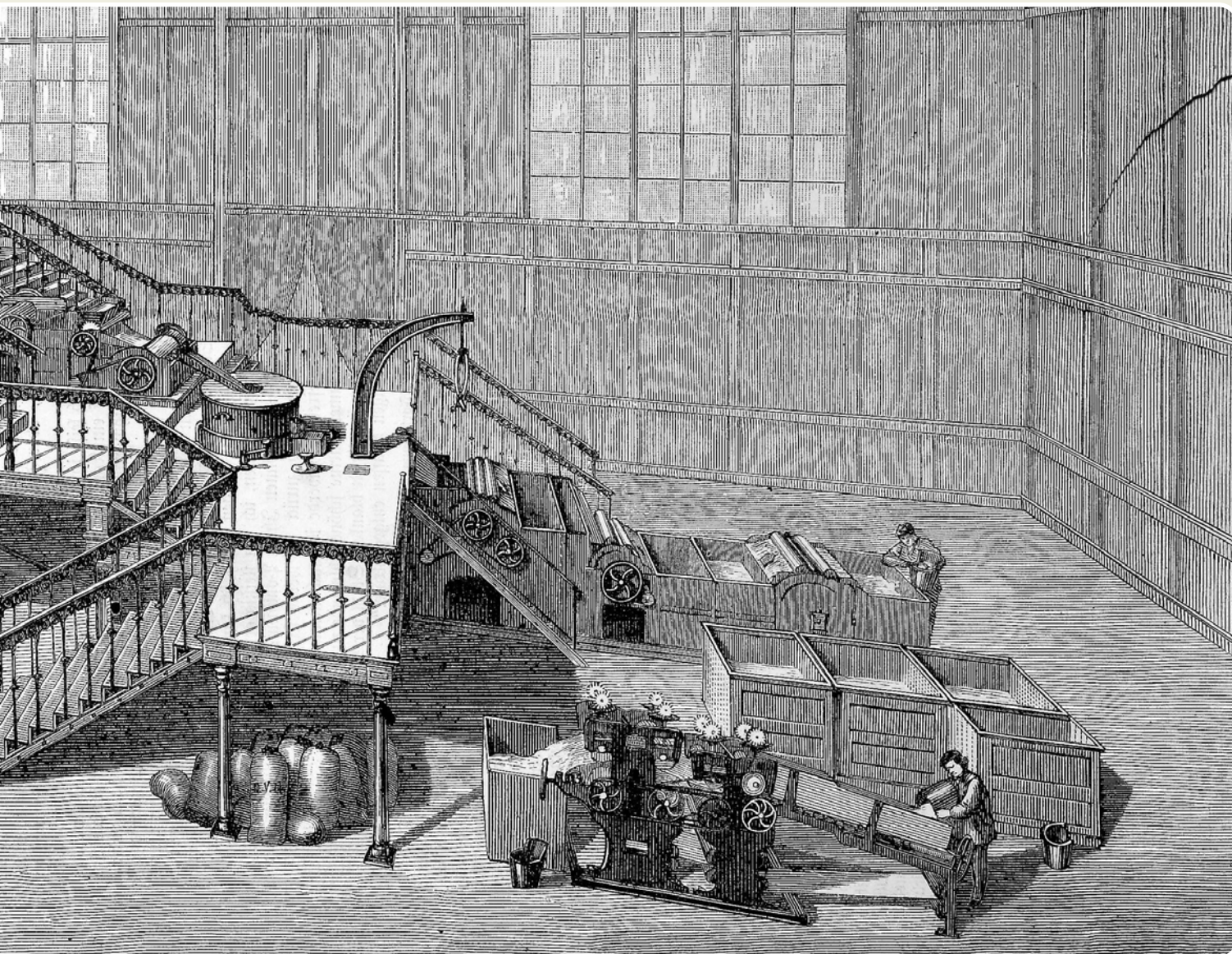
Voelter was both an inventor and a relentless self-promoter. He noted that during the 1860s that “I did not cease, by publications in different languages and by personal application, to press my invention upon the public notice and to solicit orders for machines.”<sup>34</sup> The economic advantages of Voelter’s technology were recognized first at the General German Industrial Exhibition in 1854, then at the London International Exhibition of 1862, and finally at the 1867 Paris Exhibition, where it won a gold medal and the paper produced from its pulp a silver medal.<sup>35</sup> The paper pulp used then by Voelter consisted of thirty to fifty percent wood and was being produced from woods with pale fiber: pine, ash, poplar, and beech.<sup>36</sup> A report of the Paris Exhibition called Voelter “the inventor of a successful method of making from wood a cheap paper-pulp which is pretty white and clean, without being bleached.” Noting that Voelter had received a patent for his machine in nearly every European country, the report also proclaimed that “it may be said that hardly a newspaper is printed in Germany of which does not contain some portion of this material.” Voelter had not yet solved the problem of troublesome wood particles that made wood pulp paper inferior to paper made from cotton rags, yet at half the cost of cotton, it was wood pulp’s economic promise that drove interest in his machine. The Paris reviewer, who evaluated all the wood-pulping technologies on exhibit, noted that “in an economical point of view, Voelter’s invention must be considered of no small importance.”<sup>37</sup>

The promotion of his technology in the United States was more challenging. Voelter’s own account reveals the difficulties of relying on agents to represent his interests and overcome the resistance of

paper manufacturers to using wood pulp.<sup>38</sup> His first agent in the United States was Gustav Ramsperger, an apothecarist in Manhattan who was known as a dispenser of “Destilers Anti-Periodic, or Fever and Augue Pills.”<sup>39</sup> Ramsperger secured the services of Munn and Company, owners of *Scientific American*, to help promote Voelter’s technology. Munn introduced Voelter’s patent to Cyrus W. Field, best known for his role in laying the first transatlantic cable. Field had worked as a young man at his father’s paper mill in

Lee, Massachusetts.<sup>40</sup> In 1840 Field began his own paper-manufacturing business in Westfield, Massachusetts, and the next year became a partner in E. Root and Company, a New York paper wholesaler. When Root went bankrupt in 1841, Field continued in the wholesale business, amassing a sizable fortune by the mid-1850s while paying off much of Root’s debt.<sup>41</sup> Field appeared interested in Voelter’s grinder but was unable to secure wood pulp from Voelter for testing in America. Voelter resumed his search.<sup>42</sup>





Voelter next enlisted the services of Joseph Bischof, a German engineer living in Philadelphia, who introduced Voelter's machine to Pennsylvania paper mill owners with circulars that described its mechanical features and benefits.<sup>43</sup> After being reproached by Voelter for not making progress, Bischof confessed that he had gone into business with a Mr. Kruger of Cincinnati, and together they had taken out a patent on a method for preparing wood pulp. That ended Voelter's business relationship with Bischof, although there is no evidence

that either Bischof or Kruger secured a U.S. patent for a pulpwood grinder in their names.<sup>44</sup>

Louis Prang, a Boston printer and publisher who would later be considered the father of the American Christmas card, became Voelter's third agent in 1863.<sup>45</sup> Voelter gave Prang "a large collection of circulars, drawings, estimates, testimonials, and other documents, which he had already in print and also various papers prepared by him," along with wood pulp and paper samples. The financial arrangement with Prang

**Heinrich Voelter demonstrated one version of his machine at the 1867 Paris Exhibition. Before then, he had been trying to bring the technology to the United States for several years.**

was the same he had given to his previous agents: twenty-five percent of yearly royalties plus expenses. The agreement between the two men was to be in force until 1872.<sup>46</sup> Voelter now realized, however, that for his invention to be seriously considered, he had to provide American papermakers with either sample

wood pulp or a means to manufacture it.<sup>47</sup> Consequently, the agreement stipulated that Voelter would bear the expense of shipping a grinder to the United States (and back again after one year if it failed to sell) and sending an engineer to operate it. Voelter, who believed that his technology would flourish amid America's abundant water power and wood supplies, was particularly motivated to ship a grinder to Prang after he learned of the startup of the American Wood Pulp Paper Manufacturing Company in Pennsylvania in the spring of 1866.<sup>48</sup> Unable to persuade Prang to accept responsibility for the receipt of a demonstration grinder, Voelter threatened to find another agent.<sup>49</sup> But before he could act, an inquiry from the United States arrived.

The inquiry came from Alberto Pagenstecher, cousin of Albrecht Pagenstecher. In his narrative of 1897, Albrecht wrote that during the summer of 1866, Alberto desired to invest money he had made from work on a South American railroad.<sup>50</sup> Although Albrecht offered no details regarding Alberto's work, Chilean court records confirm that Alberto had a contract with the Valparaiso Railroad during its construction of a rail line and tunnel between Valparaiso and the Chilean capital, Santiago. He and the railroad company went to court in 1863 over disputed compensation and allegations of unfinished work.<sup>51</sup> He appears to have entered the United States in late 1865.<sup>52</sup> That year, at the age of twenty-four, he received two U.S. patents, one for a hydraulic ship propeller and one for a method of armoring military vessels.<sup>53</sup>

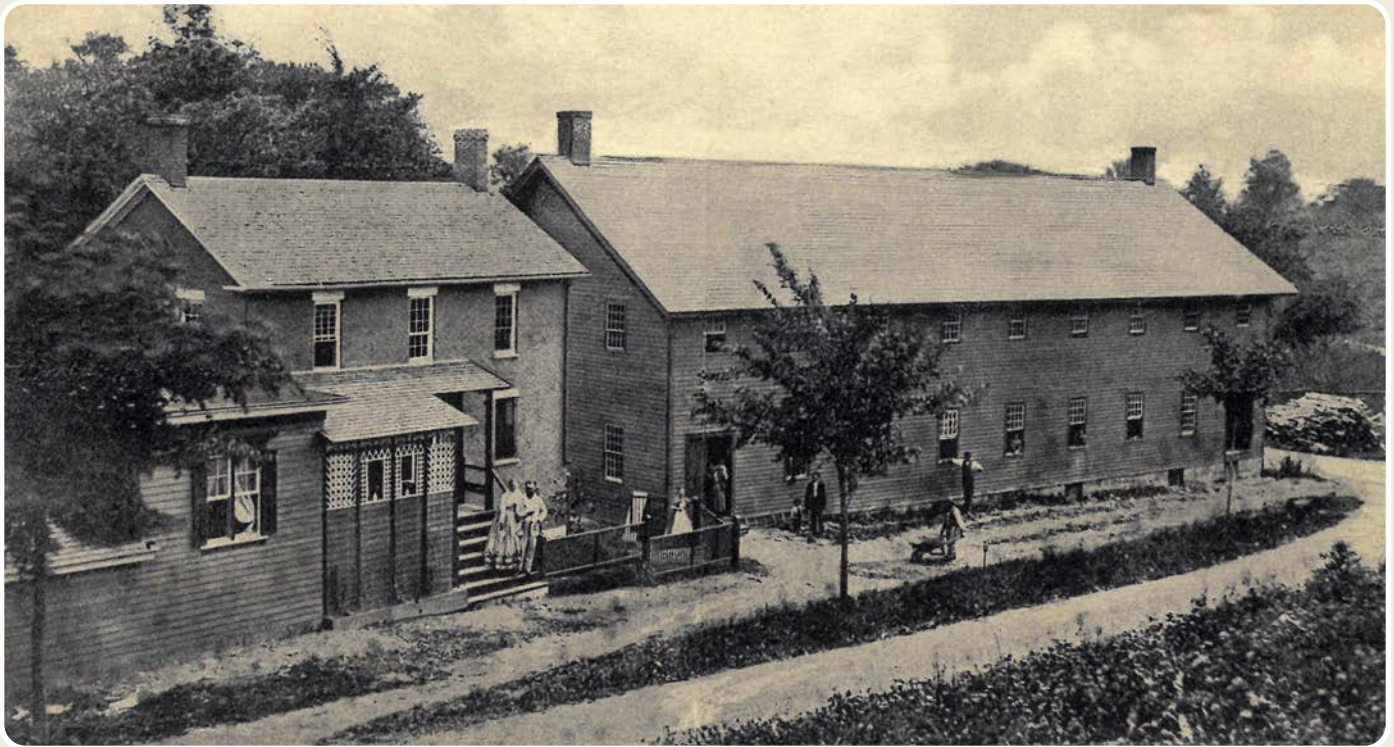
Albrecht Pagenstecher's 1897 narrative indicated that it was C. F. Theodore Steinway, son of the founder of Steinway Pianos, who told the Pagenstechers that paper was being made from wood in Germany.<sup>54</sup> Steinway, who had emigrated from Germany in 1865 to manage piano

production for his family's New York business, might have had first-hand knowledge of Voelter's invention and passed it on through the German Society of New York, where Theodore's brother and Albrecht's brother Rudolph served as directors.<sup>55</sup> Steinway was also an exhibitor at the same 1867 Paris Exhibition where Heinrich Voelter demonstrated his wood pulp grinder.<sup>56</sup> Albrecht wrote that he asked Rudolf, who was in Germany in 1866, to investigate Voelter's invention. According to Albrecht, after a presumably favorable report Alberto arranged for two Voelter grinders to be shipped to Curtisville, Massachusetts, then a center of American paper manufacturing.<sup>57</sup> Frederick Wurtzbach accompanied the machines from Germany to the United States in December 1866, set them up at the mill site that Alberto had purchased earlier that year, and had them operational by March 1867. The first sale of wood pulp to the Smith Paper Company in Lee, Massachusetts, was made that same month.<sup>58</sup>

That narrative omits crucial details about the transfer of Voelter's technology to the United States. Although Alberto was seeking Voelter's technology between 1866—the year that Rudolf first made inquiries about wood pulping in Germany—and late 1868, when he purchased Voelter's American patent, the omission of any reference to Voelter in the section about the acquisition of the machines in Germany and their shipment to the United States is notable. Nor is Voelter's role in the technology transfer mentioned in the discussion of the early industry written in 1917 by Pagenstecher's business partner, Warner Miller, which has also been a widely cited first-person account.<sup>59</sup> Pagenstecher gave ample credit to Voelter for his invention, but otherwise Voelter is absent between the 1866 contact and the 1868 purchase of the patent. That Voelter

is not mentioned in the 1866–1868 portions of either account begs the question of whether he was involved in selling the machines to Pagenstecher. Since Voelter's paper factory in Heidenheim had burned down in 1865, and as of February 1866 there were no grinders at the mill in working order, the machines were likely not obtained from him.<sup>60</sup> Pagenstecher acknowledged in his 1897 article that cousin Alberto's use of the two grinders at Curtisville represented an infringement of Voelter's U.S. patent, yet he does not explain how or from whom Alberto obtained them.<sup>61</sup>

The initial transfer of Voelter's technology to the United States—the grinders that arrived in Curtisville—has been described in two different yet conflicting sources. Carl Wurtzbach, son of Frederick Wurtzbach, wrote in 1938 that his father had supervised the construction of the two machines in Magdesprung, Germany, and accompanied them to Curtisville in 1866.<sup>62</sup> Charles H. Carpenter wrote in *The History of Mechanical Pulping* that “grinders of Voelter design, made by Voith, were brought from Germany and placed in the Albrecht Pagenstecher mill in Curtisville, Massachusetts.”<sup>63</sup> Given that the J. M. Voith works were in Heidenheim, more than 240 miles from Magdesprung, both accounts cannot easily be true. If Wurtzbach is correct, then the machines could have been made in Heidenheim, far from Voelter's paper mill, with Pagenstecher paying for construction and a licensing fee to the patent owner. If the Carpenter account is correct, then Voith would have manufactured the machines presumably for the patent owner after Voelter had shifted his own grinder construction to Brothers Decker and Company, a change that Carpenter dates to 1864.<sup>64</sup> It is possible that Pagenstecher could have simply purchased two used machines from a failed German pulp mill.<sup>65</sup>



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But the greater question is why Alberto Pagenstecher purposefully infringed on Voelter's American patent by importing two German machines to the United States. Pagenstecher's purchase of not one but two grinders in 1866 suggests that he was not seeking to demonstrate the feasibility of wood pulp to American papermakers. And the \$11,500 that he paid for the former Brown textile mill in Curtisville in August 1866, several months before the grinders arrived in the United States, suggests that he was committed to developing a pulp mill there.<sup>66</sup> The simple answer to the patent infringement question might be that Alberto determined that paying a licensing fee to have two new machines built in Germany (or purchasing two used grinders) was less expensive than buying Voelter's U.S. patent and then having machines manufactured in the United States by an inexperienced machinist. That Voelter resided in Germany and his American agent was an illustrator,

not a lawyer, must also have been factors in considering Alberto's legal exposure.

Having secured a site for a pulp mill in Curtisville and purchased two grinders by the summer of 1866, Pagenstecher persuaded Frederick Wurtzbach to travel from Magdesprung to install the machines and operate his mill. By early March 1867, Wurtzbach was producing wood pulp. To what degree cousins Albrecht and Rudolph had invested in the Curtisville pulp mill in 1867 is uncertain, yet it is clear that Alberto was manufacturing wood pulp with Voelter grinders two years before the Voelter patent was assigned to him for use in the United States. Pagenstecher's 1897 article laid a foundation of the transfer narrative, but it omitted facts essential to developing a complete and forthright account of the industry's beginning.<sup>67</sup>

Another problematic aspect of the Pagenstecher narrative is the suggestion that Alberto was unaware

**Two German-made grinders were shipped to Curtisville, Massachusetts, and installed in a former textile mill in 1866. Albrecht Pagenstecher's article left out key information about this occurrence.**

that he was infringing on Voelter's U.S. patent by operating two German-built machines at Curtisville. Albrecht wrote that "when, therefore, we received a notice from Louis Prang, of Boston, who was Mr. Voelter's American agent, that the machines which we had imported from Germany were an infringement on a patent taken out in this country by Mr. Voelter, I immediately induced my cousin and my brother to buy the patent on joint account." Although the patent sale agreement with Voelter was in Alberto's name only, Albrecht's narrative suggested that he and Rudolph held a shared interest in the patent. Albrecht presented himself, his brother, and his cousin as unaware of the infringement, and



thus unaware of Voelter's U.S. patent from the time of the initial inquiry in 1866 to the summer of 1868, when Prang's letter arrived.<sup>68</sup>

### STRATEGIC INFRINGEMENT?

The gaps in Pagenstecher's 1897 narrative and the questions they raise can be filled by a close reading of documents that have been largely overlooked by historians of the pulp and paper industry. Voelter sought to secure an extension of his 1858 patent, first in 1870 and again in 1877. Published by the U.S. House of Representatives under the title "Papers In The Matter Of The Application of Henry Voelter For Extension Of Reissue Of Letters Patent For Improvement For Reducing Wood To Paper Pulp," the 272-page document contains depositions filed in both patent extension applications. The papers cover Voelter's development of the wood pulp grinder, his effort to find an American buyer for his patent, and the two years of negotiations with Pagenstecher for the sale of his patent. The depositions provided by Voelter, Louis Prang, and others offer details that both contradict and augment Albrecht Pagenstecher's 1897 origins narrative. They also point to other primary materials that both corroborate Voelter's narrative and refute Pagenstecher's version.

Alberto Pagenstecher's effort to secure the Voelter patent began in 1866, not in 1868, as his cousin Albrecht wrote. Voelter said in an 1870 deposition that Pagenstecher sought to gain control over the patent in 1866, when Voelter was asked to join a proposed American wood pulp company and exchange his patent rights for shares of stock and some cash. Voelter rejected the partnership offer and "submitted to them a counter-proposition, through Mr. Prang, and a long negotiation followed, which finally failed and was abandoned."<sup>69</sup> Voelter did not

describe his counteroffer, yet Prang noted that Voelter believed his 1858 patent to be worth \$100,000.<sup>70</sup> Voelter wrote that "after some delay Mr. Pagenstecher made me new offers, which again led to long negotiations, which resulted in an agreement by which Mr. Pagenstecher bought my patent."<sup>71</sup> The negotiations between Voelter and Pagenstecher that were intermittent between 1866 and 1868 are mentioned in neither the 1897 *Paper Trade Journal* article nor Warner Miller's 1917 piece for *Paper*.

The "some delay" Voelter mentioned likely took place from mid-1866 to March 1867, when Alberto was securing the Curtisville mill site, purchasing the two grinders in Germany, arranging for their shipment to the United States, and preparing to start wood pulp production. When patent negotiations resumed is not known, but Pagenstecher traveled to Germany to meet with Voelter at the U.S. consulate's office at Stuttgart on at least one occasion.<sup>72</sup> Three-party communications through Prang may have complicated the negotiations, but the delay might also have been due to Voelter's preference to sell his 1866 patent rather than its 1858 predecessor. Voelter, who told Prang that he believed the value of the new patent to be 50 percent greater than the previous one, was perhaps holding out for a contract on the 1866 patent, which would be valid for ten more years.<sup>73</sup> Whatever the reasons for the delay, Alberto Pagenstecher began operating the grinders before signing a purchase agreement with their patent holder.

One explanation for Pagenstecher's actions is that he sought to secure a wood pulp manufacturing foothold in Berkshire County after reading of the startup of the American Wood Pulp Paper Manufacturing Company at Manayunk, Pennsylvania, in 1866. Using the chemical wood-pulping process patented in 1864 by Charles Watt and Hugh Burgess, the Manayunk

plant was to produce 30,000 pounds of wood pulp per day.<sup>74</sup> Voelter, who himself had learned about the new company from an article in the *New York Demokrat*, a German-language newspaper published in New York City, wrote to Louis Prang in May 1866, expressing concern that the Manayunk mill posed a threat to the sale of his patent in the United States. Urging Prang to better promote his interests, Voelter wrote, "I do not want my system in America to be pushed in[to] the background."<sup>75</sup> The numerous newspaper articles about the Manayunk mill followed from a tour of the mill by two hundred Northeast publishers in April 1866. It is not unreasonable to assume that Pagenstecher read the same account as Voelter and felt a similar sense of urgency.<sup>76</sup> With Berkshire County and its nearly forty paper factories a principal center for American paper manufacturing, Pagenstecher might have thought it essential that his wood pulp mill be the first in the region, even though he did not yet own the technology on which it would be based.<sup>77</sup>

The Pagenstecher pulp mill in Curtisville was an immediate success. The Smith Paper Company of Lee, which tested the initial wood pulp produced in March 1867, purchased more than 6,000 pounds in the first month of operation, and then agreed to buy all the pulp that the mill could produce.<sup>78</sup> That persuaded Pagenstecher to expand operations. By May 1868 he was building a second pulp mill on the site of a burned brick factory in Curtisville, and by July he had formed a partnership with B. F. Barker & Co. to operate a third pulp mill.<sup>79</sup> Pagenstecher likely supplied the Voelter patent in exchange for Barker's agreement to manufacture the wood pulp grinders at his iron foundry.<sup>80</sup> An account of the new partnership in the *Pittsfield Sun* in August 1868 also said that Pagenstecher owned the "Voelter invention."<sup>81</sup>



Yet Pagenstecher did not own the Voelter patent until November 6, 1868. A careful look at that agreement offers insight into both how it was negotiated and how its terms would ensure subsequent patent extension applications. The agreement gave Alberto Pagenstecher the rights to Voelter's 1858 patent for a royalty payment of \$5,000 on January 1, 1869, plus \$6,000 on January 1, 1870, and each successive January through the life of the patent and any extensions.<sup>82</sup> But since the 1858 patent had been antedated to 1856, Voelter would earn only \$8,250 in total royalty income before the patent expired in 1870, after Prang's commission was taken—far less than the \$100,000 Voelter thought the patent to be worth.<sup>83</sup> Voelter's share from an invention, whose benefits to

the paper industry were “estimated by the millions” by Samuel Duncan, acting commissioner of patents, was indeed meager.<sup>84</sup> By 1870, 134 of his grinders would be manufactured in the United States. Although many of these machines were operated in mills owned outright by Pagenstecher or in those in which he shared ownership, Alberto charged \$100 per month for each licensed grinder.<sup>85</sup> Two years after the patent was sold, the per-unit value to Pagenstecher from licensing Voelter grinders was more than \$160,000 per year. Commissioner Duncan was incredulous on reviewing the terms of Voelter's 1868 contract with Pagenstecher: “It is regretted that the man who, by years of study and costly experiment, by the exercise of sublime faith, and by active and persistent efforts, has given the world

**The Hudson River Pulp Company's mill, seen here around 1872, was located at Corinth, New York, on the Hudson River. In 1898, the company became International Paper Company.**

so valuable an invention, should have no larger interest in it at a time when the public appreciation of it might compensate him for the ingenuity displayed.”<sup>86</sup>

So why did Voelter agree to such paltry royalties? Perhaps he reasoned that after having tried for ten years to find an American buyer for his patent, he needed to salvage whatever remaining value it held. Yet the terms of the agreement also suggest that Voelter sought to leverage the sale of his 1858 patent in hopes of gaining

a future contract for the improved 1866 version. Voelter surely tried to persuade Pagenstecher to purchase the 1866 patent rather than the 1858 version when he was approached in 1866, not only because he considered it more valuable but also because it would have provided him with royalty income through 1880. That having failed, Voelter gave Pagenstecher the rights to the 1866 patent for two years, allowing him to build and test a machine based on its design and to “endeavor to introduce it into use.”<sup>87</sup>

Voelter surely reasoned that providing Pagenstecher with limited, royalty-free use of the 1866 patent with its improved method would encourage its use and ultimate purchase, and then he could negotiate a purchase contract with larger royalties for a longer time.

Pagenstecher, however, had his reasons for wanting the 1858 version. Warner Miller, after learning of Voelter’s invention from friends in Germany, first approached Pagenstecher in 1868 to purchase an interest in the patent. Miller, along with Albrecht and Rudolf Pagenstecher, would become a founder of the Hudson River Pulp Company that was being planned in the Adirondacks. Miller had secured his own U.S. patent in 1868 for an improvement to the wood grinder patented by H. & F. Marx in 1866, which featured wood fiber screening.<sup>88</sup> Although the date of Miller’s contact with Pagenstecher is not documented, it is likely that a plan emerged to add Miller’s patented screening method to Voelter’s grinder, making purchase of the 1866 version with its improved screening unnecessary. In fact, both the Voelter and the H. & F. Marx patents are featured in the January 1869 incorporation papers for the Hudson River Pulp Company as technologies that it would use.<sup>89</sup> By 1870, however, one of Voelter’s machines based on the 1866 patent had been imported from Germany for testing at the Hudson River Pulp

Company mill at Palmer Falls, and by 1872 Voelter had sold the 1866 patent to Pagenstecher.<sup>90</sup> Although the terms of sale are not known, that Pagenstecher owned both of Voelter’s patents by 1872 but pursued patent extensions only on the 1858 version—in both 1870 and 1877—suggests that securing control of Voelter’s 1866 machine may have been strategic: he wanted to keep it out of the hands of competitors.

### THE INVENTOR AS FORGOTTEN HERO

The success of the Curtisville pulp mill drove Pagenstecher’s expansion plans while setting off a wood pulp boom in the Berkshires.<sup>91</sup> Pagenstecher continued to exploit Voelter’s technology by forming a partnership with Lewis Beach and James H. Royce in December 1868 to convert their Lee, Massachusetts, textile mill into a wood pulp mill.<sup>92</sup> The Curtisville men who had built Voelter grinders for Pagenstecher realized the sizable profits from licensing their own technology and sought to exploit the growing interest in wood pulp, obtaining a total of eleven patents related to wood pulp production.<sup>93</sup>

Among them was Frederick Burghardt, who patented a pulpwood grinder in 1869, and Pagenstecher’s pulp mill partner, B. F. Barker, who obtained a patent for a grinder in 1871. Both became Pagenstecher’s competitors in Berkshire County. By 1876 there would be four pulp mills in Curtisville alone, two owned by Pagenstecher and one each by Barker and Burghardt.<sup>94</sup>

Alberto Pagenstecher’s purchase of the Voelter patent in November 1868 was driven by plans to expand wood pulp production beyond the Berkshires. Three months before he concluded his November 1868 purchase of Voelter’s patent, he sold to Charles Plumb and Charles Bostwick the right to manufacture

Voelter grinders for exclusive use in Connecticut.<sup>95</sup> Pagenstecher also sold the rights to the Voelter machine to G. B. Mayadier, who constructed a pulp mill at Lawrence, Massachusetts, in late 1868 “under a Prussian patent, of which the right for this country is owned by Pagenstecher and Co. of Stockbridge, Mass.”<sup>96</sup> Lawrence paper manufacturer William Russell, who used Mayadier’s pulp, partnered with Mayadier on two large wood pulp mills, one at Franklin, New Hampshire, and another at Bellows Falls, Vermont, which together housed forty Voelter grinders.<sup>97</sup> In February 1869 Russell formed the New England Wood Pulp Company and purchased the rights to use Voelter grinders in Maine, New Hampshire, Vermont, and most of Massachusetts.<sup>98</sup>

By October 1868, a month before the purchase of the Voelter patent, Pagenstecher had initiated plans to form a new pulp company in New York State. He hired a Stockbridge contractor to design and build a two-grinder pulp mill at Luzerne, in the Adirondacks.<sup>99</sup> At the same time, he was planning a second pulp mill five miles south on the Hudson River at Palmer Falls.<sup>100</sup> The two New York mills were part of the Hudson River Pulp Company, which was incorporated in January 1869, with Alberto, cousins Albrecht and Rudolf, and Warner Miller serving as partners.<sup>101</sup>

By September 1869 fifteen American pulp mills were manufacturing wood pulp under the Voelter patent, and two more mills were under construction—at Three Rivers, Michigan, and Brookfield, Indiana.<sup>102</sup> The speed at which Pagenstecher advanced these initiatives, before and immediately after completing the agreement with Voelter, suggests that plans for the licensing of Voelter grinders in the United States was under way well before the patent was purchased. With two extensions on Voelter’s patent of 1858, one of which required an act

of Congress, Pagenstecher and his associates controlled the technology until 1884, while Voelter continued to earn royalties under the terms of the 1868 contract.

Histories of the wood pulp paper industry have acknowledged Heinrich Voelter's role in developing mechanical pulping technology and have credited the Pagenstechers with scaling up and expanding the wood pulp paper industry in the United States. Missing from the standard historical narrative, however, is exactly how the Pagenstechers became so successful. Although cryptic comments in patent records suggest that Pagenstecher might have had some kind of agreement with Voelter for the use of his technology prior to 1868, no document conferring the right of prior use has been found.<sup>103</sup>

When Albrecht offered his version of the origins of the wood pulp industry in the *Paper Trade Journal* in 1897, industrialists were more celebrated in America than inventors, who only a few decades earlier had been viewed as heroes. Heinrich Voelter was described in such terms in 1870 by the patent commissioner, Samuel Duncan, when he wrote that “the inventor has given the best years of his life, laboring therefore with an energy and zeal and singleness of purpose that find a parallel only among the great inventors whose labors have become historic.”<sup>104</sup> Thirty years later, Albrecht Pagenstecher's wealth, which flowed from Voelter's technology, had made him a celebrated figure and given him a platform from which to offer his version of the beginnings of the wood pulp industry in America. That the financial benefits of Voelter's work were distributed disproportionately was not lost on the *Paper Trade Review*, which on Voelter's death in 1887 noted that although his “influence on civilization has been enormous,” he “did not make a fortune.” Rather, Voelter's

wood pulp grinder made “the fortunes of hundreds of papermakers and publishers.”<sup>105</sup> In Albrecht Pagenstecher's case, along with the fortune he made from exploiting another man's innovation came the ability to construct a misleading origins narrative of the industry—one that has remained largely uncontested for more than a century.

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*Stephen Cernek is working on a book about the Hudson River Pulp and Paper Company covering the years 1869 through 1898.*

#### NOTES

1. Hannes Toivanen, “Waves of Technological Innovation: The Evolution of the U.S. Pulp and Paper Industry, 1860–2000,” in *The Evolution of Global Paper Industry 1800–2050: A Comparative Analysis*, ed. Juha-Antti Lamberg and Jari Ojala (Springer: Netherlands, 2012), 49.
2. Fourteenth Census of the United States (1920), Vol. 9, Manufactures 1919 (Washington, DC: Government Printing Office, 1923), 1011.
3. *Annual Report of the Forest Commission of New York State* (Albany: New York State, 1891), 211; *Sixth Annual Report of the Forest, Fish and Game Commission of the State of New York* (Albany: New York State, 1901), 25–26. New York State timber harvests were measured in both cords and board feet. The calculation increase for 1890–1899 was 52 million to 229 million board feet.
4. A. Pagenstecher, “Ground Wood. The Story of Its Introduction to This Country,” *Paper Trade Journal* 26, no. 42 (October 16, 1897): 19–21.
5. Lyman Horace Weeks, *A History of Paper-Manufacturing in the United States, 1690–1916* (New York: Lockwood Trade Journal Company, 1916), 234–38; Judith A. McGaw, *Most Wonderful Machine: Mechanization and Social Change in Berkshire Paper Making, 1801–1886* (Princeton, NJ: Princeton University Press, 1987), 200–04; Dard Hunter, *Papermaking: The History and Technique of an Ancient Craft* (New York: Dover, 1943), 378–79; David C. Smith, “Wood Pulp Paper Comes to the Northeast: 1865–1900,” *Forest History Newsletter* 10, no. 1 (April 1966): 12–25; and Smith, *History of Papermaking in the United States, 1691–1969* (New York: Lockwood Publishing Co., 1970), 132–34; Hannes Toivanen, “Learning and Corporate Strategy: The Dynamic Evolution of the North American Pulp and Paper

Industry, 1860–1960,” PhD dissertation, Georgia Institute of Technology, 2004, 13–23; Toivanen, “Waves of Technological Innovation,” 2–4. None of the materials cited here question Pagenstecher's 1897 origins narrative.

6. *Index to the Miscellaneous Documents of the House of Representatives for the Second Session of the Forty-Sixth Congress, 1879–80* (Washington, DC: Government Printing Office, 1880). Documents related to the Voelter patent extension applications of 1870 and 1877 are in volume 6, under “Papers in the Matter of the Application of Henry Voelter for Extension of Reissue of Letters Patent for Improvement for Reducing Wood to Paper Pulp,” 1–272, hereafter, “Papers.”
7. Joel Munsell, *A Chronology of the Origin and Progress of Paper and Paper-Making*, 5th ed. (Albany: Munsell, 1876), 123–65. Munsell reviews the principal technological and business developments in the United States and Europe during the 1850s. His otherwise exhaustive chronology of the paper industry covers Berkshire paper mills but does not mention the Voelter patent or the startup of the Pagenstecher wood pulp mill at Curtisville.
8. Charles Thomas Davis, *The Manufacture of Paper, Being a Description of the Various Processes for the Fabrication, Coloring, and Finishing of Every Kind of Paper* (Philadelphia: Henry Carey Baird & Co., 1886), 61–62.
9. Charles Watt and Hugh Burgess, “Improvement in the Manufacture of Paper from Wood,” U.S. Patent No. 11,343, 1854; Henry T. Brown, “The Manufacture of Paper from Wood in the United States,” in *Practical Guide for the Manufacture of Paper and Boards*, ed. Albert Prouteaux (Philadelphia: Henry Carey Baird & Co., 1866), 263–64.
10. Benjamin C. Tilghman, “Improved Mode of Treating Vegetable Substances for Making Paper Pulp,” U.S. Patent 70,485, 1867; S. Charles Phillips, “The Use of Wood Pulp for Paper-making,” *Journal of the Society of Arts* 53 (May 19, 1905): 17.
11. Smith, “Wood Pulp Paper Comes to the Northeast,” 12–13; Munsell, *Chronology*, 138–39.
12. Heinrich Voelter, “Improvement in Reducing Wood Fibers to Paper-Pulp,” U.S. Patent 21,161, 1858. Voelter's patent was awarded in 1858 but antedated to August 29, 1856.
13. Davis, *Manufacture*, 166–70, 295–99.
14. Davis, *Manufacture*, 148.
15. The narratives by Pagenstecher and Miller (“First Use of Ground Wood in Papermaking,” *Paper*, February 17, 1917, 128–32) were both cited in the most recent complete history of the industry, Smith's *History of Papermaking in the United States*, and in the most recent scholarly discussion of the origins of the wood pulp

- industry by Toivanen in 2012, “Waves of Technological Innovation.”
16. Pagenstecher, “Ground Wood,” 19–21; Passenger Lists of Vessels Arriving at New York, New York, 1820–1957, Records of the Immigration and Naturalization Service, National Archives, Washington, DC, manifest for the ship *Australasian*, December 19, 1863; Ninth Census of United States (1870), State of New York, County of New York, City of New York, District 13, 242 W. 21st Street, 39; Tenth Census of the United States (1880), State of New York, County of New York, City of New York, District 298, 52 W. 40th Street, 36; Albrecht Pagenstecher Obituary, *Saratogian*, August 12, 1926; Albrecht Pagenstecher Obituary, *New York Times*, August 9, 1926; Cuyler Reynolds, “Forest Preservation in the State of New York,” *New England Magazine* 19 (September 1898–February 1899): 206; *Paper Mill and Wood Pulp News* 20, no. 8 (February 25, 1897): 23. Pagenstecher’s obituary in the *New York Times* features an overview of the pulp and paper industry that is typical of late-nineteenth and early-twentieth-century accounts: it gives Albrecht, rather than his cousin Alberto, the credit for introducing wood pulp to the United States.
  17. “Hon. Warner Miller,” *Bankers’ Magazine*, 58, no. 5 (May 1899): 712–13; Miller, “First Use of Ground Wood in Papermaking,” 128–32; Warner Miller obituary, *Paper*, March 27, 1918, 28; Deposition of Warner Miller, July 20, 1870, “Papers,” 148–51. The *Banker’s Magazine* entry suggests that it was Miller who invented wood pulping technology, licensed grinders to others, and established pulp and paper factories and thus “amassed a fortune from the business.” Neither Voelter nor the Pagenstechers are named in the article. Although Miller’s own 1917 article was generally accurate and forthcoming, his obituary in *Paper* credited him with being “the first to introduce ground wood pulp manufacture in the United States.”
  18. Pagenstecher, “Ground Wood,” 19.
  19. Weeks, *History*, 234. Weeks cites the Pagenstecher article of 1897 as a source on page 236.
  20. Parke F. Hanley, “The Accident That Gave Us Wood-pulp Paper: How a Mighty Modern Industry Owed Its Beginning to Gottfried Keller and a Wasp,” *Munsey’s Magazine* 60, no. 4 (May 1917): 688–90.
  21. Carl Wurtzbach, “A History of Curtisville” (unpublished manuscript, 1938). Historians who have cited this document have not questioned its account of the first Pagenstecher mill. Carl Wurtzbach was only four years old in 1867 when his father started the mill, and his memoir was written seventy-one years later. The manuscript is in the Stockbridge (Massachusetts) Library Archives.
  22. *Boston Globe*, June 27, 1909; *Wichita Daily Eagle*, April 29, 1917; *Wilmington Morning Star*, February 21, 1922; *New York Sun*, August 26, 1933; *Oregon County Times-Leader*, August 31, 1944. These are selected newspapers from four different decades that published articles on the wasp myth.
  23. “Extension of Remarks of Hon. Ellsworth B. Buck of New York,” *Congressional Record Proceedings and Debates of the 80th Congress*, First Session, Appendix, Vol. 93, Part II, (April 2, 1947, to June 12, 1947), A1969.
  24. Hunter, *Papermaking*, 375; Munsell, *History*, 35; Phillips, *Use of Wood Pulp*, 3. Hunter, whose book has been widely cited by historians, notes on 378–79 he drew from Albrecht Pagenstecher’s 1897 article for his information. It is also evident that Hunter used—but did not cite—the Wurtzbach memoir, for he directly paraphrases some of its contents and then describes Friedrich Wurtzbach as a “mechanical genius,” just as his son Carl had done in his memoir.
  25. Dard Hunter, “A Rare Book on Papermaking,” *Paper* 27, no. 2 (September 15, 1920): 16–18; Harry B. Weiss, “Jacob Christian Schaffer, 1718–1790, Clergyman, Entomologist, Papermaker, Scholar,” *Journal of the New York Entomological Society* 60, no. 4 (December 1952): 241–44; Munsell, *Chronology*, 41; *International Cyclopaedia: A Compendium of Knowledge*, 11 (1892): 2. The *International Cyclopaedia* reported that Schaffer had made paper from sixty woods, including beech, willow, aspen, mulberry, and pine.
  26. Peter Burger, *Charles Fenerty and His Paper Invention* (Toronto: P. Berger, 2007), 30–31.
  27. *Chambers’ Edinburgh Journal* 1 (February 4, 1832): 8.
  28. Hunter, *Papermaking*, 376. Hunter’s Chapter 13 offers an extensive and informed discussion of the development of wood-pulping technologies yet provides only one footnote across its twenty-five pages.
  29. Charles H. Carpenter, *The History of Mechanical Pulping* (Montgomery: TAPPI, 1987), 3. Carpenter writes that Keller’s paper was first used for a German weekly on October 11, 1845. He provides detailed coverage of Keller and Voelter’s work with J. M. Voith but does not cite his sources or provide a bibliography.
  30. Deposition of Henry Voelter, July 4, 1870, in “Papers,” 192. Voelter came to Boston in 1870 to create the petition for his patent renewal application. “Papers” contains documents in which Voelter is referred to as both “Heinrich” and “Henry.”
  31. Voelter, “Papers,” 192–93.
  32. Carpenter, *History*, 4–5.
  33. “Machine for Making Paper from Wood,” *English Mechanic and Mirror of Science and Art* 5, no. 122 (July 26, 1867): 333; Carpenter, *History*, 4–5.
  34. Voelter, “Papers,” 19.
  35. Voelter, “Papers,” 195.
  36. “Machine for Making Paper from Wood,” 333.
  37. J. W. Appell, Esq. “Report on Paper, Stationery, Painting and Drawing Materials, and Bookbinding,” *Reports of the Paris Universal Exhibition*, 1867, Vol. 2 (London: Her Majesty’s Stationery Office, 1868), 137.
  38. Appell, “Report on Paper,” 19–22.
  39. *New York Times*, October 10, 1853.
  40. Isabella Field Judson, *Cyrus W. Field, His Life and Work, 1819–1892* (New York: Brothers Publishers, 1896), 26; *Pittsfield Sun*, December 5, 1839; Voelter, “Papers,” 20.
  41. Judson, *Cyrus W. Field*, 27.
  42. Voelter, “Papers,” 20.
  43. Voelter, “Papers,” 25.
  44. Voelter, “Papers,” 9.
  45. Daniel Boorstin, *The Americans: The Democratic Experience* (New York: Random House, 1973), 162.
  46. Voelter, “Papers,” 20, 134.
  47. Voelter, “Papers,” 19–20.
  48. Voelter, “Papers,” 210.
  49. Voelter, “Papers,” 211.
  50. Pagenstecher, “Ground Wood,” 19.
  51. Corte Suprema, 1,183, Gaceta De Los Tribunales (ano 21, num. 1,148), Santiago de Chile, Julio 9 de 1864, 434–35.
  52. Passenger and Crew Lists of Vessels Arriving at New York, 1820–1897, Records of the U.S. Customs Service, Record Group 36, National Archives, Washington, DC, A. Pagenstecher, Arrival in New York, October 27, 1865; *Berkshire County Eagle*, August 2, 1866. Alberto Pagenstecher purchased the former Brown cotton mill in Curtisville in August 1866.
  53. Albert Pagenstecher, “Improved Hydraulic Propeller,” U.S. Patent 44,584, 1864; Albert Pagenstecher, “Improved Water-Defense as the Protecting-Armor of Vessels,” U.S. Patent 43,377, 1864.
  54. Pagenstecher, “Ground Wood,” 19.
  55. *New York Herald*, January 31 1869.
  56. Gino Cattani, Roger L. M. Dunbar, and Zur Shapira, “Designing for Authenticity: The Steinway ‘D’ Grand Piano” (New York University: Stern School of Business, November 18, 2013), 20.
  57. McGaw, *Most Wonderful Machine*, 160. Data from Figure 6.1 suggest that Berkshire County had about forty paper mills in 1866.
  58. Pagenstecher, “Ground Wood,” 20; *Now & Then*, e-newsletter of the Stockbridge (Massachusetts) Library and Museum and Archives (March 2014). The newsletter contains a copy of an invoice, sent by Alberto Pagenstecher to Wellington and DeWitt Smith’s Columbia Mill in Lee, showing the charge for 6,123 pounds of wood pulp purchased in March 1867.
  59. Miller, “First Use of Ground Wood,” 128. Miller referred to Pagenstecher’s

- acquisition of the Voelter patent, and like Albrecht Pagenstecher in his 1897 article, glosses over its details, writing that “Some of his German friends had called his attention to woodgrinding and he bought some machines, patented by Voelter.”
60. Letter from Heinrich Voelter to Louis Prang, February 12, 1866, “Papers,” 41.
  61. Pagenstecher, “Ground Wood,” 20.
  62. Wurtzbach, “Curtisville,” 2.
  63. Carpenter, *History*, 6.
  64. Carpenter, *History*, 5–7.
  65. Voelter, “Papers,” 24. Voelter wrote that his royalties from the patents sold in Europe were limited, in part, because of “the financial failure of the persons to whom they were sold.”
  66. *Berkshire County Eagle*, August 2, 1866.
  67. Pagenstecher, “Ground Wood,” 20.
  68. Pagenstecher, “Ground Wood,” 19–22; Miller, “First Use of Ground Wood,” 128. Miller said that he, too, was a partner to the original purchase of Voelter’s patent, writing in 1917, “We joined forces and bought Voelter’s patents.”
  69. Voelter, “Papers,” 21; Prang, “Papers,” 134. Prang’s testimony confirms that Pagenstecher’s initial approach to Voelter was made in 1866.
  70. Prang, “Papers,” 135. Prang does not indicate the time period of the negotiations, but he suggests that an agreement was delayed because Voelter sought too much money for his patent. If Prang’s statement is correct, Voelter would have expected royalty payments of just over \$7,000 for each of the fourteen years that the patent would normally be valid.
  71. Voelter, “Papers,” 21.
  72. Voelter, “Papers,” 21. In accounting for his expenses in developing his machine, Voelter cites a trip to Stuttgart to meet with Pagenstecher. Stuttgart was then the site of the U.S. Consulate.
  73. Voelter, “Papers,” 141. Voelter’s belief that his 1866 patent was fifty percent more valuable than the 1858 patent, based on its successful use in Europe, suggests that he thought its value to be \$150,000 over fourteen years.
  74. Brown, “The Manufacture of Paper from Wood in the United States,” 263–64.
  75. Letter from Henry Voelter to Louis Prang, May 9, 1866, “Papers,” 141. This letter, in which Voelter expresses his concern that the pulping process used at the Manayunk mill would compete with his own, is among several communications from Voelter that Prang supplied to the Patent Office.
  76. Among the many newspapers that covered the startup of the Manayunk pulp mill were the *Albany Express*, April 13, 1866; *Troy Daily Times*, April 13, 1866; *Buffalo Evening Courier and Republic*, April 13, 1866; *Journal & Courier*, May 10, 1866; *Daily Bee*, April 21, 1866; *Adams Sentinel*, April 17, 1866; and *Pittsburgh Weekly Gazette*, April 16, 1866.
  77. McGaw, *Most Wonderful Machine*, 160. Figure 6.1 plots the number of paper mills in Berkshire County, 1801–85.
  78. McGaw, *Most Wonderful Machine*, 203; Weeks, *History*, 236. A copy of the Pagenstecher mill’s invoice for wood pulp delivered to the Smith Company’s Columbia mill is also reproduced in Weeks’s book.
  79. *Pittsfield Sun*, May 21, 1868; *Berkshire County Eagle*, July 29, 1869.
  80. *Valley Gleaner*, July 23, 1868; *Berkshire County Eagle*, July 29, 1869; E. E. Barker, “History of the Barker Mill and Water Tower,” (n.d.), Stockbridge (Massachusetts) Library Museum and Archives. Barker wrote that the partnership agreement was signed on July 15, 1868.
  81. *Pittsfield Sun*, August 27, 1868.
  82. Patent Sale Agreement between Henry Voelter and Alberto Pagenstecher, November 6, 1868, “Papers,” 246.
  83. Prang, “Papers,” 205. By agreeing to \$6,000 after the first year, Voelter accepted less than the \$7,000 per year royalty that would have resulted from a patent valued at \$100,000 over fourteen years.
  84. Samuel Duncan, “Henry Voelter, Extension. August 26, 1870,” *Decisions of the Commissioner of Patents for the Year 1870* (Washington, DC: Government Printing Office, 1871), 86. Duncan used the word “millions” but did not indicate how he reached this figure.
  85. Miller, “Papers,” 66.
  86. Duncan, “Henry Voelter,” 86.
  87. Voelter-Pagenstecher Agreement, November 6, 1868. Voelter believed that the improvement made in the 1866 patented machine increased its value by fifty percent above the 1858 version.
  88. Warner Miller, “Improvement in Machines for Making Paper-Pulp,” U.S. Patent 77,829, 1868. The Miller patent refers to one issued to H. & F. Marx in 1866: “Wood Grinder,” U.S. Patent 59,042.
  89. Certificate of Incorporation of the Hudson River Pulp Company, Warren County Clerk’s Office, Queensbury, New York, January 15, 1869.
  90. Miller, “Papers,” 217; H. Voelter, “Wood Pulp A,” U.S. Patent 55,031, 1866; Henry Voelter, “Improvement in Process of Reducing Refined Wood-Pulp for the Manufacture of Paper,” U.S. Patent 4881, 1872, Reassigned to Alberto Pagenstecher.
  91. McGaw, *Most Wonderful Machine*, 204.
  92. McGaw, *Most Wonderful Machine*, 203; *Valley Gleaner*, December 17, 1868.
  93. McGaw, *Most Wonderful Machine*, 202–04.
  94. B. F. Barker, “Machine for Pulping Wood,” U.S. Patent 119,107, 1871; F. Burghardt, “Wood Grinder,” U.S. Patent 97,041, 1869; Map of Curtisville, Town of Stockbridge, *The County Atlas of Berkshire, Massachusetts* (1876). This map documents the location of each pulp mill in the community.
  95. Agreement between Alberto Pagenstecher and Charles H. Plumb and Charles E. Bostwick of the firm Plump and Bostwick, August 31, 1868 (Recorded February 13, 1869), “Papers,” 248. Pagenstecher’s early contract with Plumb and Bostwick required a royalty fee of \$400 for each machine up to four grinders, and \$500 per machine over four per year. Pagenstecher eventually charged \$1,200 per year for each machine license.
  96. *Pittsburgh Weekly Gazette*, December 30, 1868.
  97. Deposition of William A. Russell, June 6, 1871, “Papers,” 101.
  98. Russell, “Papers,” 213; *Vermont Journal*, November 20, 1869.
  99. *Valley Gleaner*, October 29, 1868; *Pittsfield Sun*, November 12, 1868; *Saratogian*, December 24, 1868, and February 18, 1869.
  100. Lease Agreement between the Palmer Falls Water Power Company and the Hudson River Pulp Company, January 3, 1869, Saratoga County Clerk’s Office, Ballston Spa, NY.
  101. Certificate of Incorporation of the Hudson River Pulp Company, January 15, 1869. The incorporation document also lists Warner Miller and Charles Roberts as directors.
  102. “Mechanically Prepared Pulp,” *Journal of Applied Chemistry*, September 1869: 132.
  103. Pagenstecher and Plumb and Bostwick Agreement, August 31, 1868, “Papers,” 248; Prang, July 7, 1870, “Papers,” 134. Pagenstecher’s assignment to the firm of Plumb and Bostwick the right to construct and use Voelter machines in Connecticut included this statement: “Whereas said Voelter has licensed and empowered said Pagenstecher and his assigns to construct and used said patented machines & inventions within the States of New York, Massachusetts and Connecticut during the period for which said letters patent or either of them have been granted.” The statement implies that Voelter and Pagenstecher had some kind of prior agreement. Louis Prang’s deposition of July 7, 1870, which ends, “I have read that part of Mr. Voelter’s statement which relates to the making of an agreement with Mr. Pagenstecher, and it is correct so far as the matters stated come within my knowledge,” suggests that an agreement might have been concluded without Prang’s knowledge or participation. Any agreement that Voelter might have made with Pagenstecher before the November 1868 contract does not appear among the documents collected in “Papers.”
  104. Duncan, “Papers,” 236.
  105. *Paper Trade Review* 8, no. 12 (September 23, 1887), 220.