The Inventor, the Patent, & Carrie Everson: Defining Success

By Dawn Bunyak

In 1990, Kathryn Phillips conducted a professional study of the U.S. Patent Office files to determine how many patents were generated by women. Phillips found that only one-and-a-half per cent of the patents granted between 1790 and 1984 were presented to women. In 1886, Mrs. Carrie J. Everson patented a process for concentration to be used in the mining industry. Not only did Everson patent one process, in 1892 she patented a second.

Congress passed the Patent Act of 1790 to encourage technological progress. By the end of the nineteenth century, the U.S. Patent Office granted more than half a million patents.² Surprisingly, despite women's lack of property and voting rights, Congress opened the patent system to all U.S. citizens, including women. It was unprecedented for a woman to have the right to patent her inventions and to retain the rights to her own intellectual property. Nevertheless, the act did not guarantee women any protection from formidable social, economic, and psychological barriers they encountered when filing for patents. This is the story of one woman's attempt at financial success in the mining industry.

In the first days of August 1886, Dr. and Mrs. William Everson bought rail tickets from Denver to Georgetown, Colorado. When the couple alighted at the rail station in Georgetown, they found a bustling community nestled at the foot of the mountains. Golden yellow heaps of tailings tumbled from the entrances of mines high on the sides of mountains. Smoke rose from the smelters, often blocking the sunshine. In the valley, ore processing mills and sampling works

dotted the ever-enlarging mining town with its frame and brick buildings. Georgetown had become more than just a silver mining camp; it was a center for innovative thought about technological processes.

Key to innovation is the on-going process of improvement and development of method, process, and technology. Assayers, metallurgists, inventors, and mining engineers from around the world lived in Georgetown, testing and reshaping metallurgical processes on the district's hard-rock



Carrie J. Billings Everson, date unknown. (Courtesy of the Everson Family.)

ores.³ While in Georgetown, William Everson approached various mining outfits, American and British, to promote a new concentration process. His only request: a fifty-ton test plant to demonstrate it.

Carrie Everson's patent (No. 348,157) for a "Process of Concentrating Ores," mixed oil with pulverized ore, then washed it in an acidic water bath, which allowed metals to adhere to the oily film on the water. In trials, Everson recognized and used a variety of principals traditionally used in mining operations. However, the crucial difference between gravity concentration and Everson's eventual discovery was that she chemically treated the pulverized ore and its water bath with acids and, more significantly, floated off the metal concentrate. For centuries, miners used methods that relied on weight or specific gravity to concentrate metals. The "Everson Process" was a startling departure from previous milling methods.

Despite favorable coverage of Everson's patent in the Georgetown newspaper, her idea did not receive the acclaim she desired.⁴ Was her process too revolutionary for even the innovative Georgetown mining operators? Unanswered questions remain today: Was Everson's process dismissed because a woman developed it? Was her discovery of oil flotation initially ignored because it contradicted conventional wisdom on ore treatment? Or, was the process not yet commercially feasible? Whatever the reason, the Eversons' marketing efforts failed and they returned to Denver.

Meanwhile in Chicago, Everson's patent lawyer, M. E. Dayton, waged battle with U.S. Patent Office officials. Dayton rewrote the letter of patent five different times for the patent examiner, who complained that a "lack of specificity" thwarted his examinations. An exasperated Dayton defended his client: "It appears possible that the manipulation of the Examiner may have been faulty at some point. . . . It is quite reasonable that a failure should result the first time of trial by the Examiner as would happen to a housewife in making her first batch of

bread, though further trials would be successful." Despite such impertinence on the part of her lawyer, the United States Patent Office registered Carrie Everson's patent, the "Everson Process of Concentrating Ores," on 24 August 1886. Her property rights were thus protected.⁵

Within two years after obtaining her first patent, Carrie Everson's husband, William, abruptly and unexpectedly died in Denver. Friends recommended she hire a promoter to advance her patent process while she looked for a means to support herself and her son. Everson enrolled in the Arapahoe County Nursing School and within a short time found a promoter for her process. In 1889, Everson met Thomas Criley, who owned a Denver blacksmith shop and "lab" with his partner, veterinary surgeon James Hogeboom. The men manufactured mining equipment in their shop. When Everson explained her patented process, Criley enthusiastically suggested that they become

Immediately Criley placed an advertisement in the Denver City Directory for the "newest" concentration process. Thomas Criley was known for his gregarious personality and had a body to suit that personality. At over two hundred pounds, Thomas was quite the opposite of the shy, diminutive Mrs. Everson. However, the two had the makings of a good partnership. Criley's expertise centered on equipment and marketing, while Everson supplied the scientific insight and the patented process. Criley began a search for financial backers to fund an experimental plant to demonstrate the concentration process. His hunt took him near and far and a fund grew quickly.6

At the terminus of the Denver and Rio Grande Railroad in the Wet Mountains' valley lay Silver Cliff, a nearly deserted mining town. When the mines at Silver Cliff were discovered in 1878, the Denver & Rio Grande built a line to within a mile and a half of the city, where a new town, Clifton, appeared. Miners from Silver Cliff hauled ore to the railroad, which carried it to smelters in Denver

and south to New Mexico. Criley found an abandoned ten-stamp mill at Clifton, later renamed Westcliffe, in which to conduct experiments.⁷

Together, Criley and Carrie's son, John, converted the mill to accommodate her flotation process. With some milling equipment including jigs and vanners already in place, they constructed an eight-hundred-gallon tank. Later, John Everson wrote about his experience at the Westcliffe mill in his autobiography and gave a detailed description of the basis of the flotation process in a mining journal article. The task of burning off the oil was a messy and arduous one, but the concentrate assayed at a significantly higher value than previous samples, much to their delight.⁸

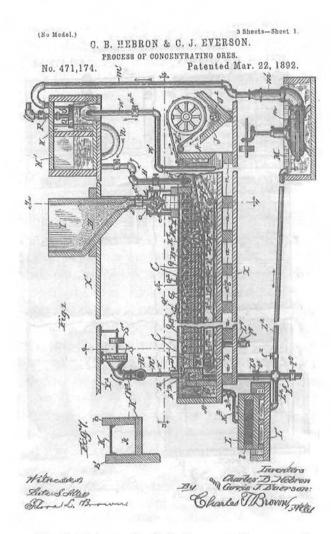
Rumors of their experiments spread quickly from Colorado to California. Denver newspapers such as the *Daily News* and the *Rocky Mountain News* published reports. One erroneously identified, "a flotation process tried at Leadville," Colorado, instead of Westcliffe. Neither newspaper report mentioned the inventor of the process. Criley and Everson's work even found national press. San Francisco's *Mining and Scientific Press*, a leading periodical of the U.S. mining industry, reported that experiments in oil with ores were being undertaken in the mountains of Colorado.⁹

Despite published encouragement, engineers, who spent much of their time avoiding the use of oil in concentration, barely recognized Everson's process, and those who did belittled its significance. In the May 1892 Engineering and Mining Journal, journalist Dan DeQuille reported, "the country was full of 'process peddlers' with vials of magical solutions in their vest pockets." Neither Everson nor Criley were members of America's renowned scientific elite, which led many to question the legitimacy of the process. Was it possible that Carrie's discovery was the "miracle" process the mining industry was looking for? Only time would tell. But for now, the skeptical American mining industry was not in crisis and, as a whole, not yet concerned with the problem of concentrating low-grade ores to which her process was especially suited. Nevertheless, Thomas Criley believed Carrie Everson's process would become one of the most significant developments in the recovery of metals. Criley set his sights on out-of-state investors and purchased a train ticket to Baker City, Oregon.¹⁰

Baker City had become the western states' copper mountain, much like the Midwest's Houghton, Michigan, long the principal national supplier from their plentiful body of pure copper. As fast as ores could be extracted from the Cascade Mountains they went to processing plants, but the recovery method then in use allowed too much copper to be lost in the tailings. Mill men were considering new concentrating equipment and better chemical processes. Criley felt certain that Everson's process would be welcomed in the region. Dressed in a Prince Albert coat and silk hat, Criley secured a seat on a stagecoach into the Sparta Mining District, confident that he could sell the Everson Process.

In January 1890, British mining engineer Ben Stanley Revett—later of Breckenridge, Colorado, dredge-boat fame—attended one of Criley's presentations. "At first I thought it was some patent-medicine vendor, but on listening I learned that he was telling them of a patent process for the separation and concentration of minerals by grease flotation." When Revett came forward at the end of Criley's demonstration, the latter introduced himself as part owner and associate patentee of the Criley & Everson Oil Flotation & Concentration Process.

After a brief discussion of the process, Revett exclaimed that Criley's development defied all known metallurgical practice, pointing out that grease of any kind was avoided in amalgamation, and that concentrators avoided making slime. Criley acknowledged Revett's assertions, even admitting that renowned Denver smelterman Nathaniel P. Hill laughed when approached about the new process. However, Criley pointed out



"C. B. Hebron & C. J. Everson Process of Concentrating Ores." Drawing submitted to the U.S. Patent Office, 1 September 1891, with a description of the process. The Patent Office patented the process on 22 March 1892.

that unless something new was discovered from time to time the world would stagnate. After some thought, Revett asked to see the demonstration again, and years later recorded his encounter with Criley and the process in his article for the *Engineering and Mining Journal*. ¹²

Traveling to Portland and nearby towns, Criley continued to push for the commercial adoption of the flotation process. The *Engineering and Mining Journal* reported that, "quite a number of capitalists from Portland and Walla Walla are here [in Baker City],

watching the result of some test working of the 'Criley and Everson Oil Process.'"

Interest was growing and then tragedy struck—Criley died.

Upon hearing of Criley's apparent heart attack, Carrie Everson boarded the next train to Oregon to attempt to continue the negotiations that Criley had begun, but without her affable promoter, she failed to complete the deal. Everson returned to Denver to find another agent. Several months later Everson teamed with a smooth-talking agent and chemist from New York, Charles Hebron. While Everson worked to improve her initial process, Hebron searched for more investors, even writing to his sister in Topeka to persuade her to invest in his scheme in exchange for an interest in the patent rights. In his search for a demonstration plant, Hebron met a Mr. Pischel in Denver, who secured a former chemical plant at Valverde, near Denver, for a demonstration venue.14

After some alterations, Hebron and John Everson installed the Carrie Eversondesigned separation trough. This was an enlarged sluice box about sixty feet long, six feet wide, and eighteen inches deep, with one end elevated. The operator sifted ground and treated ore onto the surface of the water bath. A series of wooden ribs along the bottom of the box caused the surface of the water to ripple as it traveled through the trough, and a gate at the upper end regulated the flow of the water through the box. By the time the water reached the end of the box, the separation of mineral and waste was complete. The inventors filed for a patent. After that was secured, Hebron and Pischel quarreled and parted company. Hebron then disappeared and Everson abandoned hopes of selling her patents and focused on her nursing career. 15

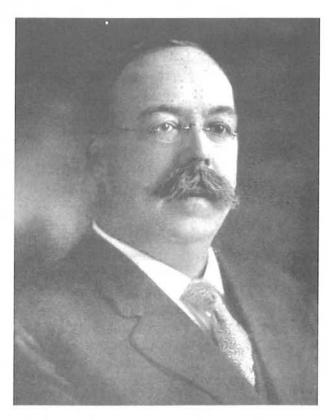
After seventeen years as a nurse—first with the Denver Flower Mission (later the Denver Visiting Nurses' Association) and later with the Colorado State Industrial School for Girls (later Mount View Youth Services Center)—Carrie Everson retired to San Anselmo, California, Only once did

Everson look back at her patents and what might have been. In 1901, a lawyer advised her against renewing her patents. It was the end of an era in Carrie Everson's life.

After Everson's early research on flotation faded into obscurity, twentieth-century Australian and British chemists, geologists, and engineers built experimental plants of their own. Their concentration processes used basic principles found in Everson's original patent. To claim whether or not they were acquainted with Everson's patents would only be speculation. Nevertheless, it is clear that their work expanded on general principles Everson defined in her 1886 patent. In 1914, British and American companies filed patent litigation suits in courts around the world claiming their right to ownership of the floatation process.

Commercial flotation began in 1905, when the English company Minerals Separation, Ltd., funded the efforts of E. L. Sulman, H. F. K. Picard, and John Ballot to patent a process and build the first commercially-successful flotation mill in the silver-leadzinc mining district at Broken Hill, Australia, widely regarded as one of the world's greatest mineral deposits. Canadian Jeremy Mouat, an expert on the history of flotation, asserts that Broken Hill operators failed to realize the long-term importance of the method they considered simply a solution to their immediate problem. ¹⁶

In the U.S., an inability to concentrate copper ores in the Butte Mining District in Montana prompted the Butte and Superior Copper Company to support James Hyde's experiments in flotation in 1912. The Montana mining district was one of the three principal nineteenth-century American copper mining regions behind Michigan and Arizona. When Hyde's experiments proved successful, the Butte and Superior quickly expanded operations. Two years later, fortytwo American mining companies used froth flotation in their mills. Enraged metallurgists in Australia and Great Britain claimed their rights to the process and brought suit against the Americans for patent infringement.17



British mining engineer Philip Argall arrived in the United States at thirty-three, managed several large milling and smelter operations across the country, and eventually settled in Denver. He became one of the eminent metallurgists of his time, eventually becoming president of the Colorado Scientific Society. He reported that his "best achievement" was introducing the eighthour day in Colorado mills in 1899 at the Metallic works at Florence. Illustration from Interviews with Mining Engineers by T. A. Rickard (San Francisco: Minerals and Scientific Press, 1922).

As patent litigation occurred from London to San Francisco, unanswered questions prompted the mining industry to review the development of the floatation process in Britain, Australia, and the United States. Lawyers studied patent books and contacted inventors. After someone found the 1892 *Engineering and Mining Journal* article reporting a secret process, Carrie Everson's 1886 patent came to light. Lawyers hired detectives to find the elusive inventor. She was traced to Denver, and an appeal was made to the Colorado

School of Mines and the Colorado Scientific Society for assistance.

Howard Parmelee, secretary of the Society, confessed that he was intrigued. In July 1915, the Colorado Scientific Society appointed a committee to find Carrie Jane Everson. Plans were made to find the amateur scientist to learn more about the work that led up to her discoveries and patents. The three-man committee consisted of the Society's president, Philip Argall, George E. Collins, and Parmelee.¹⁸

The committee focused on establishing Everson's role in the patented discovery of 1886 and possibly establishing a memorial in her honor. First the committee conducted a search of local public records. Contacts were made in the local and mining communities leading them back to California and John Everson. While the committee worked, a newspaper reporter heard about the search and realized its utility for his newspaper.

Newspapers played a helpful role in uncovering information about Carrie Everson, but they also contributed to false rumors and reports. Some of the first headlines proclaimed the "Mother of New Gold Treating Process Lost." A November 1915 *Denver Times* article announced: "State's Madame

Curie Missing; Search Is On." Rumors flew. Although the patent was filed in Chicago, members of the mining community recalled newspaper accounts of a similar process in Colorado and asked for the public's assistance in locating Mrs. Everson. As a result, friends, and clients of nurse Carrie Everson came forward.¹⁹

Because there was so much speculation about the mystery woman and so few facts, newsmen fabricated stories. Not only did Everson's notoriety intensify, but that of Denver and Colorado did also. A fanciful story circulated about the Colorado school teacher who was the first to find the key to flotation processing. Reportedly, a young school teacher discovered a flotation process while washing dirty ore sacks for her assayer brother, who lived and worked in Denver. The tale spread quickly, first in Denver and then in California newspapers. No evidence of an assayer brother was ever found. Comic sketches and photographs of Everson also appeared.20

At Parmelee's suggestion, Arthur Chapman submitted a special feature article about Everson to the *Denver Times*. He prophesied that "riches awaited Everson, the inventor of [the] Flotation Process of Extraction.



The 12 November 1915 Denver Times ran this interpretation of Carrie Everson's process discovery and life.

whose patented discovery made possible the wealth that is obtained from low grade ores."21 The story attracted attention in western news circles that followed Chapman's tale with their own. One proclaimed her to be Colorado's "Madame Curie," a reference to the famous female inventor who discovered the phenomenon of radioactivity.22 The Colorado Scientific Society followed new leads provided by Denverites and learned that Everson had retired to San Anselmo, California, to live with her son,23 While the committee did not find Carrie Everson, they did find her son, who informed them that his mother had died in November of the previous year.

The announcement of Everson's death left many unanswered questions about the Everson Concentrating Process patent. Was Everson indeed the inventor of the ore process? Did she really make the initial discovery? What, in fact, did she discover in her experiments? The mining world discussed these questions and more.

At an interview with John Everson, the Colorado Scientific Society committee explained that, although Carrie Everson's patents were both based upon flotation principles, the use of reagents—mineral versus vegetable—varied considerably. There was some question whether her husband or second partner influenced the use of a particular agent in her patents. Were there any records or notes available? John Everson regretfully told the committee that a 1910 house fire had destroyed Carrie's experimental notes, patents, and correspondence. Without written records of her experiments available, the committee could only rely upon the patents themselves or interviews.24

John assured the committee that he vividly remembered his mother working on her experiments in his father's laboratory and that she had continued with the experiments while living in Denver. When the committee asked repeatedly about Dr. Everson's involvement in the process, John declared that his father only encouraged and assisted his mother by providing ore samples

and financial backing, as well as enlisting a patent lawyer to get the necessary patent.²⁵

Having participated in many of the experiments, John Everson gave the committee as much information as he could recall. John told them that Thomas Criley, his mother's agent during the Silver Cliff experiment, was deceased, but suggested that they look for Charles Hebron, who worked with her on her second patent. After the interview, Parmelee invited John Everson to write a brief article about his mother and her patent for the journal *Mining American*. ²⁶ John, however, was not the only one to write about the life of Carrie Jane Everson.

Before the publication of John Everson's article, western newspapers picked up the story line. The *Rocky Mountain News* featured Everson's account of his mother's scientific career to counter a recent article asserting that Dr. Everson, not his wife, discovered the concentration process, but died before he could get it patented. Despite the *News* declaring that the mystery surrounding Mrs. Everson's work had been resolved, newspapers as late as 1952 perpetuated the story that a Colorado school teacher had accidentally discovered the flotation process.²⁷

In 1933, Rocky Mountain News reporter Ralph Keeler not only spelled Everson's name wrong, but promoted her to the position of a Colorado School of Mines tutor. Keeler repeated the assayer-brother story, and expanded the non-existent brother's role in contributing to her success. Although Keeler perpetuated that myth, his article provided a very clear and concise description of the modern flotation process for the layman. In 1952, a question directed to Rocky Mountain News editor Jack Foster resulted in his attempt to dispel the legend and explain Everson's involvement in the development of flotation. Contributors to journals tended to expend more energy on research when writing their articles, compared to newspaper writers, but even they did not always succeed in providing the facts.²⁸

While the Denver newspapers had a hey-

day with the story of a woman developing the floatation process, the society's committee continued its research on Everson's work. After many interviews with individuals in the mining industry and a review of the Hebron-Everson patent, Parmelee concluded that if Everson had stuck to her first ideas instead of allowing Hebron to influence her, the process would have made more rapid headway. Nevertheless, the committee pursued its search for Hebron. Due to the lack of information in its papers and journals, it appears unlikely that the committee ever found him.²⁹

However, the committee did locate Benjamin Stanley Revett, who saw the process first hand in Oregon. After Oregon, Revett, a graduate of the Royal School of Mines in London, eventually settled in Breckenridge, Colorado, building an elaborate home on the Swan River near his dredging operation. The committee encouraged him to write a journal article about his experience with the demonstration of the Everson concentration process in Baker City, Oregon, and he submitted his entertaining account to the *Mining and Scientific Press*. ³⁰

A number of articles on the evolution of the flotation process appeared in several mining journals during 1915, rehashing Everson's story. In a Metallurgical and Chemical Engineering article on the subject of the Colorado Scientific Society's hunt for Everson, Howard Parmelee confessed the regret of the society that the search had not been initiated earlier. Many American mining companies felt that Everson's appearance as a witness would have been helpful in the San Francisco suit between Minerals Separation, Ltd., and the Butte and Superior Copper Company. By the time Parmelee's article was published, the companies had filed patent litigation suits in the states of Delaware, Montana, Pennsylvania, and Maine, which eventually, in 1919, reached the U.S. Supreme Court.³¹

Publications about the floatation process and its evolution were not limited to journals. In 1914, Theodore Hoover, brother of

future president Herbert Hoover, published a book on the history of flotation concentration that included a summary of patents and litigation. It was so successful that a second edition soon followed. In his text, Hoover provided the reader with a detailed historical sketch of the various inventors, their processes, and their contribution to the development of flotation. Despite the author's lengthy discussion alleging that no one individual could claim ownership of one concentration process and likening the progress of an invention to the building of a pyramid, Hoover generously highlighted Everson's achievements and her significance in the development of flotation concentration. He wrote that "a new metallurgical process never springs fully developed from the brain of one person, but is the result of patient investigation, application, and improvement by many minds, during many years."32 But Hoover's sympathies, like those of many American mining men, lay with Carrie Everson in her plight promoting her patents and ultimately failing to sell them.

Hoover claimed that because the earliest patents, including Everson's, introduced what he termed novel ideas, the industry discounted them as having no commercial value. He concluded that the real reason for their lack of commercial success was due to their departure from previously used methods of concentration. Ironically, Hoover's text contributed to the myth that Everson was a schoolteacher who accidentally discovered the process. Hoover's book appeared in 1914, meaning that he did not have the full results of the Colorado Scientific Society's search for Carrie Everson, which were not available until 1915. In subsequent journal articles, Hoover corrected the misinformation provided in his book.33

Not to be outdone by Hoover's work, Thomas A. Rickard published the first of his three books on flotation in 1916. In his first book, *The Flotation Process*, Rickard claimed to be a detached observer eager to be helpful to metallurgists, but in *Interviews with Mining Engineers*, Rickard did not dispute

interviewer Charles Butters' comments that Rickard came to Butters' laboratory in 1915 for his first experience with what to Rickard was the entirely new process of flotation. Rickard clearly stated that he visited Butters to gather information on a new process then of growing importance.³⁴

However, upon further analysis, Rickard was not being entirely truthful. Rickard was editor of the British *Mining Magazine* in London in the winter of 1909 when it published an article outlining the history of flotation.³⁵ One would assume that, as editor, he read all of the articles to be published in his journal. Therefore, he most certainly was acquainted with the history and process of flotation, and with Carrie Everson, before he arrived in Butters' laboratory in 1915.

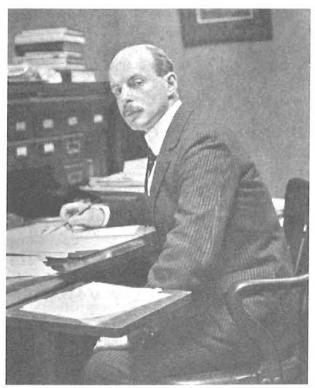
After reviewing Rickard's 1915 editorials and comments in the *Mining and Scientific Press*, a reader would assume that Rickard was sympathetic to the attempts to gain recognition for Everson's experiments and patents. In Rickard's first comments on Everson's patent, he outlined the odds against Everson's success. He acknowledged that sexism and lack of financial support seriously affected her attempts to promote her patents. In a December 1915 editorial, Rickard went so far as to profess that Everson patented the essential principle of flotation.³⁶

But beginning in 1916, there is a distinctive shift in Rickard's opinions. In his text, *The Flotation Process*, Rickard suggested that the Americans involved in the then-current litigation against the British company Minerals Separation, Ltd., embellished the significance of Carrie Everson's patents and created the romantic story of her supposedly epoch-making discovery.³⁷ Rickard cited Theodore Hoover's book, *Concentrating Ores by Flotation*, but neglected to mention Hoover's introductory discussion about metallurgical processes being developed by a team of people.

Why this shift in opinion on Rickard's part? Opinions evolve as information is gathered, but could there be another reason as

well? Was Rickard truly the "unprejudiced student" he alleged himself to be? Because of his influence on the amount written on Carrie Everson and the way her story evolved, an examination of Rickard's body of work is necessary. Analysis of available editorials, journal articles, and texts by Rickard indicate that several factors affected his writings: loyalty to country; business associations; legal issues and financial interests; and notoriety.

First of all, T. A. Rickard was British. In 1885, he traveled from England to join his uncle, Alfred Rickard, in Idaho Springs, Colorado. Called T. A. to distinguish him from his father Thomas, Rickard came from a prestigious British mining family and, like his father, was a mining engineer and metallurgist. The Rickard family traveled the



Mining Engineer T. A. Rickard (1864-1953), from a prominent British mining family, authored many significant mining texts over bis lifetime. He also served as editor of the Engineering & Mining Journal, Mining Scientific Press, and Mining Magazine.

world, working in mines in Africa, Australia, Europe, and the United States.³⁸

Rickard first worked as an assayer and surveyor for the British company Kohinoor and Donaldson. His uncle Alfred managed several British companies in a thirteen-mile area around Idaho Springs, Georgetown, and Central City, Colorado. The Kohinoor and Donaldson Consolidated Silver Mining Company contained state-of-the-art equipment in its mill. The company, as did most mining operations, reviewed any new method of concentration and updated its mill as equipment and processes became available.³⁹

Because Rickard worked in the Colorado mountains until 1887, it is likely that he heard about Everson's arrival in Georgetown in August 1886. He might have even seen a demonstration, but in all probability he read news accounts of the Everson Concentrating Process while keeping abreast of the newest experiments and methods. In addition, Rickard was a businessman, with close ties to many British companies as a member of boards, a contract employee, and a shareholder. He also chronicled the history of the industry.

Rickard retired from mining and turned to writing about the industry beginning in about 1903. He worked as an editor with the *Engineering and Mining Journal* until he left to start the *Mining and Scientific Press* in 1906. He also owned two-thirds of the total stock in the Dewey Publishing Company, which published a good many of his books.

In 1909, Rickard moved to London to found *Mining Magazine*, first issued in September 1910. In 1915 Rickard's *Mining and Scientific Press* was failing, but he was busy in London with *Mining Magazine* and fully intended to remain there. He spoke to his cousin, Edgar Rickard, about going to California to oversee operation of the *Press*, but Edgar declined because his family did not want to move to the United States. So T. A. entrusted the London journal to Edgar and returned to California to find a way to counter the drastic decline in subscriptions

to the *Press*. What better way to draw attention to the *Mining and Scientific Press* than to run editorials and articles on the floatation process patent litigation? The strategy worked and subscription rates increased.⁴⁰

This economic motive may also explain why Rickard republished the *Financial Times* article about the accidental findings of a Colorado schoolteacher, perpetuating that legend. The myth of Everson's "accidental" discovery began in America in 1902, when the *Financial Times* reprinted an article out of a Canadian newspaper, the *Rossland* [B.C.] *Miner*.⁴¹

In fact, Rickard himself was the scribe that he suggested was so irresponsible for creating this fictional tale perpetuated ever since. The first written evidence available regarding the "schoolteacher who accidentally found the process" appeared in Rickard's own publications. In a May 1916 editorial, he smugly recounted how the old varn about Carrie Jane Everson had risen again in a California newspaper called the (Kennett) Evening Howl, which reported that a "Harriet" Everson discovered the principles of flotation while on a visit to her brother at Kennett, in Shasta County, California. A new twist to the story alleged that Harriet was bested out of her rights by an Italian. The journalist was probably referring to Italian Alcide Froment's 1902 patent of a process that introduced gas as a buoyant medium in concentration.42

The final factor that may have influenced Rickard's opinions was a desire for notoriety. He came from a family of well-known mining men who were esteemed in the field. Whereas his father and uncles may have earned the community's respect, many of Rickard's contemporaries claimed that he demanded it. After repeated attempts to get an assistant professorship at the University of California at Berkeley, Rickard gave up in disgust, and perhaps this defeat nourished his desire for acclaim. Some of Rickard's colleagues considered him a vain loud-mouth, who was "full of himself." ⁴³

Despite the negative perceptions of

Rickard's personality, he did have many business associates, especially British, who needed his support in the patent litigation controversy. It is highly likely that the bias found in his writing was due to his loyalty to his home country, to his business associates, to his own legal and financial concerns, and to his desire to gain notoriety. Whatever the reason, T. A. Rickard was not as objective as he claimed to be because he was too closely tied to the mining industry.

In his earliest writing, Rickard claimed that Everson had failed to attain success due to lack of financial backing and because of sexism. Did Everson fail principally due to a lack of financial backing or because of the general mechanics of her patents or because of sexism in the industry? A constant theme throughout the controversy was that her failure came down to her effort's lack of commercial success.

In his 1918 book The Flotation Process. Herbert Megraw asserted that, as a metallurgist, Everson was a quarter of a century in advance of her profession. More importantly, he reasoned that Everson did not benefit from her discovery because she did not have any financial backing after her husband's death. There is some truth in this statement. In the 1980s, Margaret Rossiter studied the lives of early American women scientists. She concluded that "when women did get recognition, it was because they had backing of powerful and politically astute male mentors, colleagues, and spouses." It is true that while William Everson was alive, he supported his wife's research efforts and the patenting of her initial process.44

Although Everson was not a college-trained scientist, she, like many of her contemporary sisters, was self-educated and a shrewd professional. In the course of Everson's lifetime, she patented two industrial processes, developed a fattening agent for cattle, and devised a pressure cooker. However, after William's death, Carrie Everson was unsuccessful in finding either a capable agent or a financial backer, and her attempts to sell either mining patent failed miserably.



Carrie Jane Everson at her graduation from nursing school in Denver, Colorado. Landlord and friend Everett Fay presented this photograph of Everson to the Denver newspapers when the mining community was searching for the "lost" inventor.

Everson was not alone in her failure.

In the history of mining, inventors and engineers who succeeded commercially were usually funded by large companies or by benefactors. Sulman, Picard, and Ballot of Minerals Separation, Ltd., and Hyde of Butte and Superior Copper Company, are prime examples of men who benefitted from corporate investors. For every successful inventor, there were hundreds of others who failed to attract financial backers and saw their inventions languish.

But if Everson's failure was not due to lack of funding, could it have been that her patents were not commercially viable and thus did not sell? There appears to have been a significant difference of opinion between English and American mining experts regarding the working mechanics of Everson's processes, as evidenced in the

numerous journal articles written during the patent litigation.

One school of thought, generally associated with the British, argued that Everson played an insignificant, even negligible role in the evolution of the flotation process. As spokesman for the British and Australian case, Rickard—who had obviously changed his opinion that Everson failed due to lack of funding and sexism in the industry—claimed that the Everson patent described no workable process, was forgotten until patent litigation brought it to a false prominence, and went so far as to say that even if Everson had never recorded her experiments the flotation process would have lost nothing.45

The contrary school of thought, represented by Theodore Hoover, argued that Everson's invention was a comprehensive one, with all the salient points of the flotation process described in her 1886 patent. They claimed that Everson's first patent and its principles were closely aligned with modern flotation methods used in concentrating ore, and that the inventor's second patent introduced a separation device and altered the chemical formula of the process. Understanding whether her approach and patented processes are indeed the true genesis of modern flotation will require more research.46

The leading historian of flotation, Jeremy Mouat, believes Everson's approach was correct, but that the process itself does not date back to her work. Based upon extensive research on flotation in American and English records, Mouat prefers to credit Everson, as well as many of the earliest inventors, with the genesis of the process. He and other mining historians believe that the biases for or against Everson found in journal articles published during the patent litigation were colored by the legal agendas of the authors. Mouat also finds that sexual bias is evident in these discourses.47

An underlying note of tension centers on sexism. Metallurgists and engineers were, and continue to be, a small, tight-knit occupational community of males. The professionalization of this community within the rapidly-industrializing mining industry of the nineteenth century caused confusion and tumult within its ranks. As college-educated mining engineers and scientists replaced craftsmen who had earned their positions through practical experience, hard work and longevity in the business, feelings ran high. Carrie Everson's patents factored into this dynamic and also challenged genderprescribed roles and assumptions.

Societal norms of Everson's day considered women inferior to men, and many men believed in women's "innate" inferiority and lack of professional abilities. To suggest that a woman, and one not tied to the business, had invented an innovative process, could only be expected to elicit anger and ridicule within the mining industry. T. A. Rickard admitted in 1914, and again in 1921, that the odds were greatly against Carrie Everson gaining any recognition for her contribution because she was a woman. 48 In private conversations, mining men may have made snide jokes and chuckled about the story of the "wash" woman, but they showed restraint in public while allowing their scribes to ridicule her in the press. One must note that sexism was not singularly associated with the mining industry, but occurred in all of the professions.

Margaret Rossiter's studies of the lives of early female scientists, Maxine Benson's study on naturalist Martha Maxwell, and Sally Kohlstedt's exploration of women breaking into the field of science, found that women encountered significant problems in entering professions dominated by men because of men's mistrust of women's professional abilities. Society considered women amateurs in the sciences, discounting their private study or professional participation.⁴⁹

Historian Gerda Lerner notes that the exclusion of women from major professions medicine, science, and law—was rampant. She cites the example of Elizabeth Blackwell, who fought her way into college to study medicine, only to be denied employment. Angered, she established the New York In-

firmary for Women so that female doctors would have a place to work. Denver's Dr. Florence Sabin was the first female graduate of Johns Hopkins School of Medicine and the first female to teach at the college. Yet she was never awarded a chair at the college, despite her work overhauling Colorado's public health laws and becoming the first woman awarded life membership in the National Academy of Science, A nineteenth-century editor wrote that "if any unfortunate female should happen to possess a lurking fondness for any special scientific pursuit, she is careful (if of any social position) to hide it as she would some deformity." Glenda Riley, discussing nineteenth-century women and their relationship to the sciences, alleged that "whether a woman succeeded depended on the climate of the times and the area of the country."50

Three factors encourage an environment that nourishes innovation: business sagacity, investment, and marketing. Everson may have had an innate understanding of the sciences and been self-educated, but that was not enough to sustain her experiments and eventual discoveries. Her cattle fattening agent appears to have failed due to a lack of following through with the experiment. She created her cooking apparatus, simi-lar to today's pressure cooker, for personal use and never marketed it. Only as a result of her husband's interest in the flotation process and her 1886 patent did the couple try to market that particular process.

Regrettably, William Everson did not have the business acumen necessary to sell the patent in the competitive business of mining. Among the hundreds, if not thousands, of "new" processes presented, the Everson Ore Concentrating Process languished and disappeared. Clearly, Carrie Everson was well endowed with energy and drive, scientific curiosity, and confidence in her abilities, as evidenced by her efforts to find agents. One can only imagine what Everson might have accomplished with the financial investment that would have allowed her to concentrate on her experiments, and the shrewdness and

marketing skills necessary to sell the patents she developed.

In subsequent decades, technical writers have acknowledged Everson's contribution to the floatation process and have mentioned her patents in their books, but have never fully developed the discussion of her work as they did that of other metallurgists and engineers. This oversight was probably due to the paucity of information available and not necessarily to sexism. In the last half of the twentieth century, historians of the industry have concluded that Everson's primary contribution was the introduction of acids to the process, rather than the invention of the process itself.⁵¹

As Hoover and Mouat suggest, Everson was one of many innovators who contributed to the genesis of the flotation process. Initially, Mouat held that, "although one suspects that behind this sketchy narrative lays a depressing tale of sexism and one woman's inability to overcome the gendered assumption of her day, Everson's contribution to the development of the commercial process was negligible." After further research into the history of flotation, Mouat discovered that Everson's contemporaries concluded that Australia rightfully laid claim to "successfully establishing flotation concentration," but that American Carrie Everson was credited with "flotation of mineral" discoveries. Mouat concedes that she played a definitive role in the genesis of today's floatation concentrating process.52

Mouat also contends that the litigation battle in Australia, Britain, and the United States was not really over who invented the process, but over whether the American industry was to be dominated by the Minerals Separation Company, which most in the nineteenth-century industry regarded as a patent exploiter. Mouat's research does not indicate that Minerals Separation Company invented the flotation process or developed it to its present state of efficiency, but that it had the finances to buy patents or to back contemporary inventors.⁵³

Current discourse on the relevance of

Everson's role in the discovery of the flotation process highlights an interest in discovering the truth behind a woman's claims, and her attempt as a woman to enter the mining world. Despite her financial failure, Carrie Everson was the first, if not the only, nineteenth-century woman metallurgist documented through her patent registrations. She is also the first woman to be recognized by the mining industry for her achievements in ore concentration. This alone is remarkable. Her presence contradicts notions of feminine passivity during the supposed era of "separate spheres" for men and women and male dominance of the mining industry.

As Hoover stated, the development of any process is an ever-enlarging pyramid of experimentation that builds upon previous work. Success need not be determined solely by commercial viability, but can be judged by one's contribution to an invention's eventual success. Carrie Everson introduced an idea to the mining industry, which turned that idea and others into a viable commercial process. Her success is evident in the discussion her activities evoke over a century later.

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Notes:

- ¹ Kathryn Phillips, "Professional U.S. Patent Trademark Office Study Finds More Inventions Credited to Women," *The Scientist* 4, no. 20 (15 Oct. 1990): 24.
- ² Anne L. MacDonald, Feminine Ingenuity: Women and Invention in America (New York: Ballantine Books, 1992), 155. For more information on women and their patent history, Anne MacDonald, a patentee herself, describes the history and struggle women faced in filing patents. As of 1988, MacDonald found that a mere 5.6 per cent of patents awarded were to women. It appears that the struggle continues.
- ³ Robert L. Spude, "The Ingenious Community: Georgetown, Colorado, and the Evolution of Western American Silver Milling and Metallurgy, 1864-1895," *Mining History Journal* 10 (2003): 110.
- ⁴ "A Perfect Ore Concentrating Process," *Georgetown Courier*; 4 Aug. 1886, quoted in Louise C. Harrison, *Empire and the Berthoud Pass* (Denver: Big Mountain Press, 1964), 338-9.
- MacDonald, Feminine Ingenuity, 155. M. E. Dayton, letter to the patent examiner in the U.S. patent files, Patent No. 348,157.
- ⁶ John Everson, "Carrie Jane Everson, Inventor," Mining American, 27 Nov. 1915, 8. H. C. Parmelee, "Carrie Jane Everson and the Flotation Process," Metallurgical and Chemical Engineering 14, no. 2 (15 Jan. 1916): 67-69. MacDonald, Feminine Ingenuity, 155. Ben S. Revett, "How My First Introduction to Flotation Bubbles Cost Me Hard

- Labor and More Bubbles," *Mining and Scientific Press*, 16 Oct. 1915, 590. Theodore Hoover, *Concentrating Ores by Flotation* (San Francisco: Mining and Scientific Press, 1914), 3-6.
- ⁷ Later Dr. William A. Bell, a D&RG promoter, renamed the small rail stop Westcliffe, which was incorporated in 1897. Westcliffe later became the Custer County seat. Muriel Sibell Wolle, Stampede to Timberline: The Ghost Towns and Mining Camps of Colorado (Chicago: Sage Publishing, 1949, 1971) 286-94.
- ⁸ Everson, "Carrie Jane Everson, Inventor," 8. Parmelee, "Carrie Jane Everson," 68. "Carrie Jane Billings Everson," Engineering and Mining Journal, 15 Jan. 1916, 130. "Using Oil with Ores," Mining and Scientific Press, 14 Dec. 1889, 448.
- ⁹ MacDonald, Feminine Ingenuity, 156. Linda Jacobs Altman, Women Inventors (New York: Facts on File, Inc., 1997), 17. "Mother of New Gold Treating Process Lost," Denver Times, 12 Nov. 1915, 3. "Using Oil with Ores," 448.
- Jeremy Mouat, e-mail to author, 9 Feb. 1998. Dan DeQuille, "Secret Process for Working Comstock Ore," Engineering and Mining Journal, 21 May 1892, 544. Clark Spence, British Investments and the American Mining Frontier, 1860-1901 (Ithaca, N.Y.: Cornell University Press, 1958), 6-7.
- 11 Revett, "My First Introduction," 590-1.
- ¹² Revett, "My First Introduction," 590.

- ¹³ "Baker County," Engineering and Mining Journal, 15 Nov. 1890, 591. "The History of the Flotation Process," Mining Magazine 1 (Sep.-Dec. 1909): 62.
- MacDonald, Feminine Ingenuity, 156. Altman, Women Inventors, 18-9. Everson, "Carrie Jane Everson, Inventor," 8. "Carrie J. Everson and Flotation," Mining and Scientific Press, 15 Jan. 1916, 82. "Carrie Jane Billings Everson," 130. The bulk of the information on Hebron's involvement with Carrie Everson is outlined in Parmelee's article, "Carrie Jane Everson and the Flotation Process," 67-9, and in the patent, "Process of Concentrating Ores," by Charles B. Hebron and Carrie J. Everson, U.S. Patent No. 471,174 (22 Mar. 1892).
- Parmelee, "Carrie Jane Everson," 68. Everson, "Carrie Jane Everson, Inventor," 8. Hebron and Everson enlisted Chicago patent attorney Charles T. Brown to assist them in drawing up their patent application. On 1 Sep. 1891, the U.S. Patent Office filed the Hebron-Everson process. Charles Brown and John Everson witnessed Hebron's signature to the patent application. Everett Fay and Ben Curtis watched as Carrie signed. U.S. Patent No. 471,174. "Mother of New Gold Treating Process Lost," *Denver Times*, 12 Dec. 1915.
- Dawn Bunyak, Frothers, Bubbles and Flotation: A Survey of Flotation Milling in the Twentieth-Century Metals Industry (Denver: National Park Service, 1998), 25. Dawn Bunyak, "To Float or Sink: A Brief History of Flotation Milling," Mining History Journal 7 (2000): 35-44. Jeremy Mouat, "Development of the Flotation Process," Australian Economic History Review 36, no. 1 (Mar. 1996): 15.
- ¹⁷ Charles K. Hyde, Copper for America: The United States Copper Industry from Colonial Times to the 1990s (Tucson: University of Arizona Press, 1998), introduction. Bunyak, "To Float or Sink," 40.
- Parmelee was secretary of the Colorado Scientific Society, western editor of the journal *Metallur-gical and Chemical Engineer*, and on the Board of Trustees of the Colorado School of Mines. Later Parmelee would become president of the Colorado School of Mines. Argall served as president of the society and went on to become one of the eminent metallurgists of his time. Collins chaired the committee to find Everson. All were experienced mining men. "Colorado School of Mines," *Mining and Scientific Press*, 15 Jan. 1917, 824. *Denver Times*, 12 and 15 Nov. 1915. Parmelee, "Carrie Jane Everson and

- the Flotation Process," 67-8. T. A. Rickard, *Interviews with Mining Engineers* (San Francisco: Mining and Scientific Press, 1922), 5-37.
- ¹⁹ Arthur Chapman, "Mother of New Gold Treating Process Lost," *Denver Times*, 12 Nov. 1915, 3.
- 20 "Colorado School Teacher Was First to Find Key to Flotation Process," Rocky Mountain News (Denver), 17 Dec. 1933. In a 4 Dec. 1915 editorial in the Mining and Scientific Press, T. A. Rickard attempted to quell the myth. "Mrs. Everson was not a schoolteacher, her brother was not an assayer and she did not make the discovery while 'washing greasy ore-sacks' as has been reported repeatedly." When Everett Fay of Denver produced a photograph of Everson, newspaper and journal editors published it. Denver Times, 12 Nov. 1915.
- ²¹ Chapman, "Mother of Process," 3.
- ²² Chapman, "Mother of Process," 3.
- Quanah Mount (Carrie Everson's great-great-grandson), e-mail to author, 23 Feb. 1998.
- 24 "Midnight Blaze at San Anselmo," and "Everson Home Burns," unknown Californian newspapers, no dates, copies in possession of William Everson and author. The investigation conducted by the Colorado Scientific Society is discussed in detail in Parmelee's, "Carrie Jane Everson and the Flotation Process," 67-9. Several articles in the Rocky Mountain News and Denver Times discuss less salient points.
- 25 "Flotation Mother's Son Says," Rocky Mountain News, 19 Nov. 1915. "Dr. Everson and Not His Wife Found Ore Method," Denver Times, 18 Nov. 1915. Everson, "Carrie Jane Everson," 8-9.
- ²⁶ Everson, "Carrie Jane Everson," 8-9.
- 27 "Flotation Mother's Son Says," Rocky Mountain News, 19 Nov. 1915. "Dr. Everson and Not His Wife Found Ore Method," Denver Times, 18 Nov. 1915. "Mystery of Mrs. Everson Cleared," Rocky Mountain News, 18 Nov. 1915.
- ²⁸ Ralph Keeler, "Colorado School Teacher was First to Find Key to Flotation Process," *Rocky Mountain News*, 17 Dec. 1933. Jack Foster, "Pioneers Brought in Cattle in 1858," *Rocky Mountain News*, 8 June 1952.
- 29 Chapman, "Mother of Process," 3.
- ³⁰ Thomas J. Noel, *Buildings of Colorado* (New York: Oxford University Press, 1997), 459. Revett, "My First Introduction," 590-1.
- ³¹ Parmelee, "Carrie Jane Everson," 67. For more information on the search for Carrie Everson, there are several articles available in the *Den*ver Times, Rocky Mountain News, Mining and

Scientific Press, and Mining Journal. Patent litigation has been thoroughly discussed in T. A. Rickard's Concentration by Flotation (New York: John Wiley & Sons, Inc., 1921); Hoover's Concentrating Ores by Flotation; and Jeremy Mouat's, "The Development of the Flotation Process." Mouat is currently conducting an indepth study of the history of the litigation of the floatation process.

- 32 Hoover, Concentrating Ores, 2.
- ³³ Hoover, Concentrating Ores, 5, 66-7.
- ³⁴ T. A. Rickard, *The Flotation Process* (San Francisco: Dewey Pub., Co., 1916), 9. Rickard, *Interviews*, 540. Rickard was a prolific writer on mining topics, publishing over thirty books and numerous papers on current topics. His two books on the flotation process are: *The Flotation Process* and *Concentration by Flotation* and he co-authored another with O. C. Ralston, *Flotation* (San Francisco: Mining and Scientific Press, 1917). Embittered because he never got a chair at an American university despite repeated attempts, it would seem by his publication record that Rickard set out to publish more than any leading scholar!
- 35 "History of the Flotation Process," Mining Magazine, Sep.-Dec. 1909, 61-4.
- 36 Rickard, Concentration by Flotation, 4.
- ³⁷ Rickard, Flotation Process, 35.
- 38 Rickard, Interviews, 521-3.
- ³⁹ Rickard, *Interviews*, 526-8. Spude, "The Ingenious Community." Robert Spude, e-mail to author, 6 Aug. 2002.
- 40 Rickard, Interviews, 535-46.
- 41 Financial Times, 3 March 1902.
- 42 Erik C. Nordberg, archivist, Michigan Technological University, Houghton, Michigan, e-mail to author, 31 Jan. 2003. Editorial, Mining and Scientific Press, 6 May 1916, 657. "History of the Flotation Processes," Mining Magazine, Sep.-Dec. 1909, 62. Flotation Fundamentals and Mining Chemicals (Midland, Mich.: Dow Chemical Company, 1968), 7. Although at times Rickard participated in the perpetuation of inaccuracies, one cannot discount his importance in the promotion of mining, its publications, and in recording the industry's history. Rickard worked for decades as an editor and writer on mining, continuing to publish until his death in 1956. Today, many of Rickard's books are considered to be principal texts on the history of mining and its processes.

- ⁴³ Ed Hunter, "Flotation Men," Froth Flotation: 50th Anniversary Volume (New York: American Institute of Mining, Metallurgical, and Petroleum Engineers, 1962), 35.
- ⁴⁴ Herbert Megraw, *The Flotation Process* (New York: McGraw-Hill Book Co., 1918), 7. Margaret Rossiter, *Women Scientists in America: Struggles and Strategies to 1940* (Baltimore: John Hopkins University Press, 1982), 267.
- ⁴⁵ T. A. Rickard, "The Everson Myth," Mining and Scientific Press, 15 Jan. 1916, 78.
- ⁴⁶ Hoover, Concentrating Ores, 66-7. Parmelee, "Carrie Jane Everson and the Flotation Process," 69.
- ⁴⁷ Jeremy Mouat, e-mail to author, 7 Feb. 1998.
- 48 Rickard, Concentration by Flotation, 4.
- ⁴⁹ See Sally Kohlstedt, "In From the Periphery," Signs (Aut. 1978): 81-96; Maxine Benson, Martha Maxwell: Rocky Mountain Naturalist (Lincoln.: University of Nebraska Press, 1986); and Rossiter, Women Scientists in America.
- Gerda Lerner, The Woman in American History (Reading, MA: Addison-Wesley, 1971), 44-8. (See also her comments on women in the professions in Women and History, Vol. 1: The Creation of Patriarchy (Oxford: Oxford University Press, 1986).) Glenda Riley, Women and Nature: Saving the "Wild" West (Lincoln: University of Nebraska Press, 1999), 59.
- 51 Discussion of acid and its role in the flotation process can be found in A. M. Gaudin, *Flotation* (New York: McGraw-Hill Book Co., 1932); Jeremy Mouat, "Development of the Flotation Process;" *Froth Flotation: 50th Anniversary Volume*, and in Hoover's and Rickard's works on flotation.
- Mouat, "Development of the Flotation Process," 7. While conducting research in Canada in 2003, Mouat discovered a volume of conference papers entitled "Second Triennial Empire Mining and Metallurgical Congress, Held in Canada, August 22nd to September 28th, 1927, Proceedings, edited by R. P. D. Graham, Montreal: The Congress, 1928." Discussion of Carrie Everson and her work is found on page 658. Mouat wrote to the author in November 2003 that, "I think it underlines a general awareness of Carrie's role... among Australian mining engineers." He further explained that these comments about Everson were delivered by renowned and influential mining engineers.
- ⁵³ Jeremy Mouat, Professor of History, University of Athabasca, Alberta, Canada, e-mail to the author entitled "London Court Records and litigation," 11 Jan. 2000.