

THE AMBROTYPE:
A MISUNDERSTOOD HISTORY OF A
NINETEENTH CENTURY PHOTOGRAPHIC PROCESS

by

Sarah Janille Templeton

Bachelors of Fine Arts

Cincinnati, Ohio

28 July 2006

A thesis

presented to Ryerson University and

George Eastman House: International Museum of Photography and Film

in partial fulfillment of the

requirements for the degree of

Masters of Arts

in the Program of

Photographic Preservation and Collection Management

Toronto, Ontario, Canada, 2006

© Sarah Templeton 2006

UMI Number: EC53623

INFORMATION TO USERS

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleed-through, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

UMI[®]

UMI Microform EC53623
Copyright 2009 by ProQuest LLC
All rights reserved. This microform edition is protected against
unauthorized copying under Title 17, United States Code.

ProQuest LLC
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106-1346

I hereby declare that I am the sole author of this thesis.

I authorize Ryerson University and George Eastman House: International Museum of Photography and Film to lend this thesis or dissertation to other institutions or individuals for the purpose of scholarly research.

I further authorize Ryerson University and George Eastman House: International Museum of Photography and Film to reproduce this thesis by photocopying or by other means, in total or in part, at the request of other institutions or individuals for the purpose of scholarly research.

—

Abstract

The Ambrotype: A Misunderstood History of a Nineteenth Century

Photographic Process

Master of Arts, 2006

Sarah Janille Templeton

Photographic Preservation and Collection Management

Ryerson University

George Eastman House: International Museum of Photography and Film

This thesis endeavors to explore the history of the ambrotype and analyze the patent controversy surrounding this nineteenth century photographic process. It investigates the origins of the term ambrotype, its physical characteristics, the cultural response to the process, and how it has been remembered historically. Court cases, photographic and popular journals, and other nineteenth century primary sources are analyzed to reveal an intriguing series of events that influenced photographic history. The ambrotype has been increasingly left out of photographic texts today and this thesis seeks to understand why this process has faded from historical memory more than other early processes.

This thesis is dedicated to

Kevin Wilson

For his love and editorial assistance

and

Dan and Cheryl Templeton

For supporting me in all my endeavors

Table of Contents

Introduction	1
Chapter 1- The Word Ambrotype	4
Chapter 2 - The Patent Debates	10
Chapter 3 - The Ambrotype Process and its Variations	21
Chapter 4 - The Marketing of the Ambrotype and its Reception	26
Chapter 5 - Reflections on the Process	36
Appendix	
Cutting's Patent # 11,213	
Cutting's Patent # 11,266	
Cutting's Patent # 11,267	
Cutting Reissued Patent # 384	
Bisbee's Patent # 14,946	
Spooner Patent # 15,497	
Endnotes	38
Bibliography	42

List of Appendices

Cutting's Patent # 11,213

Cutting's Patent # 11,266

Cutting's Patent # 11,267

Cutting Reissued Patent # 384

Bisbee's Patent # 14,946

Spooner Patent # 15,497

Introduction

The ambrotype was one of the first photographic processes in the nineteenth century. It was primarily utilized by American portrait studios, where it contributed to the decline in the daguerreotype's popularity. Who invented it is debatable. Gustave Le Grey, a French photographer, indicated the use of collodion with glass to create images as early as 1849.¹ However, many credit Fredrick Scott Archer, the famous British photographic experimenter, who noted the possibility and created collodion positives in 1851. Photographic historians also give credit to James A. Cutting, who patented a variant of the process in 1854. Yet another man, Marcus Aurelius Root, a recognized daguerreian artist, is general acknowledged as naming the process. It is with these convoluted beginnings that one of photography's most interesting historical processes was created.

The history of the ambrotype is often ignored or misunderstood in scholarship and collections today. The reasons for this phenomenon are many, but together they weave an intriguing story about collective memory and how history is written. It is a fact that the ambrotype was one of the more popular processes in the nineteenth century. Yet, in the present day it is increasingly left out of history of photography texts and rarely exhibited. The reasons for today's lack of interest are linked to the origins of the photographic process and how it functioned in nineteenth century American society. The general public that embraced the process in

the mid-nineteenth century failed to ensure its remembrance into the twentieth century because they viewed the ambrotype as a passing technology. For the masses it was a tool that became obsolete once a newer version of photography filled its societal role. Photographers, in contrast, had a much more complex relationship with the ambrotype process. It is this relationship that has most coloured the representation of the process's history and is the basis for it being misunderstood throughout its entire existence.

This thesis will endeavor to present the ambrotype's history and question what factors have affected the way the ambrotype has been understood in the past century and a half. It is important to look at photographic historiography in relation to the ambrotype as well as the debates recorded in journals and newspapers of the time. The assertions in this thesis are based on the language and writings of the photographers, editors, and the general public that wrote both contemporaneously and subsequent to the ambrotype's popularity.

A controversy over three ambrotype patents arose out of the ambrotype's convoluted beginnings. The stimulus that the disputes provided became invaluable to the history of photography in general, even if it contributed to the ambrotype's exile. For instance, some of the photographic journals that are quoted in this paper folded soon after the patent debates were over. These early debates reveal a significant and

interesting history that reflects the role of photography in nineteenth century American culture.

Chapter 1 - The Word Ambrotype

The term “ambrotype” has expanded in meaning since its conception by Marcus Aurelius Root in 1854. Initially coined to describe the photographic process patented by James A. Cutting, the term’s definition eventually swelled to include other variations of the collodion positive process. This broadening was troubling to Cutting’s claim to trademark rights of the term “ambrotype.” Cutting took out ads in newspapers as early as 1855 insisting on his rights to the term:

Caution - The term Ambrotype was originated as a trade mark to designate our patent pictures, which are hermetically sealed by fir balsam, or its equivalent cement, between two glasses or another plate. Any application of this term to pictures on single glass plates is therefore an infringement of our rights (injures our business) and involves the user in liability for damages.

ii

The use of the term “ambrotype” became closely intertwined with the patent controversy. Cutting and some of the patent purchasers went so far as to file lawsuits prohibiting the use of the word for any variation of the process that was not sanctioned by Cutting. This act is very interesting because trademark laws, in the form that they exist in the United States today, did not exist at the time. “Trade marks” existed as a form of artist or craftsman signature, which ensured its purchaser of quality. Yet, there was no national authority that recorded these trademark requests and ensured their proper use. Therefore, when Cutting makes claims about the terms “trade mark” status, he was trying to protect his brand of images, but without formal documentation. The major question is: when did the

term “ambrotype” pass from brand name to the generic form, which is in the public domain? One could argue that the term was always in the generic form because no other name was ever recorded for the other versions of the process.

A court case, *Tomlinson vs. Battel*, that only took issue with the term “ambrotype” did little to provide clarity. One article stated that, “The suits in question are to test the right of the patentee to the use of the word ‘Ambrotype,’ as applied indiscriminately to positives on glass, *as a trade mark*. None of these suits have yet been brought to issue.”ⁱⁱⁱ Battel was not using any element of the patented process, but was using the term ambrotype to market his images. In 1857, the judge decided that because the case centered on a patent that the case was not within his jurisdiction. He therefore dismissed the case for want of jurisdiction, but still allowed Tomlinson “to appeal without security to the General Term.”^{iv}

Tomlinson was involved in many more cases over the ambrotype patents. The fact that Cutting himself did not think of the word did not debilitate him from a legal standpoint, but many photographers used that fact to further assail his claims of invention. There are many similarities between the origins of the process’s name and its chemical origins. Archer first suggested collodion positives. Root first suggested the use of the term ambrotype. Yet, Cutting was responsible for bringing both the process and the term into the mainstream consciousness in the United States.

Root is thought to have first used the term in the presence of Isaac Rehn, Cutting's partner in the latter half of the year 1854. Previous to this designation three United States patents involving the process had already been granted. As a result, there is no mention of the term "ambrotype" or a name for the process in the initial months of the patent's use. The first recorded use of the term ambrotype was by Cutting in the British versions of two of his patents. Cutting submitted these patents to the British Patent Office July 26, 1854. At some point during the twenty-two day gap between the American and British patents, Cutting adopted the name "ambrotype" for his process. The British patent states, "The Invention consists in an improved process of taking Photographic pictures upon Glass, and also of beautifying and preserving the same, which process I have styled 'Ambrotype.'"^v

This statement is interesting because of Cutting's use of the phrase "I have styled" implies ownership over the term. Root's initial reason for choosing the word is restated or even plagiarized in the same British patents. Cutting wrote, "The beauty and permanency of such a pictures are greatly increased, and I have on this account styled the process 'ambrotype,' from the Greek word ambrotos, immortal."^{vi}

The irony of this statement is that Cutting would later change his name from James Anson Cutting to James Ambrose Cutting, and thus ensured his own immortal link with the process. It has been theorized that this he did this further his claim to the invention of the process, which was

at the time hotly contested. He likely wished a certain amount of immortality that came with the idea of having a widely used photographic process named for you. Indeed there are many predecessors of this mentality. Talbot's process had been named the talbotype and Daguerre's the daguerreotype. Cutting could not change the process's name, which had become so widely accepted, but he could change his own.

Not all of his contemporaries in the field of photographic invention followed this pattern of naming the process after the inventor. Sir John Herschel's amphitype and Hamilton Smith's melainotype were named by modifying Greek words that directly related to the processes' physical natures. There were never any attempts to coin herschelotypes or smithotypes. Indeed, this is how the ambrotype was originally named. It was Cutting who, later, sought to share his name with the ambrotype process. A contributing factor for Cutting's assertion of ownership may have been the ardent protest and blatant disregard many photographers had against his right to patent the process. For a fourteen year period from 1855 to 1869 there was continuous flow of written editorials in the photographic journals, court cases, and discussion around the ambrotype and Cutting's patents. This constant assault on his credibility must have affected his own psyche. The name change is a sign that he desired to attach himself to the process to substantiate his sense of ownership over the ambrotype. He wanted to irrevocably identify himself with the process that he patented.

Analogous to its patentee, an identity crisis plagued the ambrotype itself. The process that would be later commonly called an ambrotype was known by several other names before a consensus was reached. The designation often made reference to existing photographic processes. “Daguerreotype sans miroitage,” meaning daguerreotypes without reflection, and “collodion positives” were two of the most popular names. This use of comparative terminology contributed to the confusion about the ambrotype’s individuality as a process that continues today.

Twentieth century history of photography texts regularly define the ambrotype process only in relation to the daguerreotype and collodion negative process. The most frequent phrase describes it as a “weak negative”^{vii} or an “underexposed wet collodion glass negative.”^{viii} This is an unfair characterization of the process because an ambrotype is intentionally made of less dense silver deposit. According to the nineteenth century book *The Ferrotypes and How to Make It*, “ We call an Ambrotype a positive picture, to distinguish it from a negative, which is, after all, only an Ambrotype over-timed and over-developed; but that excess development completely changes the character of the resulting image.”^{ix} If it is viewed independently on its own merits, a well-made ambrotype has many positive attributes.

In addition to its comparison to wet collodion negatives, the ambrotype is often defined as a form of daguerreotypy. While these processes may be presented in similar forms, their creation and chemical

structure are very different. When reporting on an art exhibition, *The New York Times* recently described the ambrotype as “a kind of daguerreotype.”^x If the ambrotype process is not directly called a version of the daguerreotype, it is instead compared to it. The *Encyclopedia of Printing, Photographic, and Photomechanical Processes* states that the ambrotype “effectively killed the daguerreotype” and is a “cheap substitute.”^{xi} Both the words killing and cheap reveal photographic historians’ subconscious prejudice against the ambrotype process. The nostalgia for the daguerreian era has reduced the ambrotype to an inferior status that is unfairly imposed. Interestingly, the same encyclopedia has an entry for “Collodion Positives on Glass,” another name for the ambrotype, which does not use any of the negative descriptors used in the ambrotype entry.^{xii}

This trend has continued to the antique markets that advertise everything in a case as a daguerreotype, making no distinction between them and ambrotypes or tintypes. Whether it is ignorance or misrepresentation, this practice further muddles the ambrotype’s rich history.

The problem is that few, if any, published sources in the photographic community have taken a stance on the ambrotype’s definition. If the photographic community does not recognize the process’s unique characteristics and history, there is no way the general public can.

Chapter Two- The Patent Debates

Fredrick Scott Archer and Peter W. Fry had originally made the suggestion of collodion positives in 1851. This fact would be one of the first used to attack Cutting's patents. It is a fact that Archer and Fry recognized the ability of a collodion negative to be viewed as a positive. Archer did exhibit one collodion positive portrait in the Great Exhibition at the Crystal Palace in 1851. However, neither man is recorded as having practiced the art of collodion positives extensively or endeavored to patent the medium. The physical process that Archer and Fry made note of was likely an ambrotype created on a single glass plate, a process that the Cutting patent did not include.

In his process Archer used only silver iodide, which had a longer exposure time and did not yield as strong an image.^{xiii} Bearing that in mind it is crucial to look at what exactly was patented by James A. Cutting. Cutting discovered that by substituting silver bromide and silver iodide, in place of silver iodide alone, in the process developed by Archer that the collodion film was more sensitive. This discovery accelerated the wet plate negative process as well as the ambrotype process.^{xiv} Because of this, Cutting's patent was useful to both negative and positive collodion processes.

What is legally included in Cutting's United States and British patents are central to understanding the debates and misconceptions that occurred in the nineteenth century. In the United States Cutting received

three separate patents in July of 1854 relating to what would be called the ambrotype. The first, Patent No. 11,213, was received on July 4th. This patent laid claim to “the use of gum-camphor, in addition to the exciting materials, in the preparation of collodion for positive photographic pictures on glass.”^{xv} Cutting went on to state that this element increased the vigor of the delineations of the halftones and gave greater depth and rotundity to the image. This patent explicitly stated that it was for the use of gum camphor in positive pictures on glass and not negatives pictures on glass. This is important because the negative collodion images on glass had been practiced for several years and many different photographers had experimented early on in different chemical combinations. It is likely that someone had previously used camphor in some form with photography previous to 1854. Cutting would not have been able to claim the patent if he did not limit its scope exclusively to positive collodion images on glass.

This patent for adding camphor to iodized collodion caused very little turmoil in the photographic field compared to Cutting’s other two patents. Many photographers at the time did not believe that the use of camphor did anything to enhance the image and therefore were not bothered by the restrictions of its use. One photographic manual from 1858 stated, “On this point, we have not heard his claim to priority disputed; but most persons agree that it has not the beneficial effect claimed for it and that it might as well be dispensed with.”^{xvi} Whether or not the camphor gave the desired result to photographers is not the main

issue. Photographers at that time believed that camphor was not a new invention and therefore not patentable.

While analyzing the validity of the Cutting patents in a photographic journal, Root suggested that the use of camphor in photography was not original because Sir John Hershel, an enthusiastic British photographic inventor had experimented with camphor as early as 1852. Hershel concluded that the addition of it was useless to the image.^{xvii} Root also suggested that the addition of camphor was of little use. He wrote that few photographers cared enough about that patent “to disturb the Patentee in the quiet enjoyment of that ‘right.’”^{xviii}

Cutting’s second patent involving the ambrotype process was issued July 11, 1854. This patent, No. 11,267, is for the use of “Canadian Balsam,” also known as balsam of fir; this served to hermetically seal an ambrotype image between its glass support and a coverglass, which would render it, according to the patent, “entirely permanent.” In his American patent Cutting stated, “The advantages of my improvement are, that by a mechanical combination of the balsam with the picture it is greatly increased in strength and beauty.”^{xix}

Of Cutting’s three patents this was the most imitated. It was also greatly contested by the photographic community because balsam had been previously used in photography, but not with regards to collodion positives. All of the popular photographic journals at the time took a stance about the state of this patent and informed their readers about every new

development. Henry Hunt Snelling, editor of the *Photographic and Fine Arts Journal*, was particularly vocal. At one point Cutting accused him of bias to which Snelling replied:

We never have had any cause for opposing Mr. Cutting, except in the belief that he was not justly entitled to a patent in the use of bromides in his positive process, -- and it was on this ground only, that we first became inimical to his interests, -- but subsequent investigation convinced us also that he was mistaken in thinking himself the originator of the use of balsam in sealing two glasses together in the manner specified in his patent.^{xx}

Opposition like this dominated the journals of the time. Another opponent was M. P. Simons, an ambrotypist who openly violated the balsam patent and encouraged others to do so. Simons was involved in a lawsuit with a patent practitioner and was very vocal in his beliefs about the patents. His letters to Snelling were published regularly in *The Photographic and Fine Arts Journal*. One such entry states:

I do not use balsam—and they admit it—but still they say that I infringe, when in fact balsam is the only thing that belongs to them according to their own claim...I use varnish which is superior to balsam, for if I thought balsam the best, I would not hesitate to recommend it, as I believe it to be public property...^{xxi}

There were several ways that photographers tried to evade the balsam patent. Nathan Burgess, author of *The Ambrotype Manual*, suggested fellow photographers use Anthony's White Varnish in the same way the balsam was used. This method was successful, but Cutting claimed that it infringed on his patent rights. In his many newspaper advertisements he stated, "our patent pictures, which are hermetically sealed by fir balsam, or its equivalent cement, between two glasses or

another plate.”^{xxii} The original patent did not mention equivalent cement.

Root published an analysis of the patents in 1856, stating:

This claim is limited to the ‘balsam of fir,’ any ‘equivalent’ for that particular article not having been claimed, by the Patentee, but expressly omitted in his ‘claim’ is, of course, thereby permitted to any one who may desire to ‘hermetically seal’ two or more glasses.^{xxiii}

The validity of Cutting’s claim to equivalent sealing methods may or may not have held up in a court of law. There were several court cases that went to litigation including *P.E. Gibbs vs. M.P. Simons*, of which the latter was quite vocal of his opinions. It is a fact, however, that when this patent was reissued on August 12, 1856 the wording of the patent for this matter had been changed. It now read:

The nature of my improvement consists in the application of a coating of balsam of fir or its equivalent, or varnish, to the side of the glass which the picture is made, over which coating I place another piece of glass of equal size with the one on which the picture is.^{xxiv}

Additionally this patent stated that the hermetically sealed images described by the patent are called “ambrotypes.”^{xxv} This was an important step in the legality of Cutting’s claims, and it marked the point where the debates turned to legal action. It is because of the inclusion of the equivalent sealing methods that Cutting patent holders now felt they held the authority to bring legal action against competitors that had previously been skirting the patent. Ellis, who believed that Cutting’s claim to the use of Canadian Balsam was valid, said that he did not agree that Cutting’s patent covering any other similar substances would be sustained in

court.^{xxvi} He backed this assertion by citing the case of *Gibbs vs. Simons*, which was heavily reported on at the time. The actual outcome of the case was not as Simons reported to the journal, however. He had stated that Gibbs kept on delaying the trial out of what he claimed was fear, when in fact it was the judge that delayed the trial.

Ambrotypes made upon a single plate of glass became a separate issue because they did not use any of the patented elements that could be prosecuted. As a result, Cutting's practitioners used mostly advertising to combat this form of competition. However, there was one area of Cutting's claim that could be argued in connection with these types of images -- the use of the term ambrotype. As previously stated, Cutting published newspaper ads that maintained that he held the "trade mark" for the term ambrotype.^{xxvii} They sought to bar practitioners of other forms of the process from using the term.

Cutting's other July 11th patent claimed the use of potassium bromide for use with collodion and the use of alcohol for displacing water from soluble cotton. This patent was not exclusively for use with ambrotypes. On the contrary, this patent declared that his patent covered its use in relation to "that class of photographic pictures in which the pictures are obtained upon a prepared film of glass or other substance."^{xxviii} However, it appears that it was only enforced with regard to the ambrotype. According to the patent the introduction of potassium bromide to collodion "excites" the mixture, thus affording the

photographer shorter exposure time. Cutting must have intended the resulting images to be ambrotypes because he stated, "The impression thus obtained is a negative, and the positive picture is produced in the usual way."^{xxx} In the next line of the patent Cutting named this process the mezzographic process. This is the only place where he refers to this title. The other two American patents relating to ambrotype production do not state any given name. It is possible that after adopting the process name ambrotype for the collodion positive process that he dropped the use of the term mezzographic. It is also possible that the name never caught on with photographers and therefore was never used outside of the original patent. In either case this patent along with the balsam patent became central to the ambrotype debates.

The first part of the patent, displacing water from cotton by means of alcohol, was not a major point of debate. As M. H. Ellis, the author of one ambrotype manual, observed, many photographers did not make their own collodion from gun cotton, choosing instead to buy it already prepared; therefore, they did not care how it was done. He also stated that this method had long been practiced in the pharmaceutical community and was only new with regard to photography.^{xxx} This element of the patent was rarely mentioned in the photographic journals and must not have earned the ire of the photographic fraternity. It is the second step in the process that fueled the fiery debates.

The patenting of “bromide of potassium” as it was known in the nineteenth century, or now referred to as potassium bromide, in use with collodion became the central argument against the ambrotype patents. Bromine in several forms had been used previously in photographic practice prior to the 1854 patent. In 1852 hyalotypes, also known as lantern slides, had been exhibited and discussed in *The Journal of the Franklin Institute*. This report stated that Dr. C. M. Cresson had used bromine to increase the sensitivity of the collodion film.^{xxxi} There were also several recorded uses of potassium bromide in England prior to 1854.^{xxxi} Likely for this reason Cutting did not include use of potassium bromide in his British version of the patent.

Since potassium bromide was not a new invention, many people felt that the patents should not have been issued. Many photographers believed that if challenged in a court of law, the patents would not be upheld. In fact many photographers who chose to use the patent without purchasing the rights welcomed litigation that would enable them to argue the validity of the patent. Photographic journals reported on many court cases, yet few were ever decided because either the judges lacked jurisdiction or the defendants decided to pay the fine instead. One case, *Tomlinson vs Bogardus*, was recorded as a win for the patent holders.^{xxxi} Decided in 1858, this case took the vigor from the opposition until Bogardus wrote in denying that the trial went to verdict. He claimed that he had instead paid the \$100 dollar fine, but did not lose.^{xxxi} However, the

damage was done and Tomlinson went on to sue Chas. D. Fredrickson, and in essence the entire photographic community.

Those who believed the patents were invalid freely wrote such views in their manuals. As Ellis' Ambrotype manual stated,

Some months ago Letters Patent were granted to James A. Cutting, of Boston, for the use of Bromide of Potassium in Collodion, but we believe that very little regard is paid to it by Photographers at the present time, as it is well known that it was in use in Europe some time before he made application for a patent.^{xxxv}

Ellis went on to state that anyone who was dissuaded from using potassium bromide could also substitute ammonium iodide and ammonium bromide, or iodide and bromide of cadmium.^{xxxvi} The bromide patent expired in 1868, and a renewal request was denied because the patent office said that an error had been made in the original issuance of the patent.

In the British ambrotype patent Cutting claimed rights to the use of camphor, balsam, and alcohol with collodion, but did not claim any rights to potassium bromide. Many people at the time believed that this was either because it was denied or that Cutting knew of Archer's previous experiments in Britain. Either way, the patents in Britain were not challenged like they were in the United States. It is possible that if Cutting had not tried to patent the potassium bromide in the United States, he may have literally saved his sanity.^{xxxvii} However, the patent technology was very useful whether or not it was original.

Some in the photographic fraternity thought that patenting the ambrotype would reduce its use. By not allowing photographers to freely

use the best available methods, some believed patents would inhibit the growth of photography as an art. Simons, while in the middle of a court case against a “patent man” wrote, “It is not a lamentable fact that we have no Hardwichs, Paynes, Archers, and many others who have so liberally given their time and experience to the public ‘without money and without price.’ ”^{xxxviii} He was referring to the many inventors that did not patent their work and instead allowed it to be used by the photographic community. Nathan Burgess shared this view when he wrote, “The patented process known as ‘Cutting’s Patent’ has tended in some measure to retard the efforts of many who were desirous to work by this process. At present, however, certain investigations are being made so as to undeceive the public on this point, and we can see good results of a removal of this drawback to the successful practice of this beautiful art.”^{xxxix} In fact, the Cutting patents prompted other photographers to invent their own methods to circumvent Cutting’s patents and, in this way, actually spurred innovation.

Cutting was not alone in patenting a photographic process. William Fox Talbot had patented his process, the talbotype or calotype, in England in 1839. Talbot’s patent limited the use of the calotype, but the daguerreotype, which was announced the same year, was not restricted by patent except in England. Many nineteenth century photographers claimed that the calotype was not successful because it was restricted by patent. Burgess cited the patent specifically as contributing to the

calotype's lower status. He said, "A patent for any portion of this process is almost conceded to be a misnomer. Certain it is that one always militates against the successful practice of it; and had M. Daguerre claimed one all over the world, his name would not have attained its present fame."^{xi} Others claim the calotype was not practiced on as large a scale as the daguerreotype because the process was slower and produced a less detailed image. Thus, the restricted calotype could not compete with the free market and the quality of the daguerreotype; in contrast, the ambrotype had no direct competition for its niche and, therefore, its patents were less harmful to its development.

It is because of these patent disputes many variations of the original ambrotype process arose. Photographers that wanted to capitalize on the ambrotype's popularity without paying the fees for the rights began to try to evade the patent to avoid infringement. This phenomenon caused much of the subsequent historical misunderstanding of the ambrotype as a process. Some variants, like the single glass process, have been prone to image deterioration, and this misunderstanding has contributed to the characterization of the process as substandard and problematic by many twentieth century collections and scholars.

Chapter 3- The Ambrotype Process and its Variations

The assertion that the ambrotype process is flawed conflates all ambrotype variant processes with the patented process. There is a significant disparity between the many varieties that were practiced. The conservation concerns and current condition of the ambrotypes vary widely depending on type.

The most common method of eluding patent restrictions was the single glass process. As its name denotes, a single piece of glass is coated with collodion to capture the image. The glass is then finished in one of several ways. One way involved applying black varnish or asphaltum to the collodion side of the image. This achieved the negative to positive affect and sealed the image from debris, in addition to correcting the image orientation by re-reversing it. The ability of a photograph to show correct orientation of the sitter was a not trait available via the daguerreotype process in the beginning of its use. However, it was easily remedied in many of the ambrotype formats. The single glass process, with this method of finishing, shared this trait with the Cutting patent ambrotypes. These images are often in the poorest condition today because the black varnish backing cannot be removed without harming the original image. Also, when the black varnish inevitably cracks and peels, the collodion image often comes with it.

A second method of finishing single plate ambrotypes is by sealing the collodion side of the image with a clear varnish and then coating the

non-collodion side of the glass with the black varnish. In this process the image is reversed from reality, similar to early daguerreotypes and tintypes. This was not as desirable to the patron. These images do not have the same conservation concerns as the previous variant but are still more prone to discoloration and scratches than hermetically sealed ambrotypes.

The single glass process is also found with ruby glass ambrotypes. These images use colored glass, usually in hues of red, as its base glass. The image is developed in the same manner, but does not have need of black varnish because the dark glass provides sufficient contrast. These images still need a clear varnish coating over the collodion and are reversed from reality, but were very simple for nineteenth century photographers to produce.

The second category of ambrotype is commonly referred to as a relieve ambrotype modern day historians.^{xli} It can appear as a single glass ambrotype or a more involved double glass process. The principle of both is the same. The varnish is applied to the finished collodion image; however, the black varnish is only applied to the area of the image contained by the sitter. The remainder of the image is left clear. In the simplest version the case back interior is backed with a light coloured velvet or paper that will lightly tint the white collodion background of the glass image. The more complicated and rarer version of this process utilizes a second glass plate to expose a background image and is then backed with a dark ground just as a regular single plate image. If the image with the sitter is photographed

against a dark ground, this causes the background of the developed image to be perfectly clear. The image of the sitter is backed with black varnish like in the previous version of the process. The two glass plates are then laid atop one another to create a three-dimensional affect.

Double glass ambrotypes, which include the James A. Cutting patent style of ambrotype, are another category of ambrotypes. They involve two pieces of glass, often hermetically sealed, which sandwich the collodion image and protect it from most kinds of damage. The Cutting patented images are hermetically sealed with Canadian balsam. The collodion image can be flipped to view from either side, until varnish is applied to what will become the verso. Cutting's patent called for the application of varnish. However, many practitioners who used the Cutting patent instead used dark velvet to back the images. Matthew Brady, for example, created many ambrotypes in swinging door cases, which could be viewed from either side even when finished. These images were popular because they were thought to show the two sides of the sitter's character. The Cutting images have proved to be the best preserved from a conservation perspective. The images are often still strong because no pollutants have been able to reach the collodion. There is a problem, however, that if there are bubbles between the glasses or if the glass begins to deteriorate, the images cannot be unsealed without harming the collodion image.

The Cutting patented images were very popular for their hermetical seal, which made them "imperishable." As a result, photographers found a

way to circumvent this area of the patent as well. Instead of Canadian Balsam, many studios tried using white varnish to seal the images. In today's collections it is very hard to determine which images were sealed with which substance. Often the only way to tell is if there is a mat stamp noting the patent, or if the photographer is recorded as having bought the rights for their area.

There is another slight variation of this process that was practiced: double glass ambrotypes that were clear glass on the front and backed with ruby glass. Once again this removed the need for black varnish backing. It does not appear to have been used regularly by photographers because it is rarely seen, and Cutting never directed his advertisements against it as he did with other double and single glass versions.

Many other practitioners created methods of changing the aesthetics of the ambrotype process. This ranged from coloring methods, like the one patented by D. B. and H. B. Spooner, to chemical alterations like pearl ambrotypes and lamprotypes. One such invention, called the sphereotype, was fashioned by photographers Day and Bisbee. In their version of the ambrotype, "the edges of the glass are left transparent, and the *mat* is placed behind the picture, not on a level with it, which is the common way. The effect of this improvement is to make the picture stand out in relief something like the solid appearing picture of the stereoscope."^{xiii} There also existed a variation known as the patent leather ambrotype, in which the collodion film was transferred to dark leather and

then sandwiched between two pieces of glass to form the ambrotype image. Alternately, if the leather was not sealed with glass it remained flexible and was known as a panotype or lettergraph, meaning it could be sent through the mail. Although not practiced commonly, examples of this process exist today.

Photographers attempting to create a position for their business in the restricted ambrotype community developed these variations. Most photographers saw the ambrotype as the best photographic process. For instance, Burgess stated, “We believe that the day is not far distant when ambrotypes will be classed among the most beautiful creations of the Photographic Art, and command the wonder and regard of the picture – loving public.”^{xliii} Yet, it was the customer that the photographers needed to convince to ensure their own livelihood and the ambrotype’s remembrance.

Chapter Four- The Marketing of the Ambrotype and its Reception

Nineteenth century photographers' reactions to the ambrotype were as varied as the process. Many photographers quickly paid to practice Cutting's patented process. These photographers bought the rights to exclusively practice the process in a given area. The practitioners would then widely advertise their exclusive right to make patent ambrotypes to attract consumers. There are many examples of these advertisements in nineteenth century papers from every developed region of the country. As ambrotypes gained popularity, photographers who did not own the rights for their particular region began to look for ways to capitalize on the booming market. Beginning around 1855 newspaper ads began to reflect this encroachment by those without patent rights. In one particular series of advertisements, Matthew Brady extolled the ambrotype above all other processes. This Brady Studio advertisement declared, "AMBROTYPES—A New Style of Picture on Glass, more durable and perfect than any known method of portraiture."^{xliv}

Several photographers chose to offer a variety of different processes at their studio to ensure that they reached the market. These were some of the first to capitalize on the new ambrotype process. Vannerson's studio, in Washington, D.C., was one of these studios. Their newspaper ad read,

PATENT AMBROTYPES can only be obtained at VANNERSON'S GALLERY, No. 424 Pennsylvania Avenue. NO AMBROTYPES possessing any degree of durability, can be procured at any other establishment in this city, as Mr. Vannerson is the only artist in Washington who has secured from Mr. Cutting the right to apply his process to their production. He also creates daguerreotypes,

photographs, portraits in oil, enameled millboard, and canvas, in water colors, and pastille.^{xlv}

Another advertising method utilized by many photographic studios was to emboss their names on the case's cushion or on the brass mat similar to daguerreians. This was particularly popular with practitioners of the patented process. Other patent men took the same route as Tomlinson whose ad stated:

A number of artists advertise their single glass or varnished pictures as ambrotypes: but it is a deception. They dare not hermetically seal or stamp their pictures patent. Twenty dollars reward will be paid for an ambrotype made by and sold at any other gallery in the city.^{xlvi}

Newspaper ads like this were aimed less at the general public and more at photographic competition. Patent purchasing studios praised the quality of the Cutting method while attacking the process in other forms. This method may have contributed to the ambrotype's poor historical reputation.

Daguerreians added to the published criticism of the process. Several well-known daguerreotypists refused to offer the process in their studios, claiming it to be inferior. The debate between the benefits of the two processes was often personal. *The New York Times* took note of this phenomenon and used two of New York City's most well known artists to illustrate it. The article stated:

Of the various 'types' which are more or less advertised, GURNEY confines his operations to Daguerreotype and the Photograph. He objects to the Ambrotype on the ground that it is not durable, which is another proof of the way in which even Doctors will disagree, since

BRADY declares the Ambrotype to be the most durable picture made.^{xlvii}

The ambrotype had come to threaten the daguerreotype's territory. It was especially a threat because journals were making a direct comparison between the two processes, and the daguerreotype was almost always ending up on the short end. *Scientific American* wrote, "the daguerreotype, though popular in its day, was expensive, and owing to the sheen of light from its polished surface, defective, and was justly superceded in public favor on the discovery of the collodion process, by the ambrotype"^{xlviii} In some cases profit margins overcame daguerreian studios' objections. Gurney's partner, C. D. Fredrickson, separated from their partnership to open his own studio and offer the ambrotype process.^{xlix}

Since many advertisements were aimed more at fellow photographers, the general public may or may not have responded to advertising about the different types of the processes. What is recorded is their actual use of the images. Nineteenth century American culture was significant in the ambrotype's social success and its photographic controversy. The importance of the ambrotype process varied widely among different social classes and professions. The upper class did not pay as much attention to the ambrotype because it did not help to establish them as elite. One paper published the comments of one Dr. Holmes, a Bostonian, who stated, "A good oil portrait is a better guarantee of worthy ancestors than a twenty-five cent ambrotype."¹ While elitists shunned it, the ambrotype process became very popular with most consumers; this

social divergence fueled the debate over patent rights in almost every area of the country.

The daguerreotype, which had been invented fifteen years before the ambrotype, had initiated a cultural craving for photography as a way to memorialize loved ones and immortalize one's legacy. Previously, only the upper rungs of society could afford such a luxury through the painted portrait. Daguerreotypy and the other photographic processes had opened up a previously exclusive practice to the majority of the population. This desire was still strong in 1854 when the ambrotype began to encroach on the daguerreotype's position as a mark of social distinction.

When the ambrotype was first introduced to the general public, it was seen as the newest improvement to photography. *The Albion* newspaper described it thus: "This Ambrotype is as great an advance upon the original Daguerreotype, as is the skillfully hand-coloured Photograph upon nineteen-twentieths of bedaubed portraits in oil."¹¹ The general public saw daguerreotypes as problematic because of their reflective surface, reversed image, and greater expense. Paper photographs were not as durable and tended to fade in undesirable ways. As a result, the new ambrotype process was thought to correct all these difficulties.

Newspapers at the time ran articles about the new process. An article from *The New York Observer and Chronicle* stated:

The ambrotype, as it is called, has suddenly come into great favor with the public. It gives a *positive* picture, like the photograph, not a *negative*, like the daguerreotype. Taken on glass, and in a shorter time than when the chemical is spread upon silver, the lines seem

sharper and more delicate; and backed by a dark ground, the picture does not require to be so carefully held with reference to the light, for it to be visible at all points.^{lii}

The ambrotype's benefits had a great effect on the photographic market. According to *The New York Observer and Chronicle*, " a short time ago there were one hundred and fifty daguerreotype rooms in the city, employing, on an average, five persons; but now, by the introduction of new processes, not easily attainable, many of the old operators are irretrievably ruined."^{liii} From this statement one can deduce that the exclusive nature of the patent rights granted to practitioners, the photographic market, and ambrotypes were unable to grow with demand the way the daguerreotype process had. With more and more of the customers wanting the new process, photographers had no choice. They had to either discredit the process through advertisement or find ways of producing it around the patent. In a city as large as New York City, there were many daguerreotype studios that were now unable to gain rights to practice the Cutting patent. This may be the reason that William Tomlison, who had the rights for New York City and Brooklyn, spent more time in litigation with patent infringers than creating images.

In 1856, the process that would come to be called, variously, the tintype, melainotype, and ferrotype, arrived. This brought a new competition for the ambrotype that it had never experienced. The tintype process was cheaper, more versatile, and did not have the patent issues that the ambrotype did. Edward M. Estabrooke, author of the manual *The*

Ferrotypes and How to Make It, worked hard to promote his process by idealizing the daguerreotype's aesthetics, criticizing the ambrotype's fragility, and promoting the tintype as the next best thing to the daguerreotype. In one particularly notable passage he wrote:

The ambrotype, which at that time held the field, was not calculated for a very extended usefulness, from the heavy, brittle nature of the substance (glass) on which it was made...There are so many contingencies under which its value to the owner might become incalculable, not in money or other earthly dross, but as the last memento of one, in whose existence might have centered the hopes and aspirations of many tender hearts. ^{liv}

Some saw the tintype as fulfilling many of the attributes that had caused the ambrotype to overcome the daguerreotype: it was easily visible, inexpensive, and quickly produced. The tintype, however, had one advantage. It was not bogged down in patent controversy. It was also not attacked by former daguerreians because it had not directly replaced their process and also never claimed to create the perfect images that some remembered the daguerreotype as taking. Instead, those who marketed the tintype sought to capture the utilitarian role that the ambrotype was filling. This resulted in the ambrotype suffering something akin to middle child syndrome; it could never live up to the splendor of the daguerreotype, but it also was not no-frills utilitarian like the tintype. It had sought to fulfill both roles but had instead been boxed in between its rivals.

Despite these problems, the ambrotype was used heavily in 1850's society. There are many references to its uses in journals and newspapers from the time. Its primary success was in straight portraiture. People

regularly wrote about of the softness of the features that it would produce. One writer even compared them to a painting saying, “and in its soft lines, the quiet eyes, the broad, smooth forehead, the firm yet gentle mouth, I see such a character. I would rather look at this poor reflection of a woman’s face than at the best of Durand’s sunsets or Kensett’s running brooks.”^{lv}

This belief that an ambrotype revealed a person’s character was widespread, for it appears to have been common practice of the time to have an ambrotype likeness taken to send to someone to have him or her read one’s character. Ambrotypes were particularly apt for this because “the face of the glass exhibits the sitter as he sees himself in a mirror, while the reverse shows him as he appears to others.”^{lvi} This would enable you to compare how others see you to how you see yourself.

Ambrotypes became popular in this way for publishing portrait engravings in newspapers. In one example, the editor of the *Ohio Cultivator* published a portrait of himself to “gratify an innocent curiosity in those whom we have been connected by the invisible ties of friendship, which unite reader and writer by a mystic bond that knows nothing of distance or condition.”^{lvii} This desire for true representations as illustrations must have been strong among American journal readership because, in the year 1856, the ambrotype outnumbered all other methods of photographic illustration in *Frank Leslie’s Illustrated Newspaper*. There were “one hundred and twenty-three illustrations which were copied from

some form of photograph. Of these, one hundred are from ambrotypes, thirteen from daguerreotypes, and ten paper photographs."^{lviii}

Besides these common uses, ambrotypes were also used for several other purposes. *Scientific American* stated that it was nothing new for an ambrotype to be used on a tombstone.^{lix} *The New York Times* also reported the existence of the "Rogues Portrait Gallery," which served to exhibit ambrotype portraits of some of the most notorious criminals for the "public good."^{lx} The use of ambrotypes and tintypes took on a different role when the Civil War broke out in 1861. This dramatic change in culture was reflected in the purpose of the photographic images.

Prior to 1861, larger portraiture had begun to take over the photographic market. "Life-size" photographs were commonly advertised over the smaller portrait mediums. The ambrotype and tintype were fading in popularity because they were less able to be retouched, and "Fidelity in portraiture" had become "frequently disagreeable."^{lxi} The paper processes were steadily gaining popularity.

When the Civil War erupted in South Carolina in 1861, this trend did a rapid about-face. Ambrotypes and tintypes became of even more important emotional value for families and friends to remember their loved ones that either died in battle or that were separated by the conflict. One popular story of the time told of a soldier at Gettysburg who was found dead on the battlefield clutching an ambrotype of his three children in his hand. This story touched many people and was widely reported across the

country. The identity of the fallen soldier was unknown, and the hope was that the ambrotype would help to identify him so that the image could be returned to his family. *The Saturday Evening Post* reported it as: "On the field of Gettysburg, after the battles, the dead body of a Union soldier was found, holding in his clasped hand as ambrotype picture of three children, a girl and two boys...It is hoped, however, that he may yet be identified by means of the ambrotype of his children found in his hands when his body was discovered."^{lxxi} This story embodied the importance of photographic mementos at this point in the nation's history.

Fictional stories also followed this trend of treating ambrotypes among a soldier's most valuable possessions. One stated, "I took care of his pocket-book, his wife's ambrotype and bible, and I will send them to Fredonia, Alabama, the first opportunity."^{lxxii} The ambrotype was of comparable importance as the Bible in his list of important possessions, which was significant in this age of piety. The war had renewed the cultural need for small memento-sized photographs that could withstand the rigors of battle. Portable photographic studios recognized the needs of the soldiers to create mementos of their existence when faced with their own mortality. This aspect of normal life must have been comforting to the soldiers that were living a life so different from the previous existences. The *Zion Herald and Wesleyan Journal* recognized this element and reported:

The fine arts have followed the boys from home; symbol

of the civilization that shall bloom in the trail of this sanguinary war, for yonder is an ambrotype saloon, from which gems more precious than 'pictures of silver' shall travel to distant wife, sweetheart and mother; but the rivalry of trade is not sunk in the confusion of war, and an advertisement announces that *their* pictures have not grey background, as at the other establishment.^{lxiv}

At this time ambrotypes were seen as surrogates for the presence of the person. The advertised imperishability of the process was a key element to its success during this period. Having an immortal likeness of a loved one that was likely to perish in the war was very important to people. One fictional story of the time illustrated this idea: "beneath his pillow, and drew forth a velvet ambrotype case, soled and worn...When you lay me in my grave, place this with me. In heaven we shall be united!"^{lxv} The Civil War essentially prolonged the active life of the ambrotype the same way that the ambrotype prolonged the memory of those who died in the war.

Chapter 5- Conclusion- Reflections on the Process

After the war ended, the ambrotype eventually faded from general use. At this time it also began to fade from the population's memory. The ambrotype was seldom mentioned in newspapers and journals after 1865. When it did, it was often to show how far photography had come; one such passage remembered:

Many of us can recall the shadeless, staring 'ambrotype,' successor of the earlier and still uglier daguerreotype, which preceded the first crude essays of photography. In these there was little to foreshadow the triumphs of to-day.^{lxvi}

Its ten-year popularity was not remembered; its virtues were no longer extolled. In fact, it was criticized as replacing the most perfect photographic process. The daguerreotype had already begun to reach a mythic status, fueled by nostalgia ignited by the war. This was furthered by the writings of former daguerreian artists that never forgave the ambrotype process for taking over. One such artist, Abraham Bogardus, wrote:

The daguerreotype was popular until about 1860, when the ambrotype, a collodion picture on glass, came in. Never popular, it must have been bought for its cheapness, as it was a poor black-and-white affair. The best galleries seldom made it.^{lxvii}

This statement is ironic because many of the finest galleries, such as Matthew Brady's and James P. Ball's, did offer the ambrotype. Bogardus himself was involved in litigation with Tomlinson for using the process. What is true, however, is that there were many more photographers that were exclusive to the daguerreotype. Ambrotype practitioners were more

likely to change processes with public favor and therefore did not exalt the processes' benefits after the public favor was gone.

As a result, modern historians have not written about the ambrotype with all the facts and without biased sources. For example Beaumont Newhall, one of the most influential photographic historians, only wrote one article about the ambrotype in his career and it was titled "*The Ambrotype: A Short and Unsuccessful Career*." This characterization of the ambrotype is increasingly common. Early historians often included sections about the ambrotype, as Robert Taft did in *Photography and the American Scene*. He even spoke favorably of its importance, saying, "The ambrotype, or rather the Cutting patent which covered the production of the ambrotype, led indirectly to this development (the success of paper processes)." ^{lxviii} Yet, recent textbooks, like *The Cultural History of Photography*, do not even include the ambrotype in the index.

The ambrotype has an interesting and important history, which is important to photography. It is an example of how many photographic histories remain unwritten, not because they were unimportant, but out of deep-rooted biases.

UNITED STATES PATENT OFFICE.

JAMES A. CUTTING, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN THE PREPARATION OF COLLODION FOR PHOTOGRAPHIC PICTURES.

Specification forming part of Letters Patent No. 11,213, dated July 4, 1854.

To all whom it may concern:

Be it known that I, JAMES A. CUTTING, of the city of Boston, county of Suffolk, and State of Massachusetts, have invented a new and useful Improvement in Positive Photographic Pictures on Glass; and I do hereby declare the following to be an exact description thereof.

The nature of my invention consists in the use of gum-camphor, in addition to the exciting materials, in the preparation of collodion for positive photographic pictures on glass.

To enable others skilled in the art to make and use my invention, I will proceed to describe the process, as follows:

Having prepared the collodion in the usual manner, I take a pint bottle in which I introduce twelve ounces of collodion, to which I add one dram of iodide of potassium dissolved in alcohol. I then shake the mixture thoroughly, and add thereto eighteen grains of refined gum-camphor, shaking the mixture again until the whole is combined, then allow it to settle, when it is fit for use.

The advantages of my improvement consist

in the increased vigor of the delineations of the half-tones of positive pictures on glass, giving greater depth and rotundity thereto, which renders this combination exceedingly useful for microscopic pictures, as well as the ordinary purposes of portraiture.

I would have it understood that the combination of camphor with iodide of potassium and collodion, as above specified, is adapted solely to the production of positive pictures on glass, and not to the production of negative pictures on glass, from which positive pictures on paper may be printed, as a sufficient degree of opacity is not thus afforded for that purpose.

What I claim as my invention, and desire to secure by Letters Patent, is—

The use of camphor in combination with iodized collodion, as set forth in the specification.

JAMES A. CUTTING.

Witnesses:

SAML. GRUBB,
J. REHN.

UNITED STATES PATENT OFFICE.

JAMES A. CUTTING, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN COMPOSITIONS FOR MAKING PHOTOGRAPHIC PICTURES.

Specification forming part of Letters Patent No. 11,266, dated July 11, 1854.

To all whom it may concern:

Be it known that I, JAMES A. CUTTING, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Making Photographic Pictures; and I do hereby declare that the following is a full, clear, and exact description of the principle or character which distinguishes them from all other things before known and of the usual manner of making, modifying, and using the same.

My improvements relate to that class of photographic pictures in which the pictures are obtained upon a prepared film upon the surface of glass or other substance.

The film which I employ is collodion, and in order to insure success the collodion must be prepared after my own process, as follows: Take three ounces (Troy) of pure dry nitrate potassa and pulverize in a clean glass mortar. Add to this two and one-half ounces (fluid measure) of pure sulphuric acid, and stir the mixture with a glass rod. Immerse in this liquid eighty grains of clean dry cotton and knead the mass of cotton in the liquid for about five minutes. Remove the cotton and quickly wash it till every trace of acid is gone, and it must then be dried quickly, for I have discovered that the more rapidly the cotton is dried the more sensitive the collodion; and I have found the best effects produced by displacing the water from the cotton by strong alcohol.

To prepare the collodion, take ten ounces concentrated sulphuric ether (60° Baumé) and mix this with six ounces of ninety-five per cent. alcohol. To this mixture add the prepared cotton in quantity sufficient to make a collodion as thick as it can and yet at the same time flow evenly over the surface of glass. Let it settle clear and decant the solution. In order to excite this collodion, take a deep one-ounce vial, introduce two and one-half grains of bromide of potassium, and add water, drop by drop, to make a saturated solution. In this solution dissolve two and one-half grains of iodide of potassium, then add one ounce of collodion, and shake well. Let it settle clear, and decant for use. The solution must be decanted every day.

In order to make the most sensitive collodion, I dissolve the bromide and iodide of potassium and the collodion in a saturated solution of carbonate of ammonia in water. In using this collodion pour it upon a clean glass plate to form the film in the usual way, and as soon as the collodion has set, and before it becomes dry, immerse the plate in a bath of nitrate of silver made with thirty grains nitrate of silver, two grains iodide of silver, and one ounce of water. Take the plate directly from the bath to the camera, and after sufficient exposure the plate is taken to a dark-room to develop the impression with the following solution; Take pyrogallie acid, four grains; acetic acid, No. 8, one ounce. Dissolve and filter. For use, take of this liquid one and one-half dram diluted with six and one-half drams of water, and when the impression is sufficiently developed pour off the liquid and immerse the plate in a solution of the hyposulphite of soda, four ounces to the pint of water. Wash the plate with pure water, and dry it in the usual way.

The advantages of the above process are the brief time required to produce an impression and the sharpness of the pictures. Portraits can be taken with as much facility as with the daguerreotype, and the pictures are sharp and of excellent tone. The impression thus obtained is negative, and the positive picture is produced in the usual way. I denominate this the "mezzogiaphic" process.

I do not claim the use of alcohol as a desiccating agent, but limit my claim to its special use and purpose, as herein stated.

What I claim as my improvements in the process of obtaining photographic pictures is—

1. Displacing the water from the cotton for this purpose with strong alcohol, as set forth.
2. The employment of bromide of potassium in combination with collodion.

JAMES A. CUTTING.

Witnesses:

T. CAMPBELL,
SAM'L. GRUBB.

UNITED STATES PATENT OFFICE.

JAMES A. CUTTING, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN PHOTOGRAPHIC PICTURES ON GLASS.

Specification forming part of Letters Patent No. **11,267**, dated July 11, 1854.

To all whom it may concern:

Be it known that I, JAMES A. CUTTING, of Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Photographic Pictures on Glass; and I do hereby declare the following to be an exact description thereof.

The nature of my improvement consists in the application of a coating of balsam of fir to the side of the glass on which the picture is made, over which coating I place another glass of equal size with the one on which the picture is.

To enable others skilled in the art to make and use my invention, I will proceed to describe the process, as follows:

After thoroughly cleaning a glass-plate of the same size as that on which the picture to be secured is made, and removing all dust from the picture, I hold the glass containing the picture in a horizontal position with the pictured side uppermost, then apply the balsam in a line along one edge of the glass, and placing one edge of the second glass in close contact with the edge of the first containing the balsam, press them gradually together toward the opposite edge, causing the balsam to flow by a gentle pressure toward the opposite edge, in this manner excluding all air from between the glasses, then by an even pressure exclude the superabundant balsam.

The advantages of my improvements are that by a mechanical combination of the balsam with the picture it is greatly increased in strength and beauty by an additional brilliancy and the exhibition of the most minute delineations, and by the application of the second glass, in combination with the balsam, the picture is hermetically sealed and rendered entirely permanent by being secured from the influence of both air and moisture, and also from injury by dust or other extraneous matter, or acid vapors, or any violence than what would occasion the fracture of the glass plate.

I am aware of the previous use of balsam for the cementing of lenses and the securing of microscopic objects and other like purposes, and do not therefore extend my claim to any of these uses; but

What I claim as my invention, and desire to secure by Letters Patent, is—

The combination of balsam with photographic pictures on glass, and with the additional glass, by which they, with the balsam, are hermetically sealed, as described in the specifications, and for the purposes therein set forth, and for no other.

JAMES A. CUTTING.

Witnesses:

ISAAC HELM,
SAM'L. GRUBB.

UNITED STATES PATENT OFFICE.

A. BISBEE, OF COLUMBUS, OHIO, AND Y. DAY, OF NASHVILLE, TENNESSEE.

IMPROVEMENT IN PHOTOGRAPHIC PICTURES ON GLASS.

Specification forming part of Letters Patent No. 14,946, dated May 27, 1856.

To all whom it may concern:

Be it known that we, ALBERT BISBEE, of Columbus, in the county of Franklin and State of Ohio, and Y. DAY, of Nashville, in the county of Davidson and State of Tennessee, have invented certain new and useful Improvements in Photographic Pictures on Glass; and we do hereby declare the following to be a full, clear, and exact description of the same.

The nature of our invention consists in making the edges of the coating or film on the glass transparent, so that the picture is made only on the central part of the glass and extending so far as to meet the inside edge of the mat or border generally used in putting up such pictures, and then placing the mat back of the picture.

To enable others skilled in the art to make and use our invention, we will proceed to describe the same, as follows:

We place inside of the camera, and at about one-tenth of the focal distance of the lens from the glass, a board having an aperture of any desired pattern that we wish the edges of the picture to have. This board shades the edges of the glass, thereby leaving them transparent in the picture. Then the picture, being taken in the usual manner, is finished by varnishing with transparent white varnish, and then backed with Japan varnish, care being taken to have the Japan on the back extend only to

meet the inside edges of the mat. Then we place the mat back of the picture and secure it in its place with the preserver.

If applied to the process as patented by I. A. Cutting with two glasses, the picture is made as above described, and then the second glass is applied, and finished as before by backing with Japan.

The advantage of our improvement is in having the mat protected from being soiled and making the picture appear more round, causing an illusion, as though the picture or image was suspended in the atmosphere clear from the background.

Having thus fully described the nature of our invention, what we claim therein as new, and desire to secure by Letters Patent, is—

Making the border of the picture transparent and placing the mat back of the picture, as described in the above specification, and for the purpose set forth.

A. BISBEE.

Y. DAY.

Witnesses as to the signature of Albert Bisbee:

C. A. BARKER,
WILLIAM FIELD.

Witnesses as to the signature of Y. Day:

B. BINGHAM,
W. ASKINS.

UNITED STATES PATENT OFFICE.

D. B. SPOONER AND H. B. SPOONER, OF SPRINGFIELD, MASSACHUSETTS.

MODE OF COLORING PHOTOGRAPHIC PICTURES ON GLASS.

Specification forming part of Letters Patent No. 15,497, dated August 5, 1856.

To all whom it may concern:

Be it known that we, D. B. SPOONER and H. B. SPOONER, of Springfield, in the county of Hampden, in the State of Massachusetts, have invented new and useful Improvements in Coloring Ambrotype or Photographic Pictures on Glass; and we do hereby declare that the following is a full and exact description thereof.

The nature of our invention consists in so preparing the collodion film containing the picture in alternate places with gum or other suitable material, so that a penetrating dye or pigment in a solution that will penetrate the collodion film may be deposited on any particular portion of the picture between the collodion film and the glass, in order to give it the requisite color properly distributed between the face, drapery, &c.

The following is the process adopted: After the picture is thoroughly washed and dried, proceed with a brush to cover any portion of the picture not designed to take the color with a solution of gum, or any other substance insoluble in the coloring-solution, but soluble in any other liquid in which the coloring-matter is not soluble. *e. g.*, take a solution of gum-arabic in water and apply it to a portion of the picture. Now take a solution of turmeric in alcohol and pour it upon the collodion surface of the picture, and you immediately get a deposit of the coloring-matter between the collodion and the glass. The portion of the picture covered with the gum not being penetrated by the alcohol is protected from the color, while all other portions are colored. Then, by washing the picture in water the gum is dissolved and washed off,

and the parts uncolored may remain in their natural state without color; or by applying the gum solution to the portion already colored with a part of the uncolored portion another color may be produced by the use of another pigment, in the same manner as before described. In this manner any number of colors may be produced; or when a small portion only of the picture is to be colored the whole of the picture may be colored and dried, and then that portion which is to retain the color may be covered with the gum solution, and the coloring-matter not protected by the gum may be extracted with alcohol or other solvent and the gum washed off as before.

The advantages of our invention consist in depositing the coloring-matter in its various tints on the front side of the picture, between the collodion and the glass, instead of coloring the fibers of the collodion, or the upper side of it, as is common, which does not show through to the positive side of the picture on account of the opacity of the silver deposit which forms the picture.

We do not claim the coloring of a picture all over with a single tint; but

What we claim as our invention, and desire to secure by Letters Patent, is—

The application of gum-arabic or other equivalent material, as set forth in the specification, for the purposes therein described, and no other.

D. B. SPOONER.

H. B. SPOONER.

Witnesses:

GEO. W. ADAMS,

CHAS. H. CODMAN.

UNITED STATES PATENT OFFICE.

JAMES A. CUTTING, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN PHOTOGRAPHIC PICTURES ON GLASS.

Specification forming part of Letters Patent No. 11,267, dated July 11, 1854; Reissue No. 384, dated August 12, 1856.

To all whom it may concern:

Be it known that I, JAMES A. CUTTING, of Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Photographic Pictures on Glass; and I do hereby declare the following to be an exact description thereof.

The nature of my improvement consists in the application of a coating of balsam of fir or its equivalent, or varnish, to the side of the glass on which the picture is made, over which coating I place another glass of equal size with the one on which the picture is.

To enable others skilled in the art to make and use my invention, I will proceed to describe the process as follows: After thoroughly cleaning the glass plate of the same size as that on which the picture to be secured is made, and removing all dust from the picture, I hold the glass containing the picture in a horizontal position, with the picture side uppermost, then apply the balsam in a line along one edge of the glass, and, placing one edge of the second glass in close contact with the edge of the first, containing the balsam, press them gradually together toward the opposite edge, causing the balsam to flow by a gentle pressure toward the opposite edge, in this manner excluding all air from between the glasses, then by an even pressure exclude the superabundant balsam.

The advantages of my improvement are

that by a mechanical combination of the balsam with the picture it is greatly increased in strength and beauty by imparting an additional brilliancy, and the exhibition of the most minute delineations; and by the application of the second glass, in combination with the balsam, the picture is hermetically sealed, and rendered entirely permanent by being secure from the influence of both air and moisture, and also from injury by dust or other extraneous matter, or acid vapors, or any violence less than would occasion a fracture or destruction of the glass plates. These positive pictures on glass, hermetically sealed, as above described, I denominate "ambrotypes."

I am aware of the previous use of balsam for the cementing of lenses and the securing of microscopic objects and other like purposes, and do not, therefore, extend my claim to any of these uses; but

What I claim as my invention, and desire to secure by Letters Patent, is—

The combination of balsam or its equivalent with positive photographic pictures on glass, and with the additional glass, by which they, with the balsam, are hermetically sealed, as described in the specification, and for the purposes therein set forth, and for no other.

JAMES A. CUTTING.

Witnesses:

JOHN REHN,
M. WRIGHT,

Endnotes

ⁱ Michel Frizot, *The New History of Photography*, (Koln: Konemann, 1998), 92.

ⁱⁱ *The Independent*, November 15, 1855.

“Caution - The term Ambrotype was originated as a trade mark to designate our patent pictures, which are hermetically sealed by fir balsam, or its equivalent cement, between two glasses or another plate. Any application of this term to pictures on single glass plates is therefore an infringement of our rights (injures our business) and involves the user in liability for damages. Boston, September, 1855 CUTTING & BOWDOIN, Proprietors of the Ambrotype Patent “

ⁱⁱⁱ *The Photographic and Fine Arts Journal* 9, no. 10 (October 1856), 320.

^{iv} *Ibid.*; *Ambrotypes* (March 1857), 77-78.

^v M. H. Ellis, *The Ambrotype and Photographic Instructor or, Photography on Glass and Paper* (Philadelphia: M.H. Ellis, 1856), 70.

^{vi} *Ibid.*

^{vii} Beaumont Newhall, *The History of Photography* (New York: The Museum of Modern Art, 1964).

^{viii} Luis Nadeau, *Encyclopedia of Printing, Photographic, and Photomechanical Processes*, Vol.1. A-L (Fredericton, N.B., Canada: Atelier L. Nadeau, 1994), 28.

^{ix} Edward M. Estabrooke, *The Ferretotype and How to Make It* (Hastings-on-Hudson, NY: Morgan & Morgan, Inc., 1972),

^x Vivien Raynor, “Two Shows With Links to the Past,” *The New York Times*, Jun 13, 1993.

^{xi} Nadeau, 28.

^{xii} *Ibid.*, 71.

^{xiii} Nathan Burgess, *The Photograph and Ambrotype Manual: A Practical Treatise on the Art of Taking Positive and Negative Photographs on Paper and Glass*. (New York: Wiley & Halsted, 1858).

^{xiv} Robert Taft. *Photography and the American Scene: A Social History, 1839-1889*. (New York: The Macmillan Company, 1942), 129.

^{xv} United States Patent Office, July 4, 1854, Patent No. 11,213.

^{xvi} Ellis, 74.

^{xvii} M. A. Root, “Photographic Patents,” in *The Photographic and Fine Art Journal* (Feb. 1856), 60-61.

^{xviii} *Ibid.*

^{xix} United States Patent Office, July 11, 1854, Patent No. 11,267

^{xx} Henry Hunt Snelling, *Photographic and Fine Arts Journal* 9, no. 5, (May 1856), 158-160.

“Our remarks in our last issue have called forth the following additional evidence in regard to the originality in the use of balsam of fir for photographic purposes, as claimed by the patent. This letter, together with the evidence of Mr. Perry, seems to knock away the only prop by which the Ambrotype patent could have been sustained. We have been further informed, that the term “*Ambrotype*” was not original with the patentee; but was suggested to him by Mr. Root, of Philadelphia. While on this subject we must reply to several allegations that have been made against us, in consequence of the position we have assumed in regard to this patent. We therefore wish it distinctly understood, that we never have had any cause for opposing Mr. Cutting, except in the belief that he was not justly entitled to a patent in the use of bromides in his positive process, -- and it was on this ground only, that we first became inimical to his interests, -- but subsequent investigation convinced us also that he was mistaken in thinking himself the originator of the use of balsam in sealing two glasses together in the manner specified in his patent; and we think the letter of Mr. Langenheim settles that point conclusively.

^{xxi} M.P. Simons, "The Cutting Patent," *Photographic and Fine Arts Journal* 9, no. 8, (Aug. 1856), 187.

"It appears that these patent right or rather patent wrongs men, are not satisfied yet, but talk of bringing the matter up again, to be tried before Chief Justice Taney, who will sit in this city next May. I have no fears of the result." ... He (Judge Taney) has said on a former occasion that a principle cannot be patented, and what is it but a principle they are contending for?" ... "I don not use balsam—and they admit it—but still they say that I infringe, when in fact balsam is the only thing that belongs to them according to there own claim." "I use varnish which is superior to balsam, for if I thought balsam the best, I would not hesitate to recommend it, as I believe it to be public property... There is no doubt but what the whole patent is an imposition upon the public. I deny that it is novel. Mr. Cutting admits that microscopic slides and lenses have been sealed with balsam, but remains perfectly silent about upon the subject that daguerreotypes have also been sealed with balsam in a similar manner, a fact which I proved in court to the satisfaction of all except the patent man and his council, by a little book called "Hints on the Daguerreotype" published in 1853 - Carey & Hart, Philadelphia..." It is not a lamentable fact that we have no Hardwicks, Paynes, Archers, and many others who have so liberally given their time and experience to the public "without money and without price."

^{xxii} *The Independent*, November 15, 1855.

^{xxiii} Root, *Photographic and Fine Arts Journal* 9, no. 2 (Feb. 1856), 60-61.

^{xxiv} United States Patent Office, July 11, 1854, Patent No. 11,267. reissued August 12, 1856 No. 384

^{xxv} *Ibid.*

^{xxvi} Ellis, 76.

^{xxvii} *The Independent*, November 15, 1855.

^{xxviii} United States Patent Office, July 11, 1854, Patent No. 11,266.

^{xxix} *Ibid.*

^{xxx} Ellis, 75-76

^{xxxi} Ellis, 77

^{xxxii} Ellis, 78.

^{xxxiii} *Photographic and Fine Arts Journal* 11, no. 11 (Nov., 1858), 350-352.

^{xxxiv} *Photographic and Fine Arts Journal* 13, no. 3 (Feb., 1860), 56.

^{xxxv} Ellis, 9-10.

^{xxxvi} *Ibid.*, 10.

^{xxxvii} Cutting was committed to a Worcestor, MA asylum, where he died.

^{xxxviii} Simons, "The Ambrotype Patent."

^{xxxix} Burgess, 2.

^{xl} Burgess, 22-23.

^{xli} Nathan Burgess, *The Photograph and Ambrotype Manual: A Practical Treatise on the Art of Taking Positive and Negative Photographs on Paper and Glass*. (New York: Wiley & Halsted, 1858).

In this publication the same process is referred to as a stereoscopic ambrotype. Due to confusion surrounding the term stereoscopic, I will be using the generally accepted term *relievo* in its place.

^{xlii} "Recent American Patents," *Scientific American* 40, no. 39 (Jan. 1856).

^{xliii} Burgess, 18.

^{xliiv} Advertisements, *The Albion*, Oct. 6, 1855.

^{xli v} *National Era* 11, no. 522 (Jan., 1857).

^{xli vi} Advertisement, *The Independent*, Nov. 15, 1855.

"AMBROTYPES-- An entirely new style of Pictures and the finest in the World. (See Crystal Palace Fair.) They were introduced and patented by Mr. Cutting, and I hold the exclusive rights to make them in this city. A number of artists advertise their single glass or varnished pictures as ambrotypes: but it is a deception. They dare not hermetically seal

or stamp their pictures patent. Twenty dollars reward will be paid for an ambrotype made by and sold at any other gallery in the city. WM. A. TOMLINSON, No. 373 Broadway."

^{xlvii} Vivien Raynor, "Two Shows With Links to the Past," *The New York Times*, Dec. 9, 1858, 2.

^{xlviii} "Photo-sculpture," *Scientific America* 16, no. 11 (March, 1867).

^{xlix} Advertisement, *New York Daily Times*, Sept, 18, 1856.

ⁱ O. M. E. Rowe, "A Chat About Current Art in Boston," *Congregationalist*, Mar. 28, 1895.

ⁱⁱ "Fine Arts," *The Albion*, Sept. 22, 1855.

"...what we have to say respecting the Ambrotype, the most recent and by far the most perfect of those processes, which are mechanical and chemical alone. By it, the human face is transferred to glass, with a combined power and delicacy hitherto unattained. This Ambrotype is as great an advance upon the original Daguerreotype, as is the skillfully hand-coloured Photograph upon nineteen-twentieths of bedaubed portraits in oil."

^{lii} "Scientific," *New York Observer and Chronicle*, Feb. 21, 1856.

^{liii} *New York Observer and Chronicle*, Oct. 23, 1856.

"A careful calculations shows that but a short time ago there were one hundred and fifty daguerreotype rooms in the city, employing, on an average, five persons; but now, by the introduction of new processes, not easily attainable, many of the old operators are irretrievably ruined. The finer texture and subdued coloring of the plate glass ambrotype led to the relinquishment of the metallic plate, so that an unnatural glare of the latter was avoided, the effect produced being more like that of a fine engraving; nor is the image reversed, as in the daguerreotype. Another advantage is, that the impression is taken instantaneously, so that the features are not disturbed by fatigue or impatience. The photograph is another process much in use, which approaches more to the old style of miniature painting, the pencil being employed to a considerable extent, though the lineament and general impression are conveyed by optical apparatus, as in the ambrotype, except that the paper is substituted for a plate of glass. So completely have those new processes superseded the old, that one of the largest operators, who formerly took fourteen or sixteen daguerreotype likenesses per day, now scarcely average two a week; yet the business has so increased as to require the constant service of twenty-five men, and some of the artist receive as high as fifty dollars per week. It is seldom that so complete and so sudden a revulsion occurs in any branch of business."

^{liiv} Edward M. Estabrooke, *The Ferreotype and How to Make It* (Hastings-on-Hudson, NY: Morgan & Morgan, Inc., 1972), 22, 32-33.

"The Ambrotype would probably be equal to the Daguerreotype in all points but for its lack of brilliancy caused by the absorption of light by collodion film and the glass upon the picture is made."

"The ambrotype, which at that time held the field, was not calculated for a very extended usefulness, from the heavy, brittle nature of the substance (glass) on which it was made...There are so many contingencies under which its value to the owner might become incalculable, not in money or other earthly dross, but as the last memento of one, in whose existence might have centered the hopes and aspirations of many tender hearts."

^{lv} In 1857, *New York Monthly Magazine* printed a fictional story, which stated, "I will tell you (in the strictest of confidence) that I have now before me an ambrotype, and in its soft lines, the quiet eyes, the broad, smooth forehead, the firm yet gentle mouth, I see such a character. I would rather look at this poor reflection of a woman's face than at the best of Durand's sunsets or Kensett's running brooks."

^{lvi} Tomlinson & Co., "The Brooklyn Conference," *The Independent*, Oct. 2, 1856.

"By the new process entire precision of outline and naturalness of feature and expression are secured, while at the same time, a tone of softness is diffused over the picture from the more graceful effect of light and shade upon the surface of glass. Moreover two pictures are obtained from one impression; i.e. the face of the glass exhibits the sitter as he sees himself in a mirror, while the reverse shows him as he appears to others. The latter is a very great advantage over either the daguerreotype or the photograph. These always

present a reversed picture, more natural to the eye of the subject himself than to others; but the ambrotype gives both the mirror face and the natural face. It thus enables us "to see ourselves as others see us."

^{lvi} *The Ohio Cultivator*, TBA

^{lviii} Taft, 126

^{lix} *Scientific American* 7, no. 1 (Jan. 3, 1857), correspondence section.

"It is nothing new to place a daguerreotype or ambrotype of deceased persons in their tombstones. This custom has been practiced to a considerable extent in this section."

^{lx} "The Rogues Portrait Gallery," *The New York Times*, Jun. 7, 1858.

"a collection of ambrotype "counterfeit presentments" of the most noted criminals who have brought themselves within the ken and custody of justice, is kept on exhibition for the public good."

^{lxi} "Fine Arts," *The Albion*, Sept 22, 1855, 14, 38.

"The daguerreotype itself, while its importance and advantage are conceded, has failed—in its general application—to support its claim to anything beyond mere mechanical excellence. The photograph, however demands attention from a different point of view, and advances reasonable and well supported claims to a recognition among the other aesthetic features of the day...Herein is the essential difference between a Photograph and a Daguerreotype. The latter is instantaneous, irrevocable, and mechanical; the former embodies the same rapidity of production and general truthfulness, while permitting the higher graces of artistic adornment, through the medium of water colors." ... "Again the primary principle of the Photograph is truth. Fidelity in portraiture is frequently disagreeable; but the general effect of severe and inexorable reality will be super induce a more decided adherence to that quality, on the part of the artist."... "We must postpone to another opportunity what we have to say respecting the Ambrotype, the most recent and by far the most perfect of those processes, which are mechanical and chemical alone. By it, the human face is transferred to glass, with a combined power and delicacy hitherto unattained. This Ambrotype is as great an advance upon the original Daguerreotype, as is the skillfully hand-coloured Photograph upon nineteen-twentieths of bedaubed portraits in oil."

^{lxii} *The Saturday Evening Post*, Oct. 31, 1863.

^{lxiii} "Diary of Robert E. Park, Macon, Georgia, late Captain Twelfth Alabama Regiment..." Southern Historical Society, South Historical Society Papers (1876-1905, 1, 5: APS Online pg. 370.

^{lxiv} *Zion's Herald and Wesleyan Journal*, Jan 20, 1864.

^{lxv} Lottie Linwood, "Annie Linn, The Soldier's Bride," *Flag of Our Union*, Jan 21, 1865.

^{lxvi} Helen Everston Smith, "Work Indoors and Out," *The Independent*, Nov. 5, 1896, 48.

^{lxvii} Abraham Bogardus, "The Lost Art of the Daguerreotype," *Century Illustrated Magazine* 68, no. 1 (May 1904).

^{lxviii} Taft, 129.

BIBLIOGRAPHY

Burgess, N. G. *The Photograph and Ambrotype Manual: A Practical Treatise on the Art of Taking Positive and Negative Photographs on Paper and Glass*. New York: Wiley & Halsted, 1858.

Ellis, M. H. *The Ambrotype and Photographic Instructor or, Photography on Glass and Paper*. Philadelphia: Myron Shew, 1856.

Estabrooke, Edward M. *The Ferrottype and How to Make It*. Hastings-on-Hudson, NY: Morgan & Morgan, Inc., 1972.

Feldvebel, Thomas. *The Ambrotype, Old & New*. Rochester, NY: Graphic Arts Research Center, Rochester Institute of Technology, 1980.

Jensen, James S. "Cutting's Edge." *The Collodion Journal* 5, no. 19 (Summer 1999), 1-2.

Johnson, William. *Nineteenth-Century Photography: An Annotated Bibliography 1839-1879*. Boston: G. K. Hall & Co., 1990.

Nadeau, Luis. *Encyclopedia of Printing, Photographic, and Photomechanical Processes*. Vol. 1.

Newhall, Beaumont. "Ambrotype, a Short and Unsuccessful Career." *Image* 7, no.8 (Oct. 1958), 171-177.

Newhall, Beaumont. *History of Photography from 1839 to the Present*. New York: Museum of Modern Art, 1964.

Schimmelman, Janice G. *American Photographic Patents 1840-1880: The Daguerreotype & Wet Plate Era*. Nevada City, CA: Carl Mautz Publishing, 2002.

Taft, Robert. *Photography and the American Scene: A Social History, 1839-1889*. New York: The Macmillan Company, 1942.