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## **Building the Patent Knowledgebase With Life-Size Patent Models**

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### **What's Been Lost**

Teasing out the evidence from inventors' drawings, descriptions, and claims in patent records is something librarians at Patent and Trademark Resource Centers do with expertise and pride. Another important source for our understanding of inventions, the patent models illustrating the function of an invention, were created and submitted with patents between 1790 and 1880.<sup>1</sup> The models show the invention in three dimensions (maximum size allowed: 12" x 12" x 12") and even include some working parts.

Although some models were entirely made of wood, or nearly so, most used the expertise of a metalworker<sup>2</sup>, a challenge for those whose inventive wealth was in ideas, not bank accounts or metal shops. However, the models made the inventor's ideas clearer to those not fluent with technical drawings and descriptions.<sup>3</sup> Technology historians and patent researchers get a better appreciation of the inventive concept. Beyond the technology of inventions, social scientists can see the evolution of family life and community culture as features were developed to address the needs of users, and manufacturing and marketing illustrated the business climate of the time.

Sadly, the Patent Office's collection of models was decimated by accident (fires in 1836<sup>4</sup> and 1877<sup>5</sup>). A small portion of the collection was salvaged and restored, but most were destroyed. Those losses were compounded by the resulting loss of interest in the remaining models and corresponding decision to move them off site.<sup>6</sup> The final blow came with the impulse to declutter by selling nearly all patent models at auction in the early part of the twentieth century<sup>7</sup>.

Fortunately, thanks to the persistence of a few philanthropic patent enthusiasts, a significant sample of these models has been recovered. Ann and Alan Rothschild

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<sup>1</sup> Robert H. Berry, "Patent Models—A Distinctively American Approach to Specifying Inventions.," proceedings of USPTO-PTRCP Webinar (2016), sl. ## 3 and 4; Kenneth W. Dobyns, *The Patent Office Pony: A History of the Early Patent Office* (Fredericksburg, VA: Sergeant Kirkland's Museum and Historical Society, 1994).

<sup>2</sup> Alan Rothschild and Ann Rothschild, *Inventing a Better Mousetrap: 200 Years of American History in the Amazing World of Patent Models* (San Francisco: Maker Media, 2016), pg. viii.

<sup>3</sup> Berry, "Patent Models", sl. 5.

<sup>4</sup> Dobyns, *Patent Office Pony*, 107-109; B. M. Frederico, "The Patent Office Fire of 1836," *Journal of the Patent Office Society* 19 (November 1937): 804-33.

<sup>5</sup> Dobyns, *Patent Office Pony*, 184-192.

<sup>6</sup> Berry, "Patent Models," sl. 11 and 12.

<sup>7</sup> Dobyns, *Patent Office Pony*, 200.

collected a wide range of patent models and maintained a private museum for many years<sup>8</sup>. Their newly published catalogue of their collection, *Inventing a Better Mousetrap*, gives us images of hundreds of these models, together with biographical and historical annotations.<sup>9</sup> For those ready for a challenge, readers can test their skill identifying 25 patent models. There are also detailed instructions for replicating six models.<sup>10</sup> Recently, the Rothschilds arranged for the collection to be housed in a more accessible location, the Hagley Museum in Greenville, DE, the former site of the gunpowder works founded by E. I. du Pont in 1802.

## **What Can Be Found**

How can we expand this small set of patent exemplars? Let us combine the rich database tools now available with our trained eyes and knowledge of patent records. Many full-size versions of patented inventions remain: in museums, in barns, in back rooms of factories, and attics and basements of homes. If we, the librarians at the nearly 100 Patent and Trademark Resource Centers, make it our philanthropic plan, we can identify hundreds, perhaps thousands of these inventions, now in limbo. An enhanced database of the exemplars can match them to their location, the corresponding patent, the manufacturer, and the history and marketing of the invention.

How do we find these exemplars? How can we match them to patents, particularly those that pre-date reliable full-text searching? Some may be in your barn, attic, or office. But the richest source is undoubtedly museums and historical societies of all sizes. What is needed is the trained eye of IP librarians to spot a model (in a display, in a news story, report, or local history resource). When you pass by an older, curious device, do you look for the imprint “Patent No. \_\_\_\_\_” or “Patent Pending” or “Patented month/day/year”? Have you seen a patent referenced or displayed in connection with an exhibit or story on an inventor? Let your analytical and research knowledge get hooked with these leads. The invention and the patent often travel in pairs, so ask museum or library staff if the “other half” is in the collection.

## **Found Along My Travels**

One early trophy on my patent safaris was at a museum that had both the patent and the patented object. I had made an appointment with the archivist at the Litchfield Historical Museum Archives to see an original patent<sup>11</sup> in their collection. I noted the dates of application and grant, the inventor’s name, and the description of the invention. After I completed my document examination, the archivist helpfully asked “Would you like to see one of the molds [as described in the patent]?” My jaw dropped – I was in PTRC heaven!

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<sup>8</sup> Rothschild, *Inventing*, 8-11.

<sup>9</sup> Rothschild, *Inventing*, 269-270.

<sup>10</sup> Rothschild, *Inventing*, 234-268

<sup>11</sup> Myron Norton, Improvement in the Mould for Pressing Pine Apple Cheese, [U.S. Patent], issued October 13, 1810.



*Figure 1 – Pineapple Cheese Mold<sup>12</sup>*

On the other side of the continent, in the Olympic Peninsula's Lake Quinault National Forest, I reeled in an easy patent-catch. Hundred-year-old inventions were frozen in time in the village's museum. An unusual musical instrument was featured, displayed alongside the original patent – no complex patent research required. The “ukelin” is a stringed instrument combining the strumming of a ukulele with the bowed playing of a violin.<sup>13</sup> Although the inventor gave his residence as Boston, MA, in the patent, other museum exhibits demonstrated the work of some dedicated music teachers in the community, which might explain the inclusion of the ukelin in local life.

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<sup>12</sup> Gregg Mangan, "ConnecticutHistory.org," ConnecticutHistory.org The Story of Pineapple Cheese Comments, section goes here, accessed September 15, 2015, <http://connecticuthistory.org/the-story-of-pineapple-cheese/>.

<sup>13</sup> Paul F. Richter, Stringed Musical Instrument, US Patent 1,579,780, filed December 3, 1924, and issued April 6, 1926.



*Figure 2 - Ukelin*

This brought to mind my son's History Day project centering on the Spencer Repeating Rifle<sup>14</sup>, a Connecticut invention that played a significant role in the Civil War. He had examined and photographed one of the rifles in the collection of the Connecticut Historical Society Museum. Searching the USPTO databases, I found Spencer's series of patents, beginning in 1860.

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<sup>14</sup> C. M. Spencer, Improvement in Self-loading Fire-arms, US Patent 27,393, issued March 6, 1860.



*Figure 3 – Spencer Repeating Rifle<sup>15</sup>*

On a casual trip to the Morrill Homestead, Strafford, Vermont, I inspected some of the nineteenth century inventions that had remained frozen in time in the home, barn, and carriage house. They included a patented washing machine, fluting iron, and horse-powered treadmill. Tantalizingly, they were marked – some with patent dates, some with patent numbers, some with names. Using these clues in the USPTO databases and Russ Allen's Directory of Machine and Tool Patents category searches, I found the corresponding patents.



*Figure 4 – Fluting Iron*

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<sup>15</sup> "A .50 Rimfire Spencer Patent 'm. 1865' Repeating Service Carbine, C.1865 (Wood & Metal)", digital image, Credo Literati, 2014, accessed March 4, 2016, [http://0-literati.credoreference.com.enterprise.sacredheart.edu/content/entry/bridgemanchris/a\\_50\\_rimfire\\_spencer\\_patent\\_m\\_1865\\_repeating\\_service\\_carbine\\_c\\_1865\\_wood\\_andamp\\_metal/0](http://0-literati.credoreference.com.enterprise.sacredheart.edu/content/entry/bridgemanchris/a_50_rimfire_spencer_patent_m_1865_repeating_service_carbine_c_1865_wood_andamp_metal/0)

This device, on a table in the kitchen of the Morrill home, was identified as an iron used for crimping fabric to make pleats. The markings cast into its base showed the patent date of “November 2, 1875.” Happily, that is one of the U.S.P.T.O. searchable fields for patents prior to 1976; but that produced 298 patents. As interesting as it would be to peruse the patent images for each, Russ Allen’s DATMAP database helped to narrow my focus. Patents can be sorted by “class” (the type/application of the tool or machinery) and “category” (subdivisions of the class), “type” (subdivisions of the category), and “subtype” (subdivisions of the type). I explored the classes household, household machines, and household tools. Under this last group, I discovered the category described as “fluting iron,” a phrase not commonly used in clothing care now.

The database lists exactly one patent in the “fluting iron” category<sup>16</sup>. Unfortunately, the 1866 date places it nearly 10 years earlier than my example. Still, there is gold to be mined in the earlier patent. The older patent number provides access to the patent drawings and the USPC and CPC classifications. The images make clear that that the 1875 invention is of the same nature as the earlier one.<sup>17</sup> The official classification codes in the 1866 patent (USPC: 223/32; CPC: D06J 1/00) can be used to filter the date search results. Both lead directly to Hermann Albrecht’s 1875 invention. In some cases, the terminology found in related patents can be a valuable tool in further research.



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<sup>16</sup> Susan R. Knox, Improvement in Fluting Machines, US Patent 59,913, issued November 20, 1866.

<sup>17</sup> Hermann Albrecht, Improvement in Fluting Machines, US Patent 169,327, filed April 6, 1875, and issued November 2, 1875.



*Figures 5a, 5b & 5c – Horse-powered Treadmill*



The treadmill shown above was located in a barn at the Morrill homestead. Experience teaches that the “unofficial” information that inventors, manufacturers, and vendors wrap around devices can be confounding: letters and numbers can be worn away, difficult to read, or just plain dead ends. For example, the horse-powered treadmill is boldly lettered with the name “A.W. Gray and Sons.” Unfortunately, patents from the “horse-powered” days are not indexed by inventor’s name, city, or state; the classifications (USPC: 185/15, 185/16) that were retroactively appended to the records will produce a rather large hit list for “horse-powered” inventions (36 and 148 patents, respectively).

Once again, DATAMP makes efficient connections, providing sorted lists by class and category (propulsion and energy / animal powered apparatus), with A.W. Gray’s name occurring three times among the 52 listed patents. The 1842 patent specifications highlight the portability of the treadmill, being composed of parts that can be separated for ease of transportation to a worksite. The DATAMP “Manufacturers Index” entry for the company, A.W. Gray’s Sons, collects historical information, the manufacturer’s patent portfolio, available photographs, machine information, etc. Google Advanced Patent Search led to other patents by founder A.W. Gray and others in the family business, where horse power was the engine for lumber operations and threshing.

Some old-time inventions continue to be sought after by collectors, with “fan” pages illustrated with photographs, catalogues, and sales posters for the item. Frequently, exemplars are offered for sale on these websites. Aficionados point out the improvements made between various models, the quantities produced and sold, and the features that led to their commercial success (or lack thereof).



*Figure 6 – Refrigerator*

This White Frost icebox is another item in the Lake Quinnault [WA] Museum collection. The remote area on the Olympic Peninsula was late to the electrification party. Logging camps, mountain cabins, and some Native American homes are “off the grid.” Unpredictable weather and environmental challenges can shut off power even in commercial areas. Thus, the White Frost icebox still has its fans. If Steve Jobs had designed iceboxes, this might have been his: clean cylindrical exterior, with turntable shelves, allowing fast access to all the items inside through a smaller door, thereby keeping everything cooler longer. However, the cube-shaped ice blocks didn’t match the sleek round shape of the White Frost, necessitating custom chiseling to fit the ice box before it could be used.

Identifying the corresponding inventor (Charles Boeck) and patent<sup>18</sup> was aided by information gleaned from the museum exhibit, museum staff, and public fan websites<sup>19</sup>.

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<sup>18</sup> Charles H. Boeck, Design for a Refrigerator, US Patent D38,237, filed April 18, 1906, and issued September 11, 1906.

<sup>19</sup> "The White Frost Refrigerator: Unique 100-year-old Icebox," Home Things Past, section goes here, accessed January 10, 2016, <http://www.homethingspast.com/vintage-white-frost-refrigerator/>.



*Figure 7 – Blickensderfer Model 7 Typewriter*



*Figure 8 – American Typewriter*

These two early typewriters were part of an exhibition, primarily of Hollywood costumes, hosted by Boscov's department store. The Blickensderfer<sup>20</sup> introduced a cylindrical wheel<sup>21</sup> with the various letters embossed on it, thus preventing the simultaneous striking and jamming of multiple keys, 70 years before the IBM Selectric's typeball with a similar rationale. The letter arrangement on the keyboard placed the highest-frequency letters (**DHIATENSOR**) on the home row to allow faster typing. Compare this to the Dvorak keyboard arrangement<sup>22</sup>. Finding the corresponding patent wasn't simple, given the large number of patents obtained by George Blickensderfer. The model number, features, and layout, matched to historical society and fan website information, helped focus the search and provided information about the evolution of the typewriter market as well as typewriter manufacturing.

The second typewriter shown above is referred to as an "index typewriter," typing with a single key after the user moves a selector to the desired letter. The simplified mechanism made the machine lighter weight and, more importantly, significantly less expensive. At the time, only the very wealthy and larger businesses could afford traditional typewriters. The typewriter fan websites found for the Blickensderfer machines led to more information about the American Index No. 2, including the inventor's name (Louis Valiquet), the patent number, the manufacturer, and some marketing strategies.<sup>23</sup>



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<sup>20</sup> Paul Robert, "Blickensderfer 7," The Virtual Antique Typewriter Museum: Keyboard Typewriters, section goes here, accessed March 09, 2016, <http://www.typewritermuseum.org/>.

<sup>21</sup> George C. Blickensderfer, Type-wheel for Type-writing Machines, US Patent 432,296, filed July 5, 1889, and issued July 15, 1890.

<sup>22</sup> August Dvorak and William L. Dealey, Typewriter Keyboard, US Patent 2,040,248, filed May 21, 1932, and issued May 12, 1936.

<sup>23</sup> Greg Fudacz, "American Index," The Antikey Chop Typewriter Collection, section goes here, accessed March 09, 2016, <http://www.antikeychop.com/#!american-index-no2/c8pj>.



*Figure 9a & 9b – Washing Machine*

The large number of patents for “washing machines” granted in the nineteenth century (e.g., U.S. Patents 48,596, 50,638, 90,416, 169,397, 359,161, 380,814, 455,401, 807,913, and even 162,380 – issued to a different Hampton for a different machine) gives a measure of the time and difficult work required for this chore. Not surprisingly, Sen. Justin Morrill equipped his home with the latest in this technology, another trophy in my patent safari. It was only later, when I examined the photographs I’d taken of the inscription on the side of the machine did I decipher the name: “Hampton Washing Machine” – was this a long-lost relative? Not a close one, at least, since my father’s family emigrated from Scotland in the late 1800’s, with my father the first born in the United States. Perhaps this was a branch of the family that had come over earlier and wrote back about the land of opportunities, where an inventor’s hard work and creative mind could lead to an official United States Patent!

The search for the family connection must wait for another day. So far, my search for the “patent pending” which seems to be referenced on the side of the machine has not found a definite match. The drawing and descriptions for these and other patents with the USPC classification codes “68/31”, “68/80”, and “68/232” don’t match the machine at the Morrill homestead. “Hampton” is not among the inventors’ names in the DATAMP grouping household appliances / washing machines. The location stamped on the

machine (“Cincinnati, O.”) hasn’t helped me connect with the patent so far. Steve Headley, a librarian at the Cincinnati Public Library, used a late nineteenth century directory to locate the name “William E. Hampton Co.,” possibly the manufacturer.<sup>24</sup>

The Hampton machine is mentioned in multiple stories in the *Holt County Sentinel*, an Oregon, MO, newspaper in the Library of Congress’s Chronicling America digital newspaper collection. Another washing machine inventor apparently challenged the representative of the Hampton Washing Machine to a “Grand Washing Competition,”<sup>25</sup> suggesting that the device was widely distributed. The articles about the completion between the Kunkel machine and the Hampton machine identify the latter as being represented by a William Forney. However, that name has also failed to lead to a patent. One washing machine patent’s drawings are tantalizingly similar to the construction seen in the item at the Morrill homestead; however, that inventor’s name and residence (Iowa) could not be directly connected to the object from the markings visible in the photograph.<sup>26</sup> Patent librarians can help close the loop if other exemplars and related documents are located.

### ***The Next Steps***

Of course, a great deal of biographical and historical material has been published about our most famous patent holders: Whitney, Edison, Tesla; but a rich part of our inventive history has been buried by the sands of time. Thus it is here that I invite the reader to take up the challenge: collect photographs (360° panorama if possible) and inventor and patent information for patent exemplars “in the wild.” If there is sufficient content and interest, a useful database could be developed for the use of historians and researchers.

What else can a searcher do? Is there an archivist or expert familiar with the inventor or invention? Can you link to the manufacturer, perhaps still in business, perhaps with historical records? A basic Google search may lead to postings by local historians or records keepers that can help. Some state history nonprofits or offices may have relevant paper or electronic records. Your own knowledge of local geographies, manufacturers, and family names and relationships can provide the missing link. After these local resources have been consulted, productive use can be made of the USPTO databases and other patent searching tools such as Google Advanced Patent Search and the Directory of Tool and Machinery Patents. PTRCs are also a logical tool with which to link trademarks to inventions. In an article<sup>27</sup> in the previous volume of *PTRCA Journal*, Rob Berry, our PTRCP Fellowship Librarian, describes some of the early patent publications available online, useful in identifying patents, trademarks, and inventors.

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<sup>24</sup> Steve Headley, "Hampton Washing Machine Co.," telephone interview by author, March 10, 2016.

<sup>25</sup> "[Grand Washing Machine Contest]," *Holt County Sentinel (Oregon, MO)*, accessed March 27, 1874, <http://chroniclingamerica.loc.gov/lccn/sn85034039/1874-03-27/ed-1/seq-3/>.

<sup>26</sup> Timothy Allen, Improvement in Washing Machines, US Patent 169,397, filed October 2, 1875, and issued November 2, 1875.

<sup>27</sup> Rob Berry, "Researching the Early History of the Patent Policy: Getting Started," *PTRCA Journal* 25 (2015): pg. #, <http://ptrca.org/newsletters/2015/berry>.

Your library may have additional resources, such as government documents and newspaper archives.

The examples above illustrate the many ways that inventions influenced (or were influenced by) local and national history, becoming significant primary source research material. By combining our sightings of “endangered species” of patented inventions with patent records and background information, we can fulfill significant missions of the PTRC library system: to disseminate patent information and to support the intellectual property needs of the public.

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NOTE: Except as otherwise noted, all images in this article were produced by and are the property of the author. In addition to patents cited in this article, related patents are included below to aid the reader in understanding the search and matching process.

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