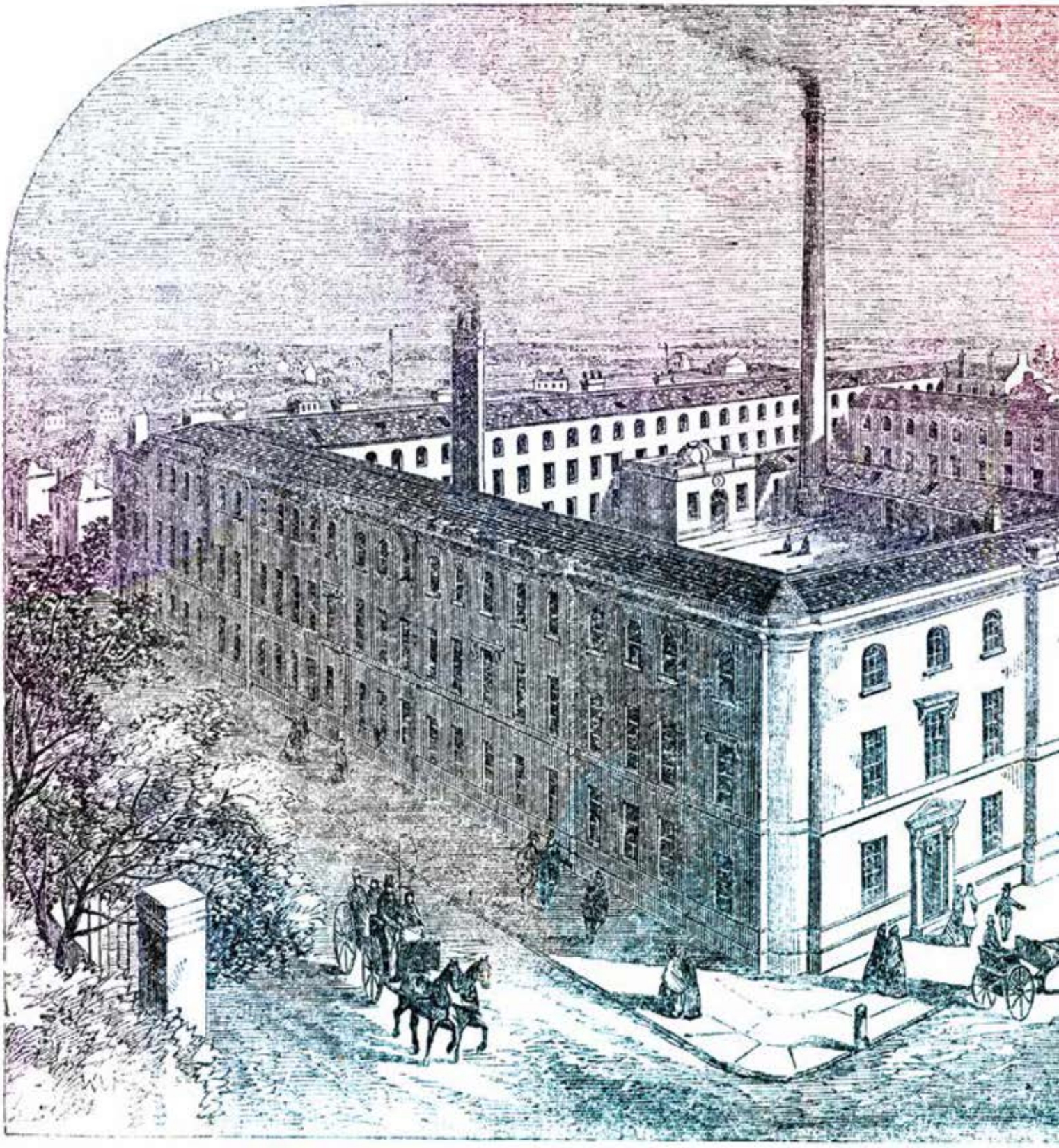
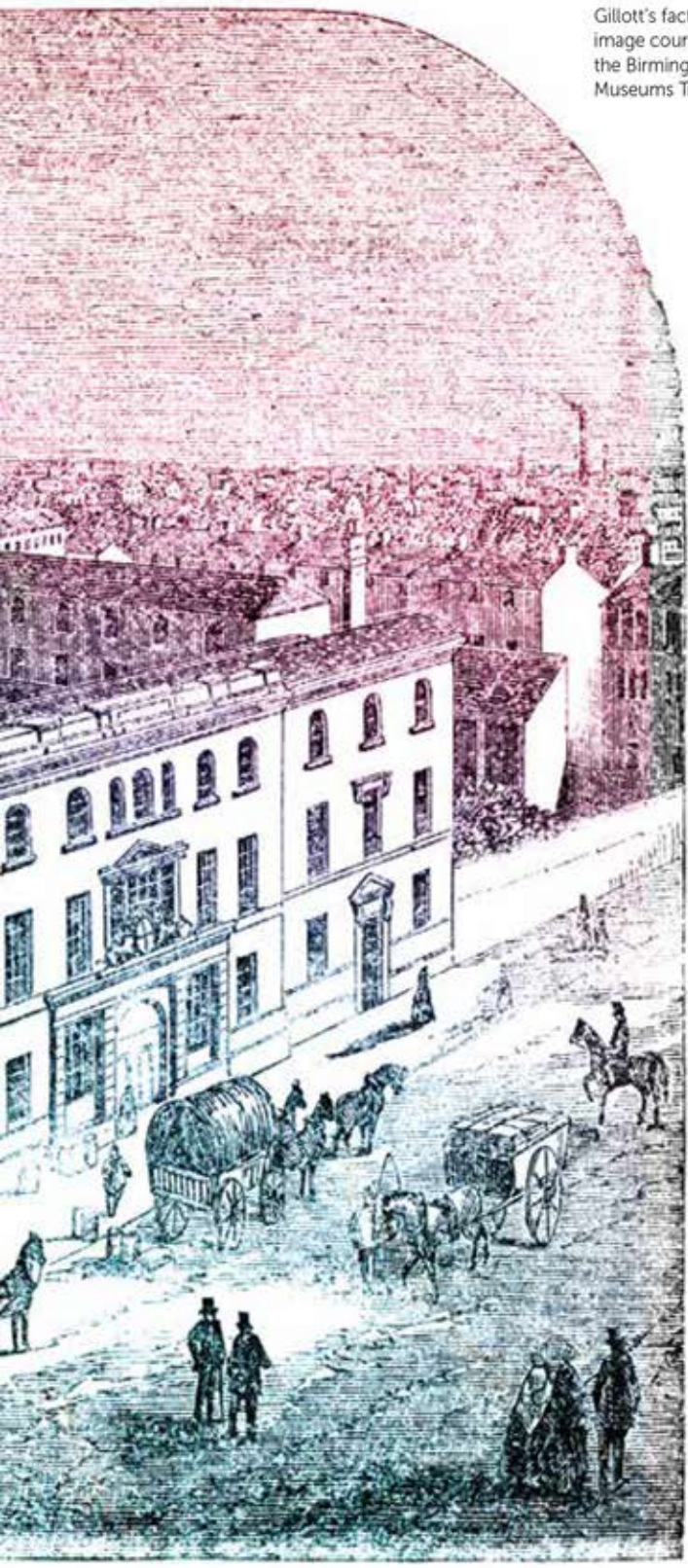
The Industrialization of
The Steel Pen Trade



PART 3: INSIDE A STEEL PEN FACTORY

BY ANDREW MIDKIFF

ANDREW MIDKIFF CONTINUES HIS ARMCHAIR TOUR OF AN 1860S-ERA STEEL PEN FACTORY.



Gillott's factory: image courtesy of the Birmingham Museums Trust

In the last issue, our tour took us through the first eight steps: from preparing the steel through hardening and scouring. The nibs are formed, but they are not usable...yet. Some of the most precise and difficult work still lies ahead.

STEP 9: TEMPERING

The pens are now very hard and cleaned of their oil and scale. If you tried to use one of these pens, it would most likely break rather than flex. Tempering is needed to bring flexibility back to the steel and find that right balance of spring and strength.

The pens are tempered by placing them in a cylindrical vessel, open at one end, which is turned over a fire until the pens reach the right color. This vessel is often compared to a coffee-roasting machine. The open end makes it easier to see the color of the pens, and the rotation facilitates even heating. Steel turns different colors as it is tempered, each indicating the extent of the tempering. The accounts tell us that experienced furnace men looked for the true blue color as an indication of the right temper. Once the pens have reached the right color, they are turned out onto steel trays to cool as speedily as possible (fig. 1, next page).

This article draws information from three sources, listed on p. 26.

TEMPERING.

SCOURI

STEP 10: SCOURING

After tempering, the pens are still rough and covered with small metallic particles. Again, as after hardening, the pens are put into the revolving cylinders, powered by steam engines—along with a mild abrasive like sand, boxwood sawdust, or pounded casting pots—and are left turning (fig. 2). "In a few hours they become perfectly white and clear" ("How Steel Pens are Made").

STEP 11: GRINDING

After the second scouring, the bright, silvery pens are brought in bushels to the grinding room. Here we encounter a very different kind of sound. Instead of the staccato bangs of the stamping room, we have the hiss and clink of pens being ground and tossed into bins. The room is long, with drive shafts running the length of the room up by the ceiling (fig. 3). Belts reach down from this shaft to the benches and turn wooden wheels, covered with leather charged with emery powder. The wheels have different dimensions depending on the pens being ground.

Each woman picks up a pen with pincers from a bin on her left, and with a quick flick of the wrist deftly grinds the pen first lengthwise along the slit, and then horizontally across the pen (fig. 4). The ground pen is then flicked over to a bin on her right. These bins are continually being renewed by young girls moving around the room, bringing new pens in from scouring and taking the ground pens off for one of the most important and delicate steps in the whole process: slitting.

STEP 12: SLITTING

If one considers the slit on a steel pen, it is a marvel that such precision can be achieved. Making the slit was one of the most difficult steps when it was done by hand in workshops. If you have ever tried to cut a sheet of tin or thin steel with snips, you will remember the distortion of the material around the cut. In a pen, the slit must be perfectly aligned with the very sharp point—even a half-millimeter off can ruin a pen. The metal must also be slit in such a way that there is no gap between the tines when they are at rest and that they

NG.

1. Adding pens to the open-sided tempering container, as seen in "How Steel Pens Are Made" (1857).

2. Scouring bins, from "How Steel Pens are Made" (1857).

3. The grinding room; illustration from "The Manufacture of Steel Pens in Birmingham" (1851).

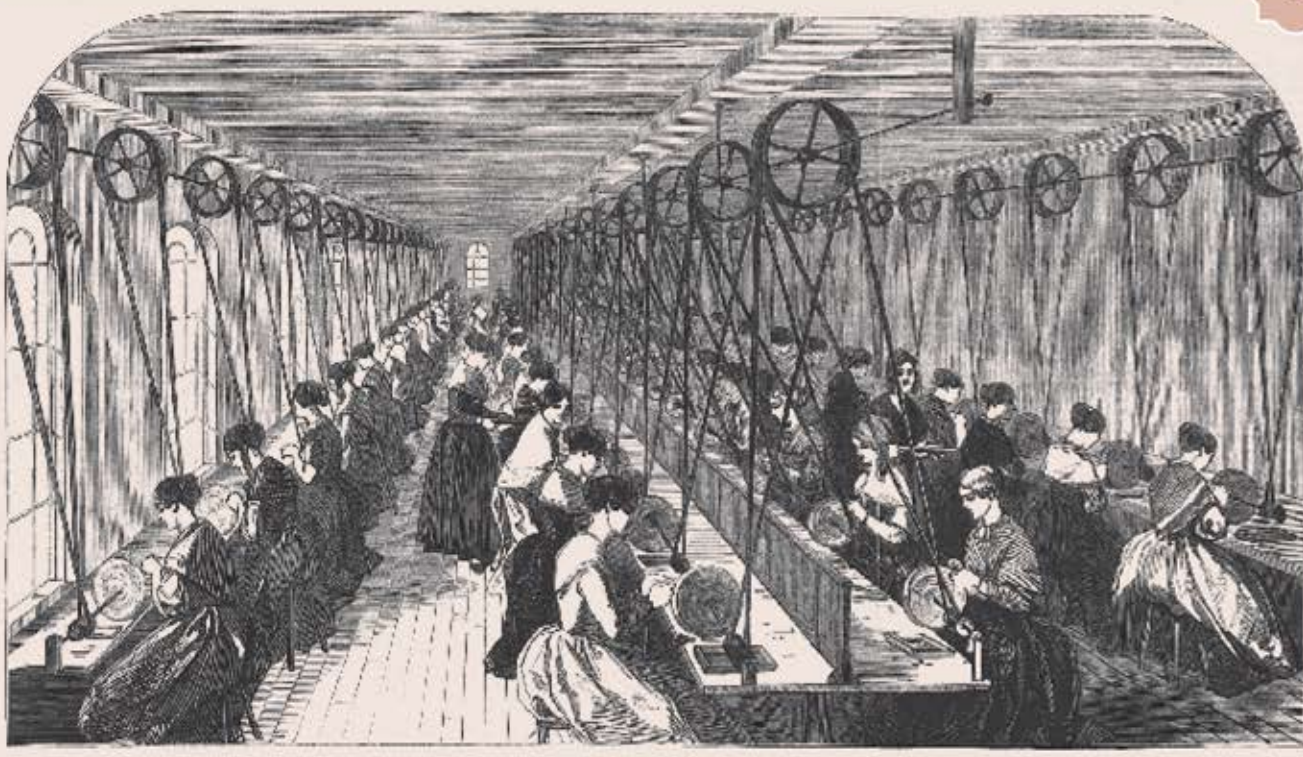
4. Example of a double grind; author's collection. Note the grind marks going in both directions. Most pens post-1860s were single grind and eventually were not ground at all. Sometimes grind marks were stamped into the steel.

will spring back perfectly after being flexed. And should a pen have two slits, often found on a "music nib" or one of the double line pens, then there is twice as much chance for a mistaken cut.

In the 1838, slitting is a two-step process. Before the pens are hardened, the first part of the slit is made by cutting to two-thirds of the depth of the final slit with a sharpened die in a press. After hardening and grinding, the slit is then finished by taking pliers and sharply pinching the brittle pen, thus "cracking" the slit. Only after that is it then tempered.

By the 1850s, this process had changed, presumably because the tooling and steel were of better quality so that it could be done in one step. The shaped and tempered pen is placed in a guard that holds it in precisely the perfect spot. The press is similar to the one used for raising (fig. 5, p. 25), but this one drops an extremely hard and sharp cutting edge that must stop at a precise point so that the slit is cut through, but the cutting edge is not dulled by hitting the bed upon which the pen rests. Most of the accounts talk of slitting just after grinding. Gillott waits and does the slitting as the very last step before inspection and boxing.

3



THE PEN GRINDING ROOM.

6

"The colors of steel after heating to different temperatures": Zaereth, CC0, via Wikimedia Commons commons.wikimedia.org/wiki/File:Tempering_standards_used_in_blacksmithing.JPG.

STEP 13: CLEANING AND POLISHING

After slitting, there is often a slight burr along the slit that needs to be removed. This is done with the revolving cylinders and boxwood sawdust we saw before. The action from rotating with the sawdust, as well as the agitation of the pens against each other, is enough to remove the burr and polish the pens to bright steel.

My 1838 source describes an interesting contraption that uses a cylinder 8 or 9 inches in diameter and 3 feet long. This cylinder is attached to joints on each end and attached to flywheels that, when set into motion, cause the cylinder to gyrate up and down and back and forth, "agitated in a manner similar to materials shaken in a bag." By the 1850s, the simpler rotating cylinder seemed the norm.

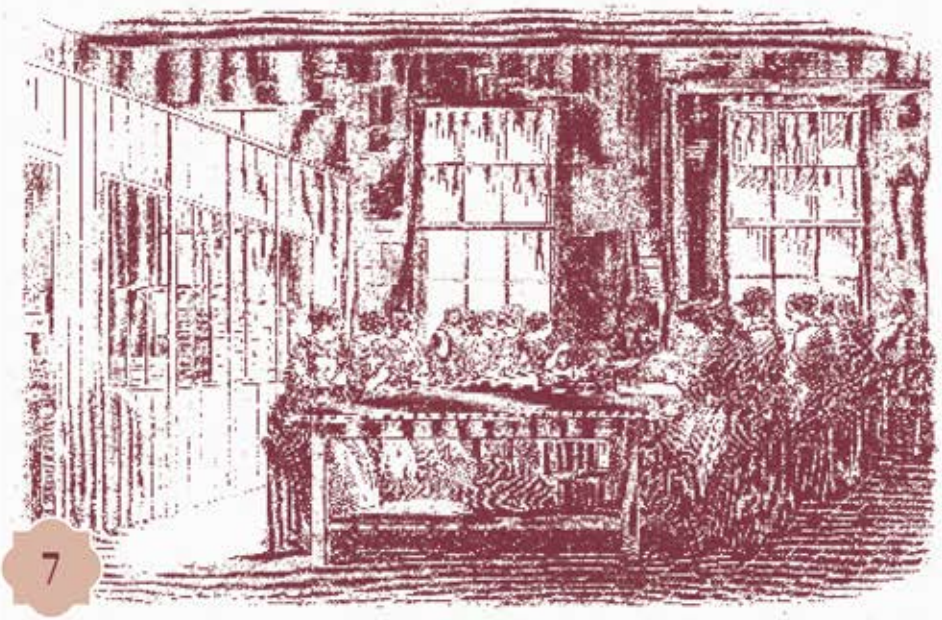
STEP 14: COLORING

The pens are now bright steel—shaped, stamped, ground, slit, and looking very much like a steel pen. But not all pens are a bright steel color. Pens come in many colors (fig. 6). Some colors come from a coating, like silver or gold alloy, but most colors seen in steel pens come from a coloring process that uses the natural color changes that come from heating steel.

The pens go back into a cylinder with an open end, which is rotated over a fire. After about five or ten minutes, the pens will achieve a bronze color. If left in for ten minutes, the color becomes a deeper purple-bronze, and if left in for a bit longer it achieves a pure blue. As long as the reheating does not exceed the original tempering temperature it does not affect the temper of the pen. This is why gentle heating of a pen over a flame to remove the varnish is safe and will not damage the pen as long as you do not approach the blue stage of tempering.

5. 1850s-era slitting room, as seen in "The Manufacture of Steel Pens in Birmingham" (1851).

7. Inspection room, as seen in "How Steel Pens Are Made" (1857).



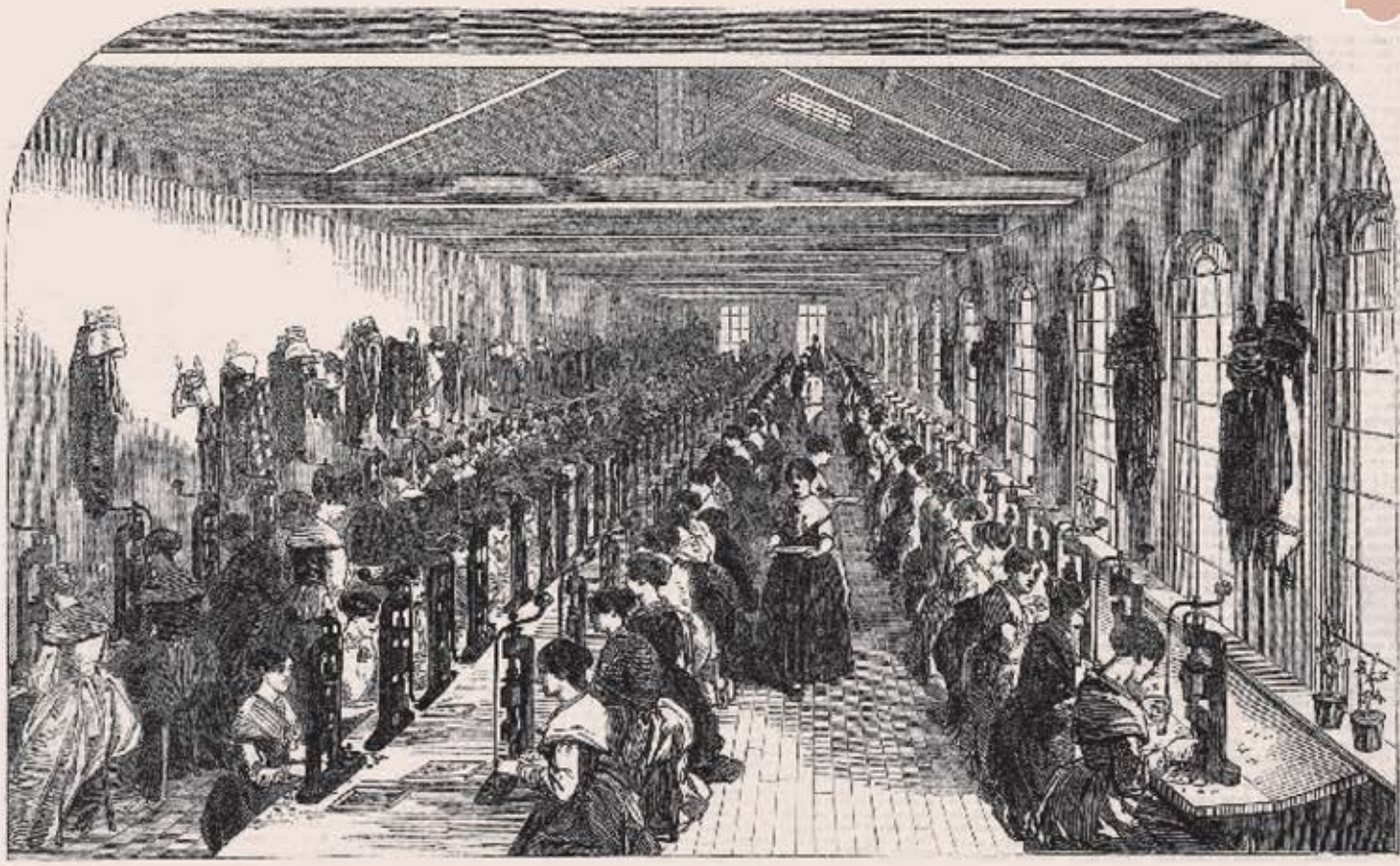
7

STEP 15: VARNISHING

These raw steel pens will rust quickly and easily in this state. To prevent them from rusting before they get into the hands of the final purchaser, the pens are coated in a protective varnish. This varnish formula varies by manufacturer: some are as simple as shellac dissolved in alcohol; some are proprietary compounds. They all seem to be a similar type of resin or shellac-based finish.

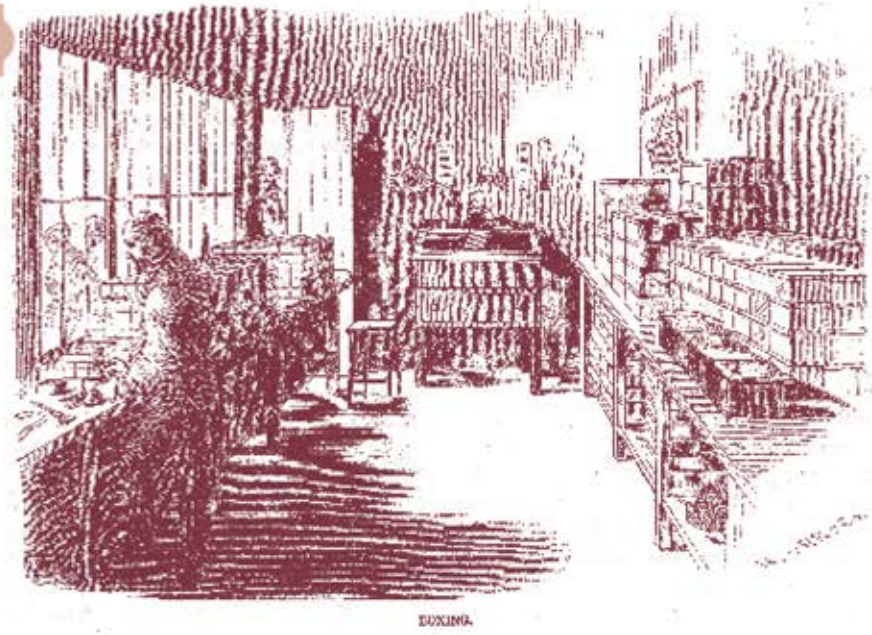
The pens are immersed in the solution and then tossed onto pierced trays for draining. Some factories would then gently heat the pens to help the varnish flow evenly over the pens before

5



THE SLITTING ROOM FOR PENS.

8



BOXING.

being laid out on drying trays. As they dry, the pens tend to stick together, so they must be constantly turned and tossed around to keep them apart while drying. This is commented upon as requiring a great deal of dexterity "for, not only are the pens effectively separated and scattered, but not one is allowed to fall to the floor" ("How Steel Pens are Made").

STEPS 16 AND 17: INSPECTION/SORTING AND BOXING

The pens are brought in broad boxes to the inspection room where a group of women will sort through and separate out any pens with defects (fig. 7, p. 25). Each pen is tested by flexing it on a piece of bone placed on the thumb. After sorting, the pens are sewn onto cards or weighed and packaged. If the latter, the packages are labeled and put into larger boxes for shipping (fig. 8).

Pens that do not pass inspection are sorted into second-quality pens and rejected pens. Rejected pens are sent back for re-melting and re-use. The second-quality, but still usable, pens are often boxed in mixed bunches and sold at a discount of 25 percent or so. This practice of collecting slightly irregular pens and selling them as seconds was also done here in the United States and was continued by many manufacturers into the 20th century. Figure 9 shows a box that contains seconds from most of the major and a lot of the minor UK brands from about the 1930s. Some of the pens were raised upside down, some were imperfectly stamped or not completely plated with silver, and some have other cosmetic issues, but all are fine for use. My 1857 source claims that other manufacturers gathered up their seconds and sold them at a 25 percent discount, but the Washington Medallion factory scorned that practice. Any flaw resulted in rejection, and rejection was final.

"Gillott's Steel Pen Manufactory" sums up the process:

> "It is thus by the union of talent, capital, and enterprise now described that we have not only good, but cheap steel pens."

9

8. Boxing and shipping, as seen in "How Steel Pens Are Made" (1857).

9. Box of "seconds" from the author's collection

SOURCES

"Gillott's Steel Pen Manufactory," Illustrated Exhibitor and Magazine of Art, *New York, v. 2, no. 27 (July 1852).*

"How Steel Pens are Made: A Visit to the Manufactory of the Washington Medallion Pen Company," United States Magazine, *v. 4, no. 4 (April 1857).*

"On Writing Materials: No. II. The History of the Steel Pen," Saturday Magazine, *no. 361 (February 17, 1838).*

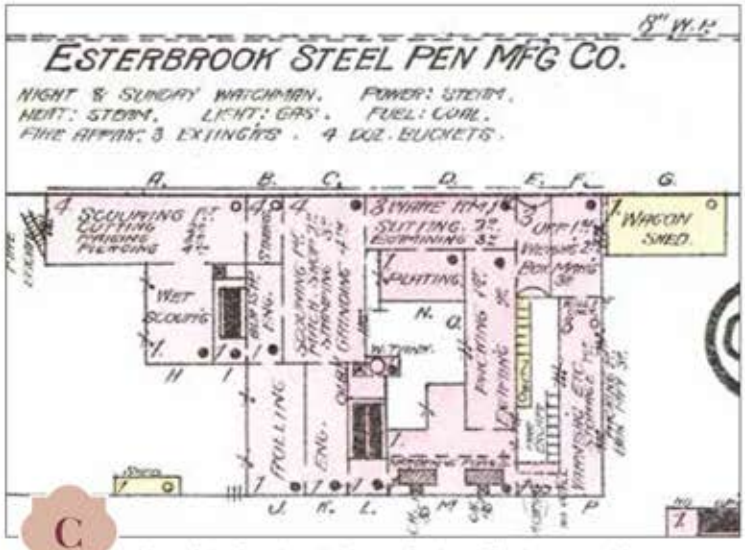
THE ALLURE OF THE PROCESS

A

"How Spencerian Pens Are Made," advertising card from the author's collection.

B

"How Pens Are Made" cards of various manufacturers from private collections, shared with permission.



C

Map of the Esterbrook factory. *Sanborn Fire Insurance Map, Camden, New Jersey*. Sanborn Map Publishing Co. (New York, New York, 1885), p. 7.

This fascination with the process for making steel pens was not limited to the mid–19th century. We find every major manufacturer producing cards that include examples from each step in the process to illustrate the amount of work and care that goes into making the humble pen.

The example shown in figure A is from the Spencerian Pen Company from very early in the 20th century. The company's pens were made by Perry, but the cards look pretty much the same for every manufacturer from New Jersey to Berlin, as seen in figure B.

We can even see the actual physical layout of a major pen manufacturer in this 1885 map of the Esterbrook factory in Camden, New Jersey (fig. C). This amazing artifact was part of a Sanborn Insurance Map of Camden, NJ. These maps recorded detailed information about urban buildings so that fire insurance companies could determine liability in an area of a city. You can see that it includes how many fire extinguishers and buckets were in the building and how often watchmen came around.

Looking at the map, and thinking back to our factory tour, we can imagine what is happening on every floor in every building of the factory. As an example, in the top left corner you can see that on the first floor were the scouring bins. On the second floor the pens were cut out, on the third they were raised, and on the fourth they did the piercing. More scouring was done a little further east in the next building. The machine shop was on the second floor, with stamping and grinding on the third and fourth floors. The rest of the building is now easy to understand because of our tour.