

History of Papermaking for Map Collectors

by Marti Griggs

This article is an excerpt from the new edition of Collecting Old Maps, by F.J. Manasek, revised and expanded by Marti and Curt Griggs. This highly anticipated reference work is an essential guide for map collectors of all types, with information on the basics of map collecting, the art of mapmaking, the history of printed maps over five centuries, identifying forgeries, understanding condition and conservation, building a map collection in the digital age, and much more. The book is profusely illustrated with full-color images from nearly 200 maps.

An antique map is more than just a geographic image. It resulted from the collaborative efforts of explorers, surveyors, draftsmen, engravers and printers. But the paper on which it is printed is also an important part of the map. Thus, understanding the evolution of papermaking technology can add to our enjoyment of maps.

In the early European papermaking process, cellulose fibers were obtained from linen rags. The collection and distribution of rags to the paper mills was an industry in itself, similar to today's recycling industry. Once at the mill, rag selection took a skilled eye to judge the quality and suitability of the old rags that would serve as the feedstock for high-grade paper.



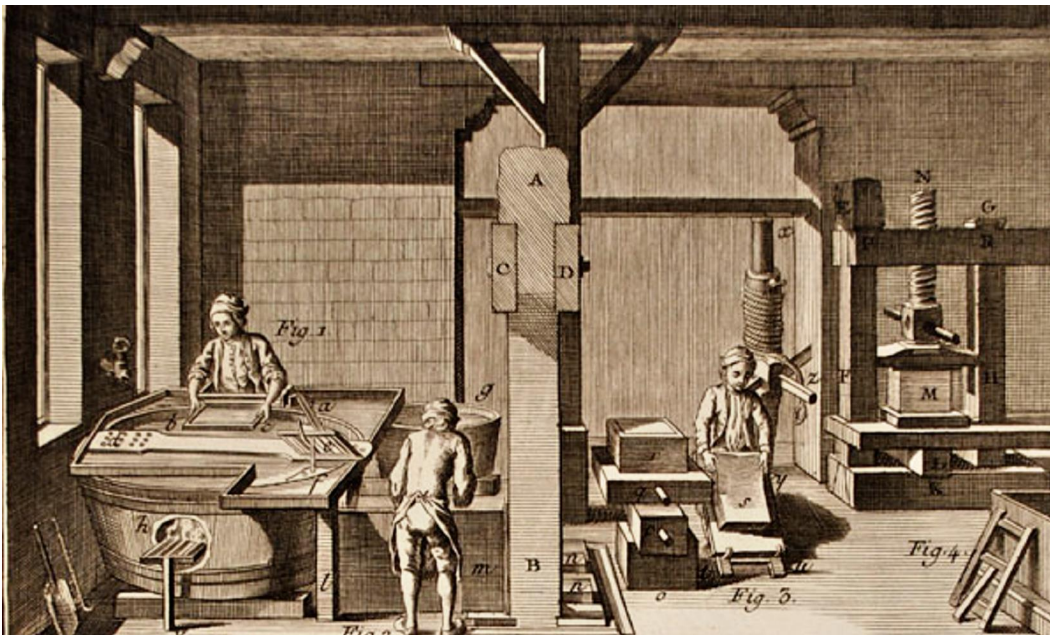
This illustration from Diderot's *Encyclopédie* shows women sorting rags. A carefully sorted batch with similar weight, color and so-called tenderness ensured predictable results during subsequent operations.

After sorting, the rags went through a long series of soaking, rinsing and washing cycles where a copious supply of clear, fresh water was critical. Prior to the use of bleach, in about 1800, whitening involved boiling the rags in a solution of soda ash or lye, which could take weeks to bring the rags to the desired whiteness.

The next step, called *retting*, gave paper its uniformity, softness and weight. This fermentation process could take up to a month and required a superb instinct combined with experience, not unlike the wizardry employed by a fine winemaker. If stopped too early the resulting paper was coarse and stiff, if left too long it resulted in a useless, wasted batch.

At this point, the rags were clean, whitened and degraded through fermentation, but still roughly in the form of cloth. The beating, or *stamping*, step took this solid mass through a progressive set of hammers to produce the slurry for the papermaker's mold.

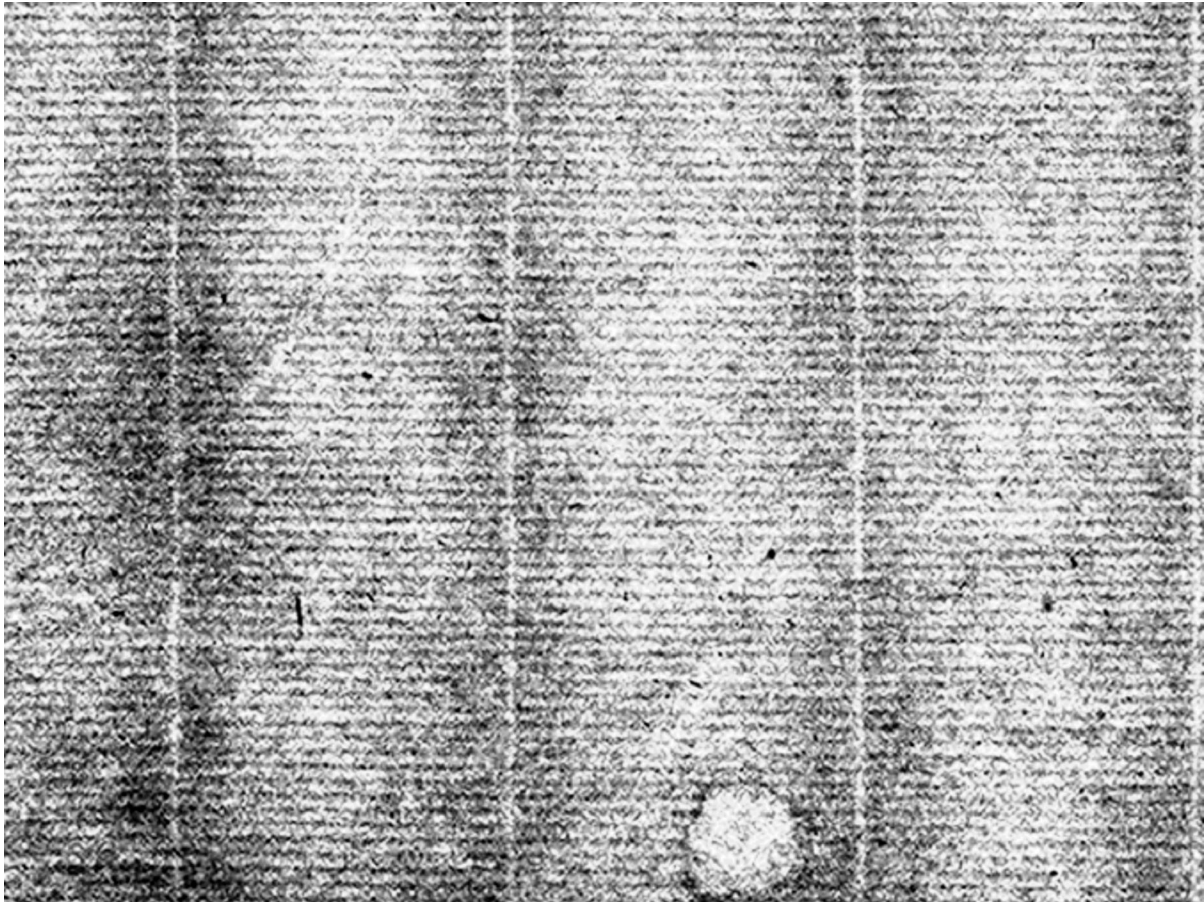
Forming the paper sheet required coordination between the *vatman*, *coucher* and the *layman*. The vatman dipped the paper mold and deckle frame into a vat of slurry to gather and evenly distribute the pulp on the mold. The vatman passed the mold to the coucher who removed the deckle and returned it to the vatman who fitted it to another mold. The coucher gently removed the wet, delicate sheet of paper from the mold and placed it between layers of felt to build up a pile called a *post*. The layman then put the post in a screw press to remove the water. This required several pressings, between which, the layman restacked the paper sheets interleaved with dry felt. The sheets were then hung to complete the drying process.



This illustration shows the vatman, coucher and layman at work. A skilled team could make a few thousand sheets in one day.

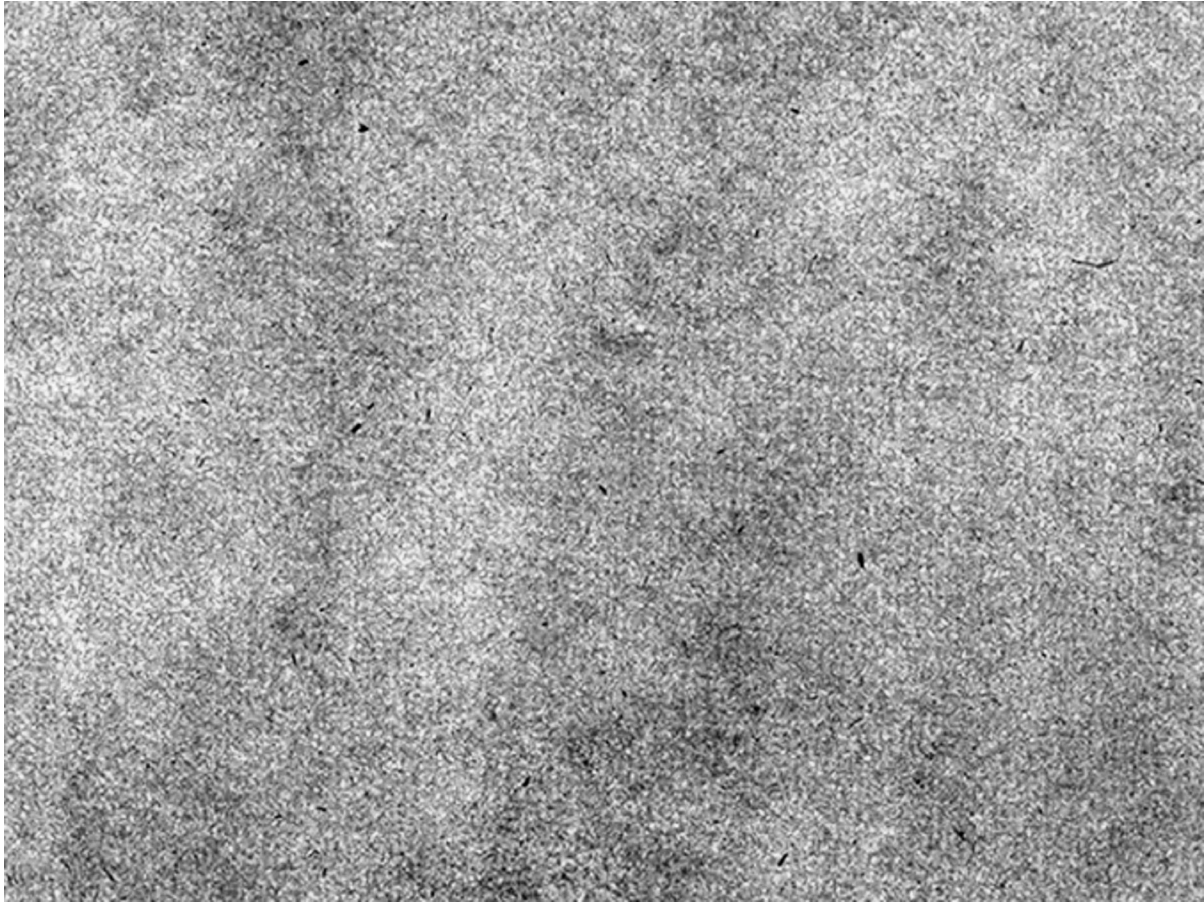
After drying, each sheet had to be *sized* to reduce absorbency, strengthen its fiber and make it suitable to hold ink and color. The sheet was dipped in a vat of gelatin and again hung up to dry. It was then burnished with a flat stone to close the pores of the paper and produce a smooth surface. Finally, the paper was complete and ready for the printer.

Paper was made in this manner for hundreds of years with minor technological improvements. The visible lines left by the paper mold and the uneven distribution of the long cellulose fibers characterize this type of paper, which is known as *laid* paper.



The distinct appearance of laid paper can most easily be seen when the paper is held up to a light. Chain lines are vertical; laid lines are horizontal. Note the irregularity of the lines and the visible flaws in the paper.

The development of *wove* paper in the latter part of the 18th century was a significant papermaking refinement. James Whatman, an English papermaker, developed a finer woven metal mesh mold that created paper with a much smoother surface. By the 1780s it was widely used in England, and by the turn of the century it was being incorporated at mills in France and America.



The mold used to produce wove paper is made of a very fine mesh which does not leave a distinctive impression in the paper. While the sheet is smoother than the laid paper, it still exhibits irregularity in the distribution of the cellulose fibers.

Even with this advancement, all paper was still being made by hand, one laborious sheet at a time. It was the invention of the papermaking machine in the early 1800s that revolutionized the papermaking industry. The machine used a fine mesh of woven wire around the outside of a drum that rotated slowly through a vat of paper slurry, gathering and consolidating the fiber as it rose out of the vat, where it was lifted off the mesh by an adjacent felt-covered drum rotating in synchronization with the wire drum. It then passed through a series of drying cylinders into the calender section where the dried paper was smoothed in a series of hard pressure rollers.

The Industrial Age gradually expanded the middle class, creating a growing market for virtually all things, including paper. The invention of the papermaking machine coincided with the increased demand for paper, but the continued use of rags was a bottleneck to the growing industry. A new and plentiful source of raw materials was urgently needed to sustain the new demand for paper. The search quickly turned to wood and by the middle of the 19th century methods were developed to use wood pulp for making paper.



Paper made from wood pulp is characterized by short fibers and a very smooth, uniform surface.

Understanding the papermaking process and close inspection of paper are important steps in dating a map, or suggesting a forgery. One of the first things a person should do when examining an old map is to carefully analyze the paper. Is the paper consistent with the date the map is purported to have been made? Is it laid or wove paper? Is it rag-based or wood-based? Occasionally paper may contain a most helpful dated watermark, but most of the time the type and construction of the paper will provide a rough idea of when it was made. These are the key points to remember:

- Paper was principally rag-based until the middle of the 19th century.
- Paper was laid paper until the last quarter of the 18th century.
- Wove paper was the most common paper in the first half of the 19th century.
- Machine-made, wood-based paper dominated the printing industry after about 1850.