

The Photographic Restoration of Letterforms

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The creation, for exhibition purposes, of a photographically restored facsimile of a damaged nineteenth-century lithograph is discussed, with emphasis on the varieties of deterioration that can affect letterforms and on the principles of conservation and restoration. The paper follows the sequence of deterioration and conservation of the artwork, looking at the typographic restoration in detail. Some discussion about the archival nature of the print and museum conservation in general is a necessary prerequisite to understand the preferences for choosing the ultimate photographic restoration processes used to restore the missing letterforms, which is the primary concern of the article.

Typography, in addition to its conventional definition as the composition of printed matter, can also be considered in its role as a language of form and material prone to both visual and physical disintegration. The study and practice of museum conservation includes the extension of our visible language in the archival form of prints, books, documents, etc.¹ Paper and ink—the materials of these objects—must co-exist, and it is their properties of permanence and durability which determine the life and condition of the book, print, or document and its typographic statements.

The degradation of paper and ink,² the material components of the print under consideration, can be attributed to any combination of five principal types of deterioration: (a) hydrolytic, (b) oxidative, (c) microbiological, (d) catalytic, and (e) mechanical (Smith 1968, p. 348). The kinds of damage and deterioration from these causes acting on the cellulose fibers of the paper and the ink can, as separate or contributing forces, result in a variety of detrimental conditions; e.g., acid embrittlement, discoloration, tearage, abrasions, lacunae, infestation, accretions, and staining.

These are the circumstances involving a nineteenth-century lithograph (Fig. 1) selected for an exhibition. This lithograph has been afflicted by many of the physical-chemical types of degradation which have contributed toward the demise, ruin, or absence of certain structural properties (paper) and apparent features (type) on which the print's documentary and artistic distinctions are dependent. (Figures 2-6 show additional examples of impaired letterforms observed on other items and resulting from human and physical/chemical causes.)

Structurally the paper has suffered lacunae and tears throughout the graphic format from mechanical damage. It was dismembered at one time into an unknown number of pieces, of which eight remain.

Apparent or visually determined damage to artistic work (the landscape portion) and more specifically, typographic matter (the loss of six printed letterforms) has impaired the print's aesthetic qualities and impeded the legibility and meaning of four words in three lines of type at the lower right portion of the print, as shown in Figure 1 and Figure 10 (detail).

Curatorial study of these incomplete words determined that the letters missing from the top line word are "CK" from the word "JACKS;" in the middle line, the missing letters are "HI" from the word "MACHINES;" and from the bottom line, the letters "N F" are missing from the words "IRON FRAMES." These words, if left with omissions as they appear on the original print, would not, in the photographic facsimile prepared for exhibition, be decipherable to the majority of visitors examining the copy on view.

Methods of remedying these structural and apparent discrepancies and conditions follow three conservation approaches: (a) the study into causes and treatments to be performed by laboratory analysis to determine acid content, ink solubility, etc.; (b) retarding these causes by preservative measures as performed by chemical deacidification of paper, repair of tears, etc.; and (c) corrective measures as performed by restoring the print to its original state or function. This was undertaken by rejoining and adhering the eight dismembered pieces onto a support paper, making it structurally and visually whole, as it appears in Figure 1.

WOOL MACHINE WORKS,



DAVIS & FURBER, NORTH ANDOVER, MASS. NEAR LAWRENCE.

MAKERS OF ALL THE BEST OF THE
 1. *WATER* 2. *WATER* 3. *WATER* 4. *WATER* 5. *WATER* 6. *WATER* 7. *WATER* 8. *WATER* 9. *WATER* 10. *WATER*
 11. *WATER* 12. *WATER* 13. *WATER* 14. *WATER* 15. *WATER* 16. *WATER* 17. *WATER* 18. *WATER* 19. *WATER* 20. *WATER*
 21. *WATER* 22. *WATER* 23. *WATER* 24. *WATER* 25. *WATER* 26. *WATER* 27. *WATER* 28. *WATER* 29. *WATER* 30. *WATER*
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 91. *WATER* 92. *WATER* 93. *WATER* 94. *WATER* 95. *WATER* 96. *WATER* 97. *WATER* 98. *WATER* 99. *WATER* 100. *WATER*

J. L. Davis

J. H. Furber

J. H. Bufford

Figure 1. *WOOL MACHINE WORKS, DAVIS & FURBER, NORTH ANDOVER, MASS.* Lithograph, 61 x 40 cm. overall. Boston: J. H. Bufford, ca. 1860-63. The Davis & Furber Machine Company, begun in 1832 and still in business today, used the lithograph from about 1860 to 1880 to advertise its machinery to textile manufacturers. Bufford lithographed two different views of the works, this being the earlier, as well as a number of prints of individual machines.

opinion, that the animals, inhabiting all naturally polished shells what are capable of not only adding to the extent and growth of their shells, but that they are able, from time to time, as occasion may require, to add a fresh polished covering to the whole shell. Should this opinion

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ing advantage of the absence of the chiefs of Salerno. in an expedition against the Beneventans, armed themselves, and, after burning and plundering Salerno, marched back in triumph to their native abodes. Being thus restored to their country, they formed a better constitution and code of laws. and adopted various measures likely to prevent inter-

*usually made with, from 40 to 50 spindles
on to Jack or Dresser. Spools for forming wool
is being put in on the Jack. The drive.*



Radel Del.

Benoist Tact.

Teinture des Gobelins, service du Couchoir et le Séchoir.

As conjecture, any attempts at this stage to restore the visual contents or functions of the print which have been lost, such as introducing the six letterforms by artistic means should be considered as modifications to the natural condition of the original design and identified as a form of disfigurement that is inappropriate and deleterious to the authenticity of the print (Buck 1973).

Therefore, confrontation by the conservator with the restoration of letterforms concerns interests and priorities which are somewhat different from those of typophiles, printers, designers, bibliographers, and paleographers, yet these attitudes should not be incompatible with their aims or inconsistent with standards of letterform design, composition, and artistic documentation. But any modification or attempt at reintroducing letterforms by artistic means to replace missing letters should be undertaken only when making a photographic facsimile, not in attempting to work on the actual print. The creation of the photo facsimile therefore avoids restoration practices which would possibly involve alteration or disfiguring unduly the authenticity of the original print.³

When institutions plan exhibitions—whether permanent, temporary, or traveling—photographic duplicates are commonly substituted for artifacts. This is done especially when an object's rarity, condition, etc., preclude its use for exhibition, as was the decision regarding this print. R. M. Organ (1968, p. 192) discusses this topic: "Protection of antiquities that are on display will require special measures. The Conservation Department should be in sufficiently close touch with display conditions to

Figure 2. Defective fabrication of paper causing hole.

Figure 3. Hole repaired to improve page legibility.

Figure 4. Crimp in paper obscures legibility.

Figure 5. Misspelled first "E" in "Dresser" relettered as "R."

Figure 6. Insect digestion in the word "Teinture."

be able to foresee when cases ought to be cleared in advance of redecoration and to advise against the proposed use of specific materials.”

The advantage of photography in this instance is the presence in undamaged areas of the print of letterforms similar to those missing. These normally would be used as guides when re-lettering or tracing letters to be used in supplying letterforms to restore photographically the missing ones. Instead, the idea of photographically transposing existing letterforms themselves to serve in place of the missing letters was adopted.⁴

The photo restoration techniques involved six procedures:

(1) The upper portion of the print, the landscape, was photographed as a continuous tone negative, on which the print's paper margins were masked out. A paper enlargement from this negative was then made at 150% of the print's original size.

(2) The bottom or lettered portion of the print was photographed as a high-contrast film negative. In other words, the grey tones of the paper were dropped out, leaving black letters against a white background. Two paper enlargements were then made from this negative at 150% of the print's original size.

(3) A count of all the available letterforms from which replacements for the six missing letters could be selected and transposed totaled seven C's, one K, five H's, eighteen I's, nineteen N's, and four F's.

(4) After individual study of these fifty-four letters to select those best suited to restore the missing letters the following were chosen as indicated in grey tones: The combined letters "CK" were taken from a top line word "PICKERS" (Fig. 7) to restore the missing "CK" in the damaged top line word "JACKS" (Fig. 10). The combined letters "HI" were chosen from the top line word "MACHINES" (Fig. 8) to restore the same missing letters in the same damaged word "MACHINES" in the middle line (Fig. 10). The separate letters "N" and "F" were chosen from the middle line words "NARROW FANCY" (Fig. 9) to restore the missing letters "N" and "F" in the damaged bottom line words "IRON FRAMES" (Fig. 10).

(5) These selected letters were then cut from one of the high-contrast paper enlargements made during step two and inserted

**ERY, PICKERS, DUSTERS, CARD M
PLAIN and TWILLED LOOMS, with or with
LING MILLS, SHAFTING, HANGERS, and P**

Figure 7. Letters "CK" from "PICKERS" restore word "JACKS."

**RD MACHINES, with THREE, FIVE and S
or without DROP BOXES, BROAD and NARI
and PULLEYS. All of**

Figure 8. Letters "HI" from "MACHINES" restore another "MACHINES."

**VE and SEVEN ROLL RUBBERS, or TUBI
and NARROW FANCY LOOMS, BROAD and N
All of the above MACHINERY mad**

Figure 9. Letters "N F" from "NARROW FANCY" restore words
"IRON FRAMES."

NING J: S, WARPERS, DRESSERS,
NG MA: NES, TWISTERS,
OF IRON FRAMES as preferred.

Figure 10. Detail of four words with six missing letters.

NING J: CKS, WARPERS, DRESSERS,
NG MA: NES, TWISTERS,
OF IRON FRAMES as preferred.

Figure 11. Restored word "JACKS."

NING J: CKS, WARPERS, DRESSERS,
NG MA: HLES, TWISTERS,
OF IRON FRAMES as preferred.

Figure 12. Restored words "JACKS," "MACHINES," and "IRON FRAMES."

or transposed onto the second high-contrast paper enlargement in the appropriate place. The letters "CK" borrowed from the word "PICKERS" are shown after their insertion in restoring the word "JACKS" (Fig. 11). This procedure was followed until all four words were restored with their properly interchanged letters (Fig. 12).

(6) This paper enlargement containing the transposed letters was then rejoined with the earlier photo enlargement made in step one of the top landscape portion. The whole was then rephotographed as a continuous tone negative, using a halftone screen overlay, at 100% or actual size of the original print, producing the finished photo facsimile ready for exhibition.

This exercise shows the restoration of legibility of damaged letterforms, making the print more suitable for exhibition, but it is to be hoped that the exercise will also point up the realization that art is a man-made resource, and like any resource, its existence is not indefinitely assured. All art has the potential of returning to matter, and in this particular case, letterforms containing intellectual information from the nineteenth century might have deteriorated along with the aesthetic values of the print. The creation of the photographic facsimile served the immediate purpose of facilitating legibility for the duration of the exhibition, but for long-term benefit, it also restored the content of the message without altering the authenticity of the original print.

¹*The American Heritage Dictionary of the English Language* (New York: 1969) defines conservation as "preservation from loss, waste, or harm." For discussion of the subject in greater detail, see the references listed here.

²"In fact, the sulfuric acid produced by the interaction of ferrous sulfate and the organic acids of the galls does burn into the paper, and in some cases where there are heavy deposits of ink, it burns a hole through the paper." (Barrow 1972, p. 17). Acid conditions are less prevalent in the earlier carbon-based gum arabic inks and in present-day pigment and dye-based linseed oil printing inks.

³Bodhan L. Marconi (1969, p. 2) has stated the differences of opinions among experts on this issue. Some think that "each repair of a missing part is an extraneous distorting element," while others feel that "compensation of lost parts is necessary for artistic perception by visitors in the gallery."

Garry Thomson (1973, p. 19) makes a similar point: "The arguments will continue on whether losses, large or small, should be filled in so as to become invisible or not. . . . Restoration should mean highly durable repair by methods which are, however, reversible, so that it always remains possible to remove the materials used."

⁴The idea for this approach came in part, appropriately enough, from a paragraph by printer and historian Isaiah Thomas (1810, p. 9) "We owe the same justice to the ancient philosophers as to the ancient sculptors; we should judge of the parts which are lost by those which remain, as it is reasonable to suppose there was a mutual correspondence between them and, that a collection of them would form a whole, which would be perfectly uniform and consistent."

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