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Book Reports

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PAPER TRAILS

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One of my favorite stamps is U.S. Scott C23, Eagle Holding Shield, Olive Branch and Arrows. This 6-cent airmail stamp was printed in two separate passes on the flat plate press in two colors: dark blue for the Art Deco frame and carmine for the central vignette - an eagle, the design of which can be traced back to U.S. revenue stamps of the 1860s.[1] The stamp was issued May 14, 1938 to commemorate National Air Mail Week. The stamp's appearance is striking and it was wildly popular with the public, although Doug Kelsey, in his *Linn's* Airmail column jokingly noted that some "… think the design is the Anheuser-Busch corporate logo."

The stamp exhibits a phenomenon that puzzled me: The "coloration" of the stamp paper in the unprinted area often shows a pronounced pinkish hue, particularly in the marginal selvage. I attributed this, at first, to visual shading cast by the bold carmine color of the stamp's vignette. As time went on, however, I saw examples that did not have this strong pinkish cast. This intrigued me and posed obvious research questions and learning prospects in return. First, was there consistent variability among examples? If there was such variability, what could have been the cause?

The first thing I did was to look at two other stamps printed on the flat plate press in 1938 - the single color Scott 836, Swedish-Finnish Tercentenary, printed in red violet, and the bi-color Scott 832, $1 Presidential, printed in purple and black.[2] Examples of both stamps exhibited a similar pinkish coloration in the marginal selvage; however, as with C23, there were examples without this pinkish cast.

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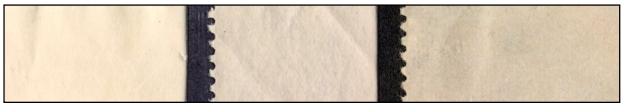
[1] The "odd" juxtaposition of frame and the vignette was troublesome to many stamp commentators who derided the stamp's design. The original vignette was to be a mail plane and the frame was designed for that layout. Almost immediately, the vignette was changed to an eagle similar to that used for the 16-cent air post special delivery stamp (CE1). President Roosevelt, however, supported an eagle in flight. Because the stamp was scheduled to be issued in conjunction with the rapidly-approaching National Air Mail Week, the Bureau simply used the original frame within which to accommodate the eagle design. This history is reported in "The Design of the 1938 Eagle Airmail Stamp," by James H. Patterson in *The Congress Book 1996*.

[2] The $2 and $5 bi-color Presidential stamps were also printed on the flat plate press in 1938, neither of which exhibits the paper coloration condition – perhaps due to the weaker hue of the colors in those stamps.

ANALYSIS

I gathered subject examples of C23: multiple mint and used singles, covers, and plate blocks, which I borrowed from colleagues Wayne Holmes and Greg Alexander. The plate blocks would ultimately prove most useful to me in the analysis because they had broad areas of marginal selvage that had no printing other than the standard marginal markings. The *Durland Standard Plate Number Catalog* [2008] told me the plate blocks were fairly representative of early and late printings. Almost 350 million copies of C23 were printed using 16 frame plates and 38 vignette plates. Its 6-cent rate was in effect, in some capacity, until 1946.[3]



Paper Color Variability
Figure 1

Arraying my subject plate blocks, I could visually discern differences in the coloration of the paper.[4] This variability is exhibited in Figure 1 in side-by-side comparisons of marginal selvage from three plate blocks. Using the color charts from *Color in Philately* [R.H. White, 1979], the paper colors ranged in name from "cream" to "moderate brown pink." Pink seemed to be a common color name throughout most examples, being modified in strength by gray or brown. Was this variability due to ink, paper, or some other factor?[5]

Is the pink coloration of the paper somehow related to the carmine ink used in the vignette? This is not a case of "fugitive" ink whereby the ink runs outside its intended print boundaries; rather, it may be a case of incomplete plate wiping. On the flat plate press, the entire surface of the engraved plate is inked and then wiped clean with a flexible steel scraper presumably leaving ink only in the recessed areas. The printer would then polish the plate by hand. But no matter how well a plate is cleaned, a film of ink may remain on the plate. This seemed a plausible cause in the matter at hand, but the evidence was weak because the marginal selvage color was uniform, but stamps in the lower locations of the plate blocks did not always exhibit the color of the selvage. Possibly the doctor blade was inadvertently "adjusted" to wipe just the design area of the plate, but I think that is unlikely.

I then considered the possibility that the Bureau may have reverted to using aniline ink for the eagle vignette. This variety of ink, produced less expensively from synthetic organic compounds, produces bright vivid shades, particularly reds. Aniline inks had been used previously on U.S. stamps and their use here may have been an economic response to offset a portion of the cost of the large printing run of C23. A major problem with aniline inks, however, is that they lacked color fastness. Could this drawback underlie the pinkish coloration of the stamp paper? Fortunately for the present analysis, aniline ink, because it penetrates so deeply into the stamp paper, will show the stamp color on the back of the stamp. No such color suffusion was noted on the subject blocks of C23.

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[3] *U.S. Domestic Postal Rates, 1872-1999* (rev 1999) and *U.S. International Postal Rates, 1872-1996* (1996) by Wawrukiewicz and Beecher. Despite the stamp's popularity, the U.S. House of Representatives rejected a POD request for $165,000 for printing the bi-color stamp. C23 was, therefore, replaced by the 6-cent stamp in the Transport series, C25, in 1941. *Franklin D. Roosevelt and the Stamps of the United States, 1933-45* by Brian Baur (1993).

[4] There is also notable, and collectible, variability in the intensity [saturation] of the colors, particularly in the carmine. Some of this variability also appears, on closer examination, to be caused by over- or under-inking of the printing plates or, perhaps, varying moisture content in the paper.

[5] I dismissed gum as a factor even though it has been known to happen before. [A notable case is Scott 1552, the self-adhesive Dove Weather Vane atop Mt. Vernon, in which *Scott Specialized* states "Most copies are becoming discolored, probably from the adhesive."] The gum in my examples does not extend to the edges of the margins; visually, the gum appearance on all examples ranges from clear to yellow, but there is no obvious correlation to the identified paper colors; and none of the gum exhibits signs of deterioration.

This left stamp paper as the only remaining variable. Fortunately, the Library has an excellent reference, *The Papers and Gums of United States Postage Stamps* [R.W. White, 1983]. This fascinating book comprises 20 multi-image color plates illustrating various paper and gum scenarios for U.S. issues to 1909 and appendices that thoroughly explain paper and gum. The book did not specifically illustrate stamp paper with a pinkish hue, but it was useful in understanding how to look at the subject.

For the matter at hand, a critical stage in the papermaking process is the composition of its "stock," basically wood pulp, bleach, and fillers. Since around the 1920s, machine-made papers have been produced using chemically treated wood. Today's stamp papers favor environmentally-sensitive, i.e., neutral, raw materials; but in the 1930s, when Scott C23 was produced, the chemical process for making paper was based on the sulfite, or acid process.[6] In that regard, besides cellulose, wood fibers contain elements that are organically acidic. Bleaching compounds used at the time further added to the acidity of paper, as did the "sizing," a chemical treatment added to reduce the absorbency of water and to make the paper more receptive to receiving inks.[7]

Paper, as we know, will naturally deteriorate in reaction to oxygen. This is inevitable and inexorable. This process is described generically as "oxidation." Might this explain the paper colorations observed with Scott C23? Natural oxidation results in a yellowing of the paper. Acidity in the paper accelerates this process, ultimately leading to dark brown staining and culminating in physical disintegration.[8] As I noted earlier, the color name "brown," using the nomenclature of *Color in Philately*, is part of the color descriptions of the subject stamps, but each of these "browns" has one or more modifiers - light or moderate, and gray or pink. I was also still concerned with the pattern of paper coloration within the subject plate blocks, i.e., some portions of a block are uniformly colored, whereas other parts of the block have a different coloration. I was not sure that I had found a useful clue to solving the problem.

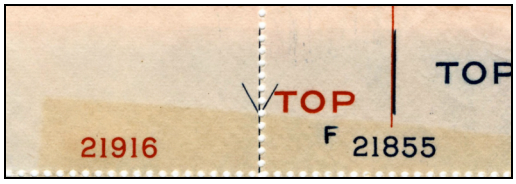

Photo-oxidation?
Figure 2

Then it struck me when I came across the plate block in Figure 2. For whatever reason at some unknown point in time, someone had apparently placed a covering strip over the two plate numbers, leaving, over time, an indelible pattern of this covering in the marginal selvage. Of note here is the color "scheme" in the selvage: the plate number area is moderate pink brown, whereas the rest of the selvage is light grayish pink. This selvage pattern hints strongly at the effect of *photo-oxidation,* a slow deterioration that takes place when paper is exposed to sunlight and fluorescent lighting. We typically associate photo-oxidation with its changeling effect on inks,[9] but its impact on paper is equally serious.

[6] This process predominated in papermaking until around 1950 when it was replaced by the "sulfate" or alkali process.
[7] Another excellent description of stamp papers is in the handbook *Fundamentals of Philately*, by L.N. Williams (1990).
[8] Hand-made paper, is less susceptible to the effects of acidity primarily because it does not use wood [historically, hand-made paper has a high rag content] and because it does not use acidic chemicals in the stock.
[9] See, for example, the Ken Lawrence's experiment of exposing a sheet of Scott 2419, Moon Landing, to direct sunlight to achieve a changeling that replicates a printing error noted earlier by Scott. *Scott Stamp Monthly* [November 2005].

Thus, the apparent uniqueness of the paper coloration of C23 is caused, I think, by sensitivity to light. A sensitivity perhaps exacerbated by the chemical composition of the paper stock used by the Bureau in the late 1930s and the manner in which the subject plate blocks have been handled by their owners over 70-plus years' time. I do not regularly see that pink tinge on single copies of the stamp, maybe because they have been under cover in stamp albums, although I noted infrequently a grayish buff color that seems to correlate with natural oxidation of the paper.

PRESERVATION

Damage from oxidation is a result of the breaking down of the cellulose molecules of the paper. The damage cannot be undone. The effects of deterioration are well known: the paper discolors, becomes brittle, and eventually disintegrates. I doubt whether the Post Office Department was concerned with the condition of stamp paper 70 years down the road. Document conservators today have technical solutions available to address this problem, all of which de-acidify the paper. This does not reverse earlier damage; rather, it is a means of maintaining the viability of an original document.

De-acidification of a postage stamp, particularly those with original gum, is problematic for a number of reasons, many of which apply to the preservation of documents in general.[10] De-acidification options remain expensive and inconvenient. There is not widespread acceptance of available treatments. Treatments add alkalinity to the paper through chemical means, most of which require contact with an aqueous [liquid] solution, although newer methods involve exposure to vapors. Documents will "look" the same after treatment as before treatment; however, the treatment particles absorbed by the paper serve to neutralize the acids and provide a buffer against future damage.

Despite the uncertainties from the foregoing discussion, there are purposeful steps, some already well-known, that you can take to mitigate the effects of acidic stamp papers and types of oxidation.[11]

[10] See, for example, Robert Fellows, "Postage Stamp Restoration - Parts I and II," *Stamps* [April 7 and April 14, 1973].
[11] See, for example, George Saqqal, *Preserving Stamps and Covers* [2007].