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REPORT ON THE RECONSTRUCTION OF TWO TIME PAYMENT LEDGERS DAMAGED BY FIRE AND WATER

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Recently, this office was consulted by the Montgomery Ward Co. which had suffered fire damage to two customer time payment ledgers at the Bowling Green, Ohio, retail store. The interior, roof, and furnishings of the brick building were almost totally destroyed by the fire but, fortunately, had been covered by insurance. The accounts receivable ledgers, which were not insured, however, were kept in a safe (assumed to be fireproof) which dropped from a second floor to the basement during the intense fire. After the heat had subsided sufficiently for officials to enter the building, the safe was found to be resting in several inches of water surrounded by a pile of rubble.

Upon opening the safe, the books were found to be relatively intact, considering their two-story fall, yet in a very badly charred and water soaked condition.

Acting upon instruction from this office, the books were carefully wrapped in cotton, placed in a suitable box, and transported from Bowling Green to Milwaukee by personal messenger. Instructions by the Montgomery Ward Company were to decipher as much material in these ledgers as possible in order to reestablish the account and to do so in the shortest period of time. Information desired included the name and address of the customer, the monthly payment, due date, the limit, last charge, and final balance.

In order to expedite examination of this material, the Montgomery Ward Co. furnished an old list of charge customers, names and addresses, together with an itemization of those accounts reconstructed by the Company itself from other records (these constituted about 40.7% of the total). This information eliminated the need for a detailed decipherment of every account in the books. On the other hand, the customer name and address at the top of every sheet had to be deciphered in order to determine whether further decipherment of the various entries was necessary or whether it was one of the accounts previously reconstructed by the Company.

LABORATORY PROCEDURE

Laboratory examination of the two ledger books encompassing the alphabetical names A to L and L to Z was conducted by removing the fabric covers and examining the pages one at a time, separation being accomplished with a thin metal strip which was carefully inserted between adjoining pages. Fortunately, the pages were quite flat and did not stick together noticeably.

Detailed examination of the separated pages disclosed that the intensity of charring progressed from the edges of the page toward the center with the outer two or three inches (unfortunately bearing the bulk of the information as to customer name and status of account) being most badly burned. Those sheets near the back and front covers of each book proved to be more badly charred than those in the center, due, apparently, to their proximity to the intense heat. Inasmuch as these books were burned in an enclosed container, it is probable that the charring was due principally to heat rather than fire.

In addition to the charring, one of the books suffered severe water damage which caused some of the inks, apparently aniline dye (non-permanent type) to wash almost completely from the page and to soak through and leave impressions on previous and succeeding pages.

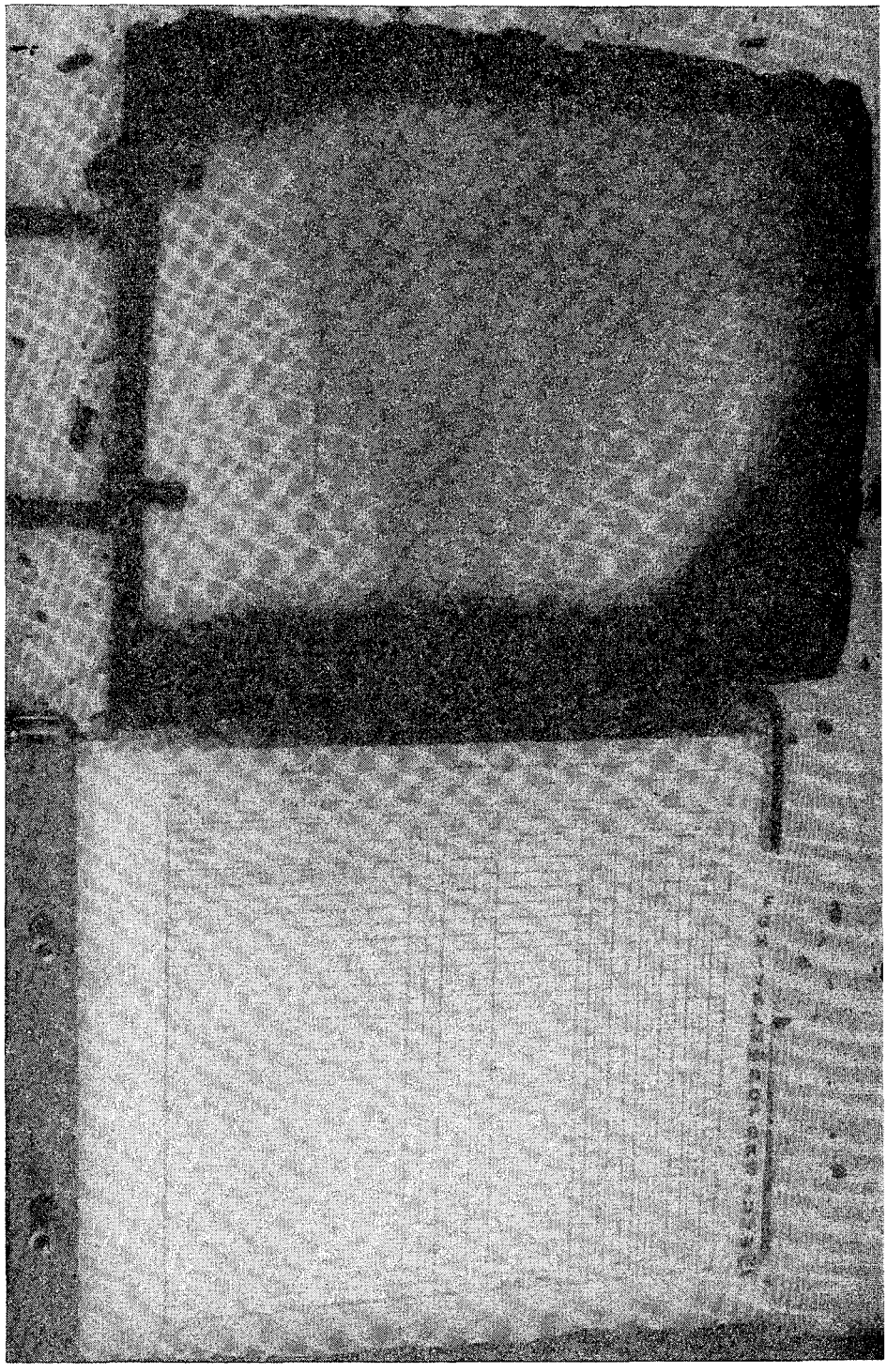

Figure 1

Ledger Book Before and After

Top: Charred ledger book as it was presented for examination. Bottom: Reconstructed account in new ledger book.

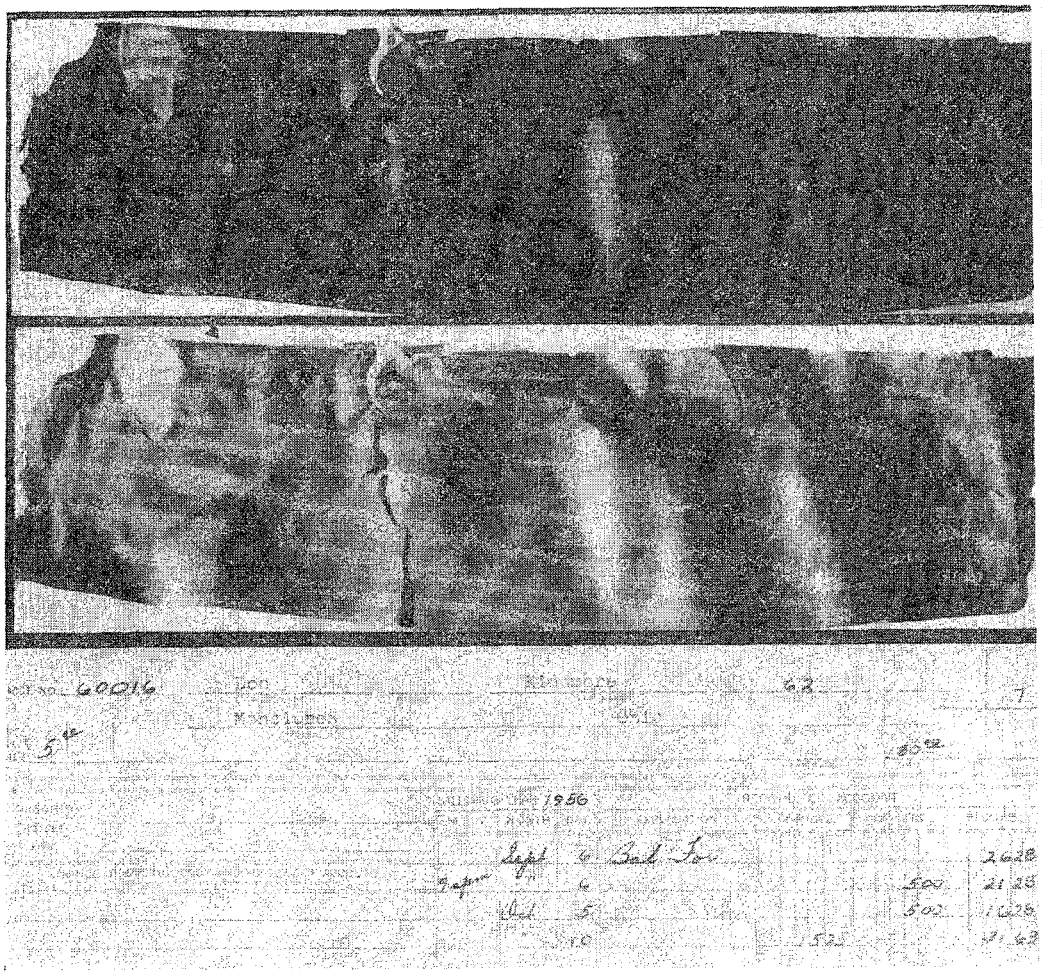

Figure 2

Decipherment and Reconstruction of Charred Ledger Page

Top: Charred page before treatment. Center: Appearance of page following treatment. Bottom: Reconstruction of account on new ledger page.

Since some 681 sheets were involved in this investigation, it was necessary to devise a rapid yet certain method of deciphering the blackened and water soaked paper and recording the information for use in reestablishing the accounts. The latter problem was simply solved with the company's submission of two new books, identical to the damaged ledgers, for use in transferring the desired information (figure 1).

Deciphering Charred Sheets

The primary problem, of deciphering the charred documents, was not so simple. After numerous experiments, however, some of which were described in previous issues of this Journal,[1] the following procedures were adopted:

A. A solution of two parts water, five parts denatured alcohol, and three parts glycerin was first prepared. A one-inch soft camel's hair brush was dipped in this solution and gently applied to the charred portions of the ledger page, a small segment at a time. At the same time an intense light, in this case a Spence

[1] "Decipherment of Charred Documents," David A. Black, Journal of Criminal Law and Criminology, Vol. 38, No. 5, Jan–Feb, 1948. "Decipherment of Charred Documents," John F. Tyrrell Journal of Criminal Law and Criminology, Vol. 30 No. 2, July–Aug, 1939.

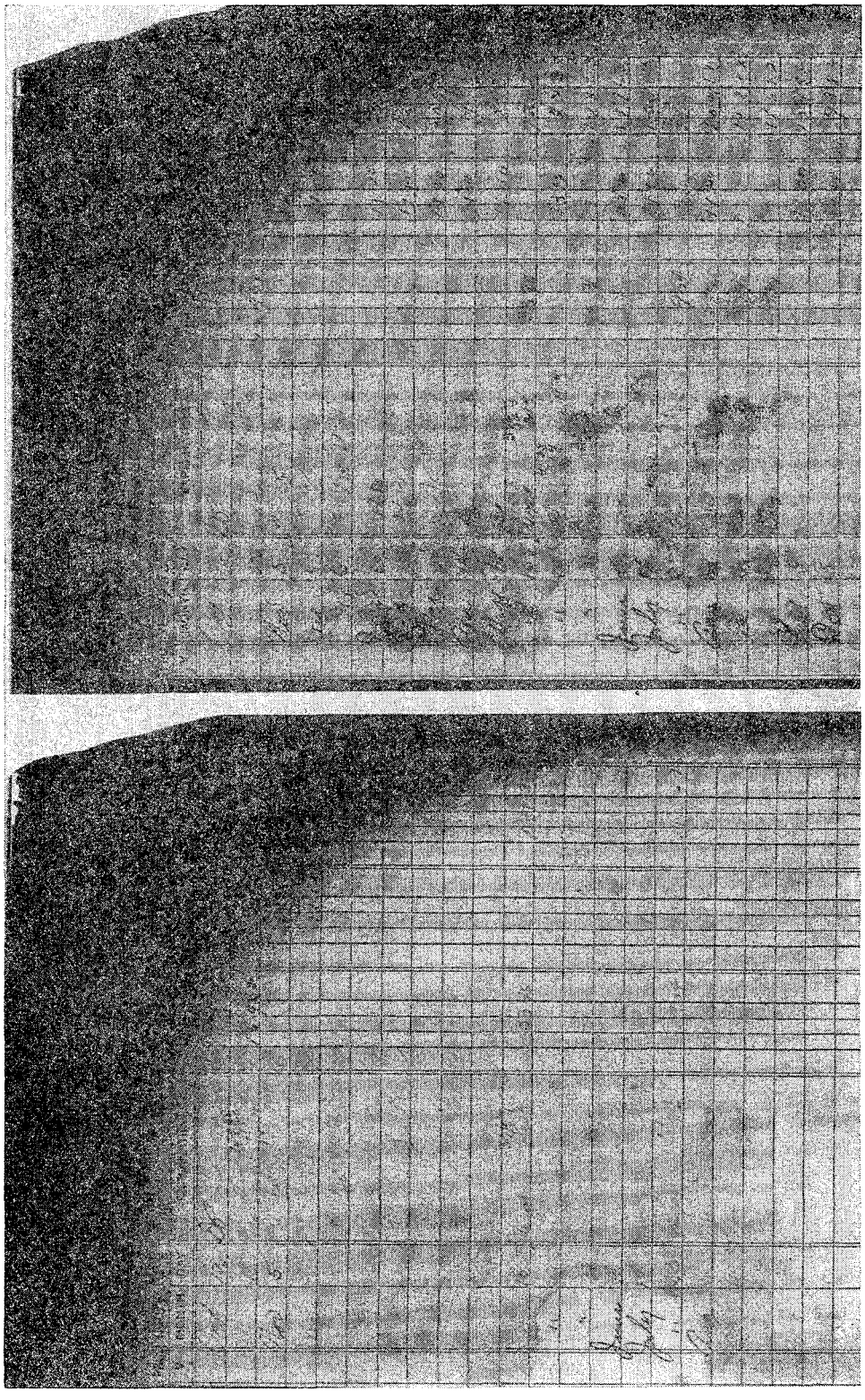

Figure 3
Decipherment of Water Soaked Document
Left: Water soaked page as it appeared upon visual examination. Right: same page photographed with Wratten A (red) filter.

100-watt lamp, was directed at a 45° angle relative to the surface of the paper. Depending upon the original ink used, the writing would sometimes pop up immediately. Or, in other cases, the writing would become faintly visible only after some time had elapsed. In a few instances it required three or four applications of the solution plus viewing under different angles of illumination to recover the writing. After desired portions of the charred documents were deciphered, the information was immediately transferred to the new ledger page (figure 2).

B. In a few isolated instances a viewing of the fragment under various angles of reflected light was sufficient to decipher the writing without application of any chemicals. This was apparently due to the use of carbon or dense iron gall inks, which caused the writing to stand up in relief from the surface of the paper.

C. A third method was tried in three or four cases involving very badly charred fragments. The fragment was placed between two fine wire screens. A flame from an alcohol lamp was then applied to the charred paper, reducing it to a semi-white ash. In one or two instances this created a remarkable clarification of the writing, but in others it failed entirely. This method, of course, is recommended only as a last recourse since the charred fragment is rendered unsuitable for any other procedure.

DECIPHERING WATER SOAKED SHEETS

A. As stated previously, many of the ledger pages in one of the books were badly soaked by water. Indeed, the damage was so severe that when the documents were inspected, some two months later, the pages still displayed considerable dampness to the touch. Examination of these water soaked pages involved entirely different procedures than the charred document fragments. For example, the ink in the central portions of the pages, which in the unsoaked documents aided in the decipherment, was often smeared or completely washed from the paper and penetrated through to other pages. This transferrance of ink from one page to the other complicated the examination considerably because it was difficult to determine which was the original writing and which was the writing transferred from a previous page. Examination of the water soaked areas by means of transmitted, oblique, and other types of lighting in conjunction with colored filters, however, disclosed either indentations made by the writing instrument, a faint yellow outline of the original writing, or both (orange and red filters seemed to provide the best clarification). The offset writing could usually be distinguished by its fuzzy appearance and the fact that the writing did not fall within the prescribed printed squares of the form (figure 3).

Using the above techniques, it is estimated that all but one or two of the 681 ledger sheets were deciphered sufficiently to enable a reconstruction of the account. The word 'sufficiently' is used because in some instances a portion of the name, address, or balance was missing due to breakage, or the writing was partially undecipherable. In these instances, however, enough additional information was available to reconstruct the account. For example, if a name was missing, the address might be decipherable. Where portions of the name and address were missing, the place of employment and occupation of the customer aided in reestablishing the account. In other cases data in the "Delinquent" or "History of Account" area of the form assisted in providing valuable information.

The decipherment of these time-payment ledgers entailed about a month and a half of work. As the various alphabetical accounts were deciphered and the information transferred to the new Accounts Receivable Ledgers furnished by the Company, the information was forwarded directly to the Montgomery Ward office in Chicago for processing. At the conclusion of the entire project the Montgomery Ward Co. sent form letters with their regular monthly billings in which the reconstructed balance as determined by the decipherment was set forth and asked for customer confirmation of this amount. The response in almost every case confirmed the results of the decipherment. At the conclusion of this project the Company reported an outstanding balance in their Accounts Receivable Ledger of less than 2%.

This story might have had a different ending, however, if it had not been for the wisdom and foresight of the Company management which took full advantage of the scientific decipherment procedures available to modern business.