

## Treatment 305: A Love Story

### ABSTRACT

Treatment 305 was developed at Princeton University Libraries by conservators Brian Baird and Mick Letourneaux. A paper detailing this binding structure was published in volume 13 of the Book and Paper Group Annual in 1994, entitled “Treatment 305: A Collections Conservation Approach to Rebinding.” Essentially, a tight joint binding with a natural hollow and minimal spine linings was developed that incorporated aspects of 18th and 19th century bindings without any of their inherent weaknesses. The Treatment 305 structure provides an incredibly flexible and durable binding that opens very flat and places minimal strains on the book during use. Given the nature of the Indiana Historical Society’s collection, Treatment 305 seemed like a logical solution to the dilemma of rebinding damaged late 18th to mid-19th century books, especially if a few adjustments could be made to tailor the structure, adhesives, and covering materials to a more special collections approach to rebinding.

### INTRODUCTION

The Indiana Historical Society (IHS) library’s collection policy states that it “collects all subjects and formats of research material, both primary and secondary, dealing with pre-territorial and territorial history, and the history of Indiana through the twenty-first century.” The collection spans the period from approximately the late 16th century to the present day and includes many different paper-based formats, such as books, diaries, maps, manuscripts, prints, photographs, and architectural drawings. Simply due to the focus of IHS’s collection, a substantial portion of printed books date from the late 18th through the mid-19th centuries. Many of these books exhibit typical damage, such as detached boards and split spines; however, there are a fair amount whose bindings are either nonexistent or so degraded that they need to be rebound. Many of the books without bindings have also

sustained significant water damage or are heavily discolored and stained, which in some cases has warranted full treatments. Full treatments include washing, sometimes resizing, extensive guarding and mending, and ultimately rebinding in an appropriate structure taking period aesthetics into account.

IHS’s collection is frequently used by the general public, by staff conducting research for publications, marketing, or upcoming exhibits, and by the preservation imaging department that creates various digital content for the IHS website. Materials need to be stable enough to withstand this type of handling and use, especially in the case of books, as bindings that are too tight can make digitization and their use difficult if not impossible. The manner in which the collections are used and the current increase in institutional exhibition of original material would best be served by bindings with good mobility and durability.

Recreating historical book structures is not without its complications, and there has been much discussion over the years of the pros and cons of replicating historical structures versus improving on them by creating “conservation bindings” (Brown and Ogden, 1998; Frost 1982; Haqqi 2016; Tribolet 1953). A conservator’s reflex reaction is to do no harm and improve upon the original structure. It broke in the first place, so why should a faulty binding be recreated that could perpetuate damage? Preserving as much of the original object and its context as possible, even though it might require rebinding, has always been a priority; however, all original binding elements do not always need to be recreated. For example, a single-hold link stitch pattern can be used when resewing books that were previously bound around sunken cords rather than recreating the original sewing structure. The link stitch is a strong, flexible sewing and fills in gaps left behind by sawn-in cords. When appropriate, original sewing structures are recreated in an effort to preserve the history of how that unique book was put together. Reincorporation of original binding remnants with recreated sewing achieves an overall aesthetic reminiscent of the book’s historical context. Hopefully, this approach to rebinding can provide the user with a fuller experience when handling the book, if even only on a subconscious level. In addition, information about the structure and binding styles of a given time period

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can be better preserved for scholars interested more in the materiality of the book rather than its contents.

An important aspect of “conservation binding” is the creation of a structure that subjects a book to minimal risks for the rest of its usable life. The new binding should be constructed of good-quality materials that will age well and not adversely affect the original binding components, and will not deteriorate in the same way as historical binding materials; red rotted leather comes immediately to mind. It is a difficult balance: do you replicate a historical structure with all of its inherent vices and flaws, or do you improve upon it and use materials or structures that are not completely “historically traditional” but could improve the life of the object? Conservators wrestle with this question everywhere, and the answer will vary among objects as well as institutions. The ultimate goal when rebinding books in the IHS’s collection is to improve their mobility so that they will essentially preserve themselves during use. However, a secondary goal is to create an object that is aesthetically harmonious with its time period even if there is not much left of the original binding. For instance, a modern case binding on a book from the 18th century would appear out of place, so a new structure more appropriate to its original publication date would be constructed instead. This is where Treatment 305 is useful. It bridges the divides between good mobility, durability, and aesthetics, which can be endlessly customized to place the book within its proper historical context all while using conservationally sound materials.

#### TREATMENT 305

In Baird and Letourneau’s original article detailing the Treatment 305 procedure, the authors specifically discuss the inherent problems associated with 18th and 19th century bindings, such as thinly pared leather joints that split, red rotted leather, and spines that are too stiff and impede mobility. They go on to characterize books from this period as having weak, broken bindings but strong text blocks printed on good-quality paper. This has certainly been the case with the majority of damaged 18th and 19th century books in IHS’s collection that have come through the conservation lab. Baird and Letourneau developed a tight joint, hollow back binding structure that is “congruous” with binding structures from this period without the inherent weaknesses (Baird and Letourneau 1994). The resulting binding is extremely flexible and very durable, and it can be easily modified by using different sewing supports or covering materials, as will be demonstrated by the following treatment case studies.

#### SEWING

In the original Treatment 305 article, the authors preferred resewing text blocks using a two-hole link stitch pattern sewn around cloth tapes, which were chosen due to their durability

and flexibility. They mention that other sewing structures can be used depending on the original sewing of the book, its value, and the choice of covering material. New double-folio endpapers were always added to a text block even if it would not be completely resewn. These would be attached using the same two-hole link stitch pattern sewn around tapes that had been adhered across the width of the spine.

#### SPINE LINING

The spine is rounded and backed as appropriate to the book, lined with a kozo fiber paper reversibility layer, then lined with an overhanging crash lining using polyvinyl acetate (PVAC). False endbands are added at this point if desired. Baird and Letourneau state that usually a third lining is not necessary except in rare cases when it seems that the text block requires additional support. The minimal spine linings are what create the flexible mobility and allow the text block to lie nearly flat during use.

#### BOARD ATTACHMENT

The board attachment is essentially that of a tight joint binding, but the boards are not laced in; rather, the sewing supports and overhanging lining are inlaid into the tops of the boards. This type of text-to-board attachment creates a sturdy joint area that can easily flex repeatedly but is not as prone to splitting as thinly pared leather joints.

#### COVERING

A variety of covering materials can be used, providing myriad options when reproducing the aesthetics of historical bindings. The authors most often used cotton-linen blend materials because they are flexible, durable, and easily colored. Baird and Letourneau even constructed molded spines using linen book cloth to accommodate original raised bands on the books that were not resewn. Another key aspect of this binding is that there is no paper spine inlay in the covering material. This allows for greater flexibility during use but also, more importantly, distributes the forces of opening across a greater area and does not concentrate them at the top of the shoulder and joints, which can lead to stress points that will eventually break.

The authors originally proposed this treatment as a bridge between special and general collection treatments for medium rare items that tend to be a large part of institutional book collections. After constructing a model and observing the benefits of this structure and the ease with which it could be made, it seemed completely appropriate for use on special collections materials and worth exploring further to determine if different materials and adhesives could be used in its construction, as the authors suggested.

## TREATMENT CASE STUDIES

## CASE STUDY 1

This item consisted of two groupings of pamphlets detailing early laws and acts of the Indiana Territory before it was established as a state in 1816. The text block was composed of handmade paper sections, with relief printed text and manuscript annotations written throughout the book in a variety of inks. These two groupings, or volumes, were different sizes and bound together using an abbreviated sewing pattern around two sunken support cords. There were remnants of original red and white striped false endbands adhered to the text block. These endbands were constructed by wrapping a piece of printed striped cotton cloth around a cord core.

When this book arrived in the lab, the only remaining original binding elements were the false endbands, a fragmented spine lining, and some remnants of the original sewing thread scattered throughout the sections (fig. 1). The text block was split in half at the point between the *Acts* and *Laws* volumes, essentially at the point where the pamphlet leaves changed size (fig. 2). The paper was significantly darkened and yellowed with signs of previous water damage in the form of tide lines and stains throughout. In addition, there were several tears throughout the text block and many detached leaves at the front and back sections. The paper from the 1792 *Acts* volume was also very limp and soft, with splits beginning to form in some areas.

After discussions with the curator, it was decided to separate this book into two volumes and rebind each one separately. Both treatments were similar, and both books were rebound using the Treatment 305 structure with matching covering materials. The only different treatment procedure was that the 1792 volume was resized and the 1802 volume was not, as the paper was much sturdier and in better



Fig. 1. *Acts Published by the Governor and Judges of the Territory of the United States, North-West of the River Ohio . . . (1792)*. Before treatment. The only remaining original binding elements were fragments of the false endbands, spine lining, and some remnants of sewing thread (not visible).

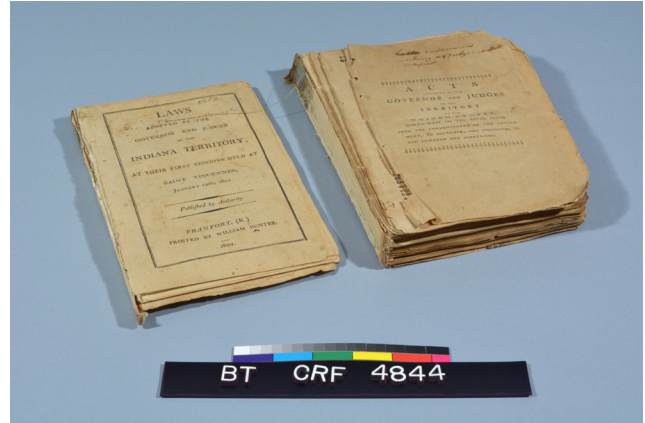


Fig. 2. *Acts Published by the Governor and Judges of the Territory of the United States, North-West of the River Ohio . . . (1792)*. Before treatment. The text block had split at the point where the two volumes were joined together. The 1802 volume was smaller in size and could have caused structural issues if rebound in the original manner.

condition overall. Since both treatments were so similar, only the treatment of *Acts Published by the Governor and Judges of the Territory . . . (1792)* will be described in the following. The decision to use the Treatment 305 structure was made after handling the fragile paper and having discussions with the curator on the importance of these books to the collection. He anticipated that the volumes could be frequently used, so a flexible binding that would not strain the text block and would hold up well over time was required. Given the books' publication period, Treatment 305 facilitated the creation of historically sympathetic bindings with more robust materials than would have been used traditionally. Other structures, such as French groove case bindings, would have looked too modern even if they allowed the book to function well. Non-adhesive paper case bindings were considered due to their flat opening but would not have been aesthetically appropriate for these books. As such, they would have appeared as more of an enclosure and would not have been in line with the curator's goals. This treatment was the first application of Treatment 305 to a collection item, and therefore Baird and Letourneau's original procedures were followed closely before making any modifications.

## TREATMENT PROCEDURE

1. The spine was cleaned with a 4% (w/v) methyl cellulose poultice to remove the original broken spine linings and adhesive residues. The text block was disbound entirely and then collated into two-folio sections.
2. The text block was dry-cleaned with vulcanized rubber sponges and vinyl erasers. Pages were numbered in the upper fore-edge corners lightly in pencil to facilitate tracking during the treatment process (these marks were erased after the text block was re-sewn).



3. After testing of the various inks found throughout the text block, the sections were washed in baths of filtered water until clean. The leaves were alkalinized in the final bath using a calcium hydroxide solution at pH 8.0. The text block sections were air-dried between Reemay on a drying rack to preserve as much of the original type impression and texture of the paper as possible.
4. Due to the limp and soft nature of the text block paper, resizing was necessary to strengthen the pages before re-binding. The leaves were resized in a bath of 0.5% (w/v) warm gelatin solution in filtered water. The sections were air-dried again between Reemay on a drying rack.
5. Once dry, the leaves were removed from the rack, collated, and placed between boards under light weight to compress the text block for two weeks.
6. The text block was guarded and mended, and losses were filled using thin, Barrett kozo fiber paper and Zen Shofu precipitated wheat starch paste. Kizukishi kozo fiber paper was used in several places where heavier fills were required.
7. Double-folio endpapers were constructed from Nidegen paper toned with Golden acrylics to closely match the color of the text block paper.
8. The text block was re sewn using an all-along, two-hole link stitch pattern around three ¼ in. wide cotton twill tape supports (fig. 3) using a lightly waxed linen thread. Most of the section folds were heavily damaged, so most of the new holes were punched in the guard paper and not through the original text block paper.
9. The spine was consolidated with wheat starch paste, rounded and backed, and then lined with a reversibility layer made from Kizukishi kozo fiber paper.
10. New endbands were constructed using red and beige printed cotton cloth wrapped around a linen cord core

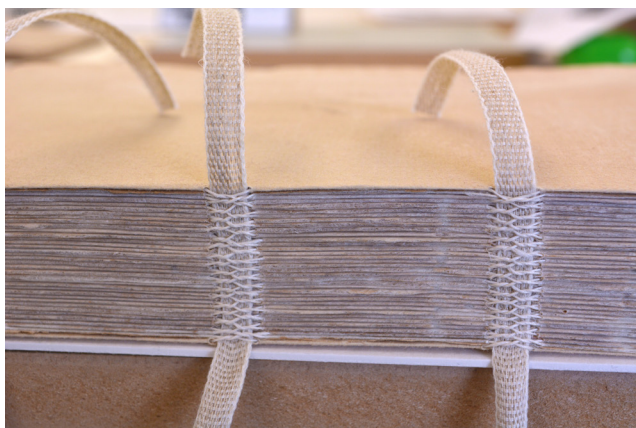


Fig. 3. *Acts Published by the Governor and Judges of the Territory of the United States, North-West of the River Ohio . . .* (1792). During treatment. The text block was re sewn using an all-along two-hole link stitch pattern around cloth tapes.

- stiffened with wheat starch paste. The endbands were then adhered over the reversibility layer with paste.
11. The final spine lining made of unlined linen cloth cut wider than the text block was applied with wheat starch paste instead of PVA.
12. New boards were constructed from two layers of four-ply museum mat board to accommodate the thickness of the shoulders and attached to the text block using the Treatment 305 structure by inlaying the overhanging linen lining and tapes into the tops of the boards.
13. The book was covered in a quarter style using Cotlin book cloth on the spine and Ruscombe Mill blue hand-made paper on the boards. A laser-printed paper label was generated, coated with matte spray fixative, and adhered to the spine. The new binding elements and pastedowns were adhered with a 1:1 mix of Jade 403 PVA and 4% methyl cellulose (figs. 4, 5).

#### CASE STUDY 2

This book was another early Indiana government publication detailing the procedure of incorporating Indianapolis into Marion County and had clearly endured strange rebinding efforts over the years. The current binding was constructed from red leather with a gold title stamped on the front cover. The boards were made of heavy cardstock with blue machine-made paper pastedowns and were placed around the original, much older binding remnants. The original binding was a quarter-style brown leather and yellow paper tight joint structure with evidence of two support cords adhered under the pastedowns. The front yellow cover paper was printed with the title and publishing information, and there was a separate piece of paper with a large letter “A” written on it adhered to the outside of the original back board. This book

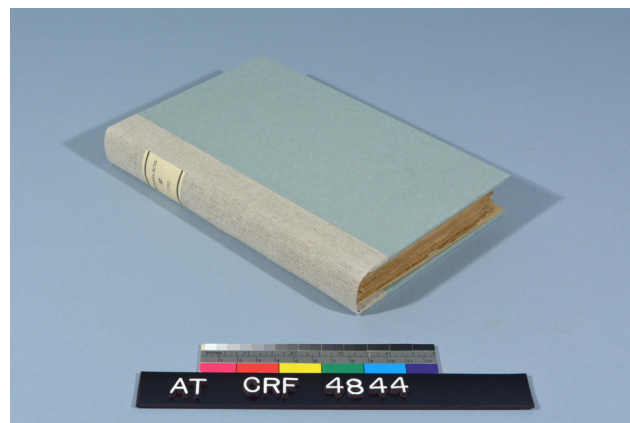


Fig. 4. *Acts Published by the Governor and Judges of the Territory of the United States, North-West of the River Ohio . . .* (1792). After treatment. Cotlin book cloth was used on the spine and Ruscombe Mill hand-made paper on the boards to mimic the aesthetic of early publishers' boarded bindings from the late 18th century.

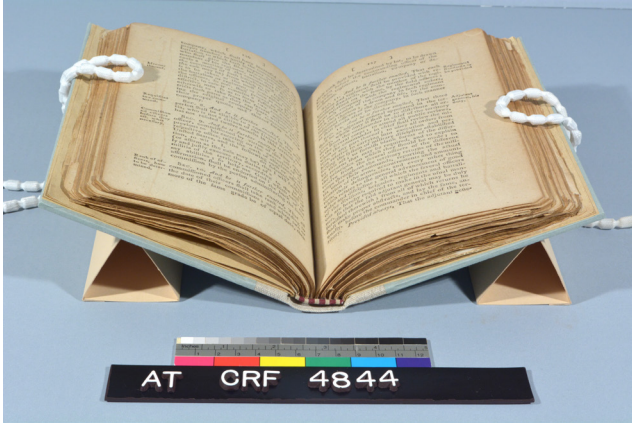


Fig. 5. *Acts Published by the Governor and Judges of the Territory of the United States, North-West of the River Ohio . . .* (1792). After treatment. The book opens and functions well and does not strain the pages during use.

essentially had a binding that consisted of double boards at the front and back that were not laminated together. Only the original boards were attached to the text block by wide pieces of gray cloth tape. The text block was composed of two-folio sections sewn in an abbreviated sewing pattern around two sunken support cords.

Worse than the strange multilayered binding was the fact that this item had sustained heavy water damage, causing all of the boards to warp and covering materials and original pastedowns to delaminate (fig. 6). The red leather dye was also apparently water sensitive and had heavily stained several pages mostly at the front and back of the text block (fig. 7). The red leather was completely delaminated from the front and back boards, which were severely warped and brittle with large edge losses. The original binding elements were also heavily degraded, and the leather strips



Fig. 6. *An Act to Incorporate the Town of Indianapolis in the County of Marion* (1838). Before treatment. The book was bound in a multi-layer binding and had sustained heavy water damage.

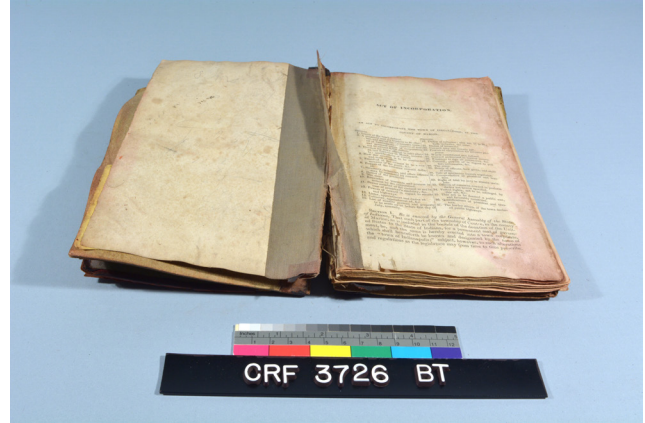


Fig. 7. *An Act to Incorporate the Town of Indianapolis in the County of Marion* (1838). Before treatment. Red staining as a result of the red leather dye bleeding into the paper during previous water damage.

on the boards had blackened and become extremely brittle as a result of the water damage. The yellow printed paper covering material was heavily fragmented and cracked throughout with large areas partially delaminated from the original boards (fig. 8).

After extensive examination and discussions with the curator, it was decided to revert this book back to its quarter-style binding. There was some discussion of simply rebinding it in a paper case, but since so much of the original covering material remained and it contained information pertaining to the volume, it seemed more appropriate to reincorporate these materials into a usable structure. The red leather binding was obviously more modern and was so heavily degraded that it was unusable. In fact, most of the original binding elements could not be reused due to the significant level of damage they sustained. In addition to the text block and original pastedowns,

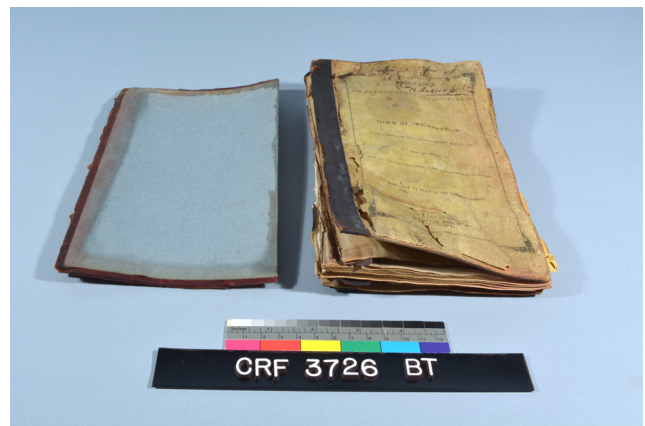


Fig. 8. *An Act to Incorporate the Town of Indianapolis in the County of Marion* (1838). Before treatment. The original binding elements with blackened spine leather and severely cracked and delaminated yellow printed paper covering material.



only the printed yellow paper covering material was salvageable and reincorporated into the new structure. It seemed as though Treatment 305 would again be appropriate since the resulting binding would be very flexible and would allow for easy incorporation of the original paper covering material. Due to the use of more original materials in the new binding, some different treatment procedures and materials were used than those described in Baird and Letourneaux's original article.

#### TREATMENT PROCEDURE

1. The text block was disbound entirely and the surface cleaned with vulcanized rubber sponges.
2. After testing the ink and pencil annotations for water sensitivity, the sections were washed in baths of filtered water and then alkalized in the final bath using a calcium hydroxide solution at pH 8.0. The leaves were air-dried on a drying rack between Reemay.
3. The bath failed to remove an adequate amount of red staining from the first three and last three sections, so they were subsequently blotter washed, which did pull out quite a bit more red colorant from the paper. The leaves were air-dried again on the drying rack between Reemay.
4. Damaged sections were guarded with Kizukishi kozo fiber paper, and tears were mended with Tengucho thin kozo fiber paper and Zen Shofu precipitated wheat starch paste.
5. The original pastedowns were composed of two layers of paper laminated together with a thick layer of animal glue. These were separated and cleaned in the bath and then hinged onto the first and last sections of the text block with Kizukishi paper strips.
6. The text block was resewn using lightly waxed linen thread in an all-along single-hole link stitch pattern, reusing the original sewing holes.
7. The spine was consolidated with wheat starch paste, rounded and backed, and then lined with a reversibility layer of Sekishu natural kozo fiber paper, followed by an overhanging linen lining.
8. The original yellow printed paper covering material was severely shattered and torn. The paper was lifted off of the original boards with filtered water and the aid of a polyester film support. The leaves were then blotter washed, which removed a significant portion of the red staining from the paper without compromising the cracked areas and small fragments (fig. 9).
9. The yellow covering material was then lined with wheat starch paste and thin Yame Kozo Hadaura paper, a dyed kozo fiber paper available from Talas, that was additionally toned with Golden acrylics before lining to better match the color of the original papers. The lined covering material was dried between blotters and boards.

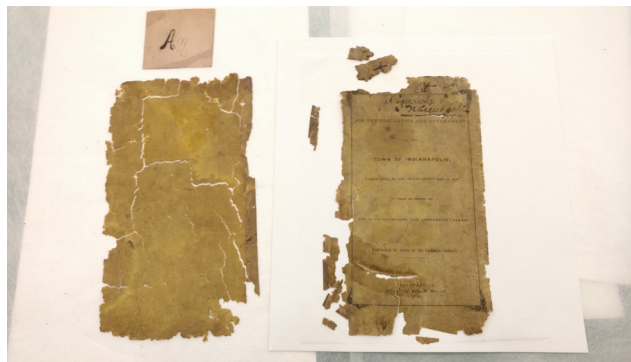


Fig. 9. *An Act to Incorporate the Town of Indianapolis in the County of Marion* (1838). During treatment. The fragmented original covering material after blotter washing.

10. New boards were constructed by laminating two pieces of four-ply colored museum mat board with full thickness wheat starch paste as in the previous treatment.
11. The book was rebound using the Treatment 305 structure using only wheat starch paste as the adhesive. The text block was fairly thin, so sewing supports were not needed for reinforcement and only the overhanging linen lining was inlaid on top of the boards to create the text-to-board attachment.
12. A new spine piece was constructed by toning a strip of linen and kozo fiber paper laminate with Golden acrylics. After the material dried, SC6000 was applied and buffed with a soft cloth to produce a slight sheen to mimic the look of leather. The new spine piece was adhered to the new boards with paste.
13. The lined original printed covering material was adhered on top of the boards with wheat starch paste and dried under heavy weight (figs. 10, 11).
14. The original pastedowns were adhered to the inside of the boards with wheat starch paste in a two-step process to



Fig. 10. *An Act to Incorporate the Town of Indianapolis in the County of Marion* (1838). After treatment. Front overall with a new spine piece and the original covering material incorporated into the new binding.

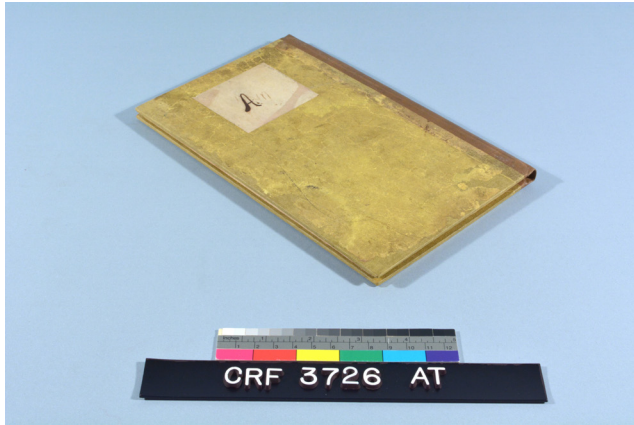


Fig. 11. *An Act to Incorporate the Town of Indianapolis in the County of Marion* (1838). After treatment. Back overall.

prevent the board from winging out from the text block.<sup>1</sup> After the first pastedowns were adhered and mostly dried, the second leaves were applied and then dried with fences between blotters and boards under heavy weight. The resulting binding functioned well with boards that laid flat (figs. 12, 13).

### CASE STUDY 3

This book is part of a four-volume set detailing surgical techniques of the late 18th century, written by Benjamin Bell, a member of the Royal Colleges of Surgeons of Ireland and Edinburgh, one of the surgeons to the Royal Infirmary and fellow of the Royal Society of Edinburgh. This volume belonged to William Guthrie of Monticello, Indiana, a doctor practicing in the area in the mid-1800s. The only remnant of the original binding was a heavily fragmented brown leather spine piece that was gold tooled with three lines. There also remained about half of a red leather gold-tooled spine label

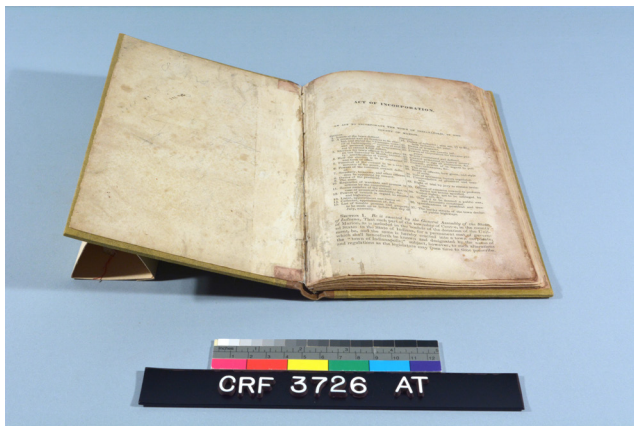


Fig. 12. *An Act to Incorporate the Town of Indianapolis in the County of Marion* (1838). After treatment. First page with red staining minimized.

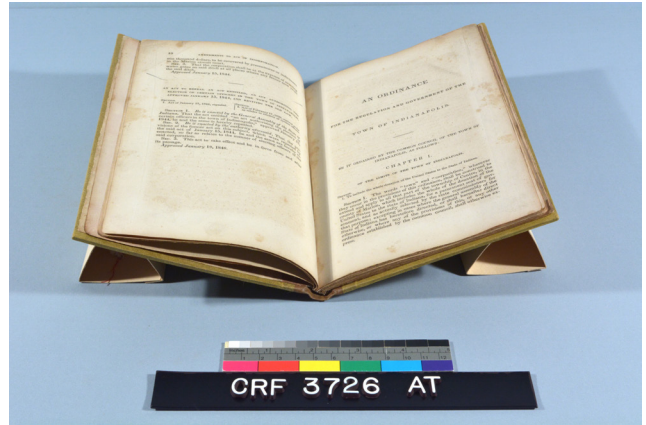


Fig. 13. *An Act to Incorporate the Town of Indianapolis in the County of Marion* (1838). After treatment. The text block is very flexible and moves easily.

with a decorative border around its perimeter. The text block was composed of two-folio handmade paper sections with relief printed text and engraved illustration plates depicting various surgical implements. These illustrations were incorporated throughout the text by a combination of tipped edges and stubs wrapped around inner folios and adhered to neighboring leaves. The sections were sewn around three sunken support cords using a two-on abbreviated sewing pattern. There were several annotations and William Guthrie's signature written in blue and iron gall inks on the first five pages of the text block.

The remaining original leather spine piece was heavily deteriorated and brittle, exhibiting red rot and severe cracking. The text block sustained heavy previous water damage and was stained and discolored throughout with many tide lines. The paper was also heavily soiled toward the front and back of the book, and several of the exterior-most leaves were torn and heavily creased. The text block was split and broken into three sections with several detached or tenuous leaves as a result of the breaks in the sewing. The engravings were heavily tipped to the text block leaves, which created stress points as the text block paper was quite thinner than the paper used for the illustrations (figs. 14, 15).

Once again, it seemed that this book required a full treatment that would include washing; however, testing revealed that the blue ink used for the annotations and signatures was extremely water sensitive and the iron gall ink annotations on the first two leaves were also problematic<sup>2</sup> (Jacobi 2011). Gellan gum seemed like an appropriate material to use to wash these pages, as windows could be cut in the gum to avoid the water-sensitive media (Maheux 2015). The two leaves containing iron gall ink signatures were left unwashed because they also contained the water-sensitive blue ink, and thus a phytate treatment would not have been possible. If gellan gum had been used to wash these pages, the visual difference





Fig. 14. *A System of Surgery, Volume 1 (1791)*. Before treatment. Front overall showing the split text block, staining, and annotations written in iron gall and blue inks.

between the washed and unwashed areas would have been very stark and distracting. It is not ideal to leave book pages unwashed, but it seemed to be a necessary compromise that was required in this situation.

Rebinding would be necessary after treatment, and given the thickness of the text block and the various paper weights throughout the book, a flexible binding was desirable that could be aesthetically sympathetic to the other two volumes in the collection. Volumes 2 and 4 of this work in our collection were published earlier, in 1785. Most of their original bindings remained intact, and therefore they were used as a reference for some of the aesthetic choices made during the rebinding of volume 1. Volumes 2 and 4 were bound in full brown leather, also with red spine title labels and gold-tooled spine lines. The gold tooling proportions were different from volume 1, and there were remnants of sewn endbands in plain cream-colored thread visible on one of the older volumes. Rather than using leather, a laminate of acrylic cast composite



Fig. 15. *A System of Surgery, Volume 1 (1791)*. Before treatment. Detached leaves and staining visible at the back of the text block. Similar tide lines were visible throughout the rest of the book.

leather (Owen and Reidell 2010) and cotton fabric was used for the spine piece. These materials tend to have better aging properties and with the use of cast composites can be made to look very convincingly like real leather (Minter 1985; Duffy 1989). Due to the lack of a mold large enough to create a sheet of cast composite leather to use for a full binding, paste paper was made using a pulled pattern typical of the late 18th century for use as the covering material on the boards. Gold lines were added to the spine in a similar proportion to the original binding using acrylic paint. A spine title label was created using a red piece of cast composite leather screen printed with the same gold acrylic paint used for the spine lines to mimic gold tooling. Printing and painting on the cast composite material was a more cost-effective method of mimicking gold tooling than purchasing sets of brass tools or other metal stamps.

#### TREATMENT PROCEDURE

1. After consolidating with 1.5% (w/v) Klucel G in ethanol, the original leather spine fragments were faced with gelatin-coated remoistenable tissue and lifted from the spine mechanically and with the aid of 2% (w/v) gellan gum applied through a layer of Hollytex. This was too much moisture for the leather, which did darken slightly, but it facilitated removal. The leather was extremely degraded and could not be removed without applying some moisture, as otherwise it would have crumbled completely. The slight color shift seemed acceptable to be able to remove the fragments in large pieces. The lifted leather spine was lined with Tenguchoko fiber paper and encapsulated in polyester to be stored with the book in its enclosure.
2. The remaining adhesive residue was cleaned from the spine using a 4% (w/v) methyl cellulose poultice, then the book was disbound entirely.
3. The pages that contained the water-sensitive blue ink were lightly humidified in a humidity chamber and then washed between two sheets of 4% (w/v) gellan gum for approximately 40 minutes. Windows were cut into the top and bottom sheets of gum to avoid the ink annotations (fig. 16). The washed pages were dried between blotters and boards, and tide lines around the blue ink-containing areas were reduced by locally blotting the tide lines, front and back, with small pieces of 4% gellan gum until reduced (figs. 17, 18). The conjugate leaves that did not contain any ink annotations were washed in an immersion bath of filtered water for approximately 40 minutes, partially air-dried on a rack, then dried between blotters and boards. After treatment, it was not visually obvious that two different washing methods were used to treat these pages.
4. The rest of the text block was washed in an immersion bath of filtered water. Some of the more heavily stained



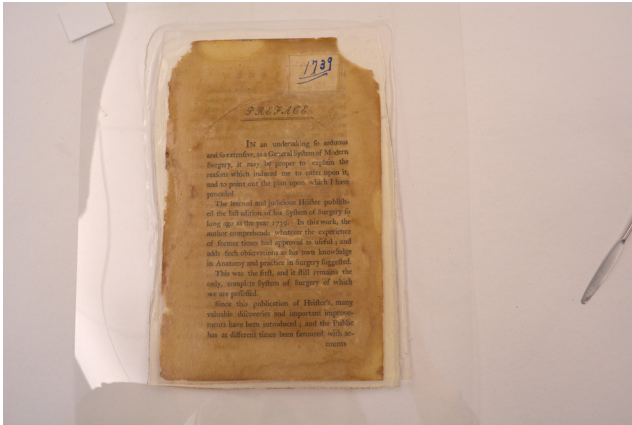


Fig. 16. *A System of Surgery, Volume 1 (1791)*. During treatment. Window cut into the gellan gum sheet to avoid the blue ink annotation. A corresponding window of the same size was cut in the bottom sheet of gellan gum to completely prevent moisture from touching the blue ink.

illustrations were washed a second time using TEK-Wipe to pull out more discoloration; however, most of the tide lines could not be fully removed. The pages washed in the bath were air-dried between Reemay on a drying rack.

5. The sections were mended and guarded with Kizukishi kozo fiber paper and Zen Shofu precipitated wheat starch paste. The heavily tipped illustrations were released during the bath and reattached to their corresponding sections with loose guards, sometimes using the original paper stub and sometimes extending these stubs with a strip of Kizukishi paper adhered with wheat starch paste. After guarding and mending, the sections were pressed between boards and light weight for about two weeks to flatten before rebinding.
6. Double-folio endpapers were constructed from Ruscombe Mill Stone Laid handmade paper toned with Golden

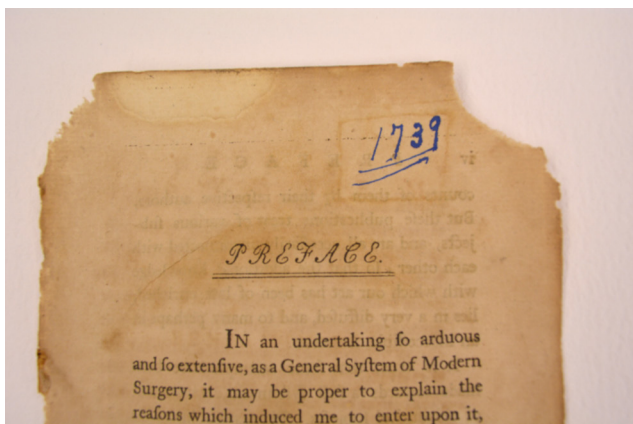


Fig. 17. *A System of Surgery, Volume 1 (1791)*. During treatment. Tide line after gellan gum washing.

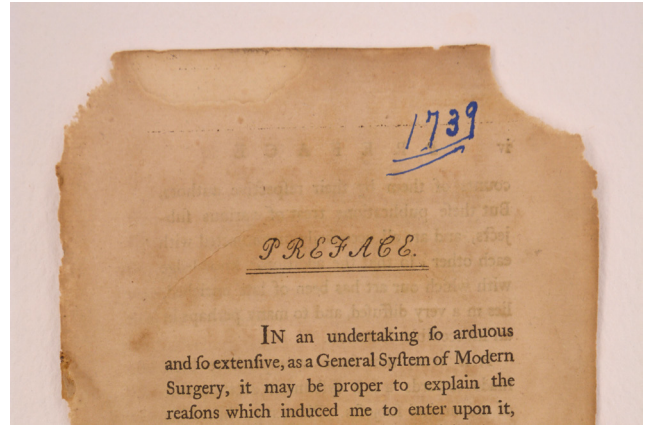


Fig. 18. *A System of Surgery, Volume 1 (1791)*. During treatment. The tide line has been minimized by dabbing it with a small piece of 4% gellan gum, drying between reapplication.

acrylics to better match the color of the original text block paper. The text block was re sewn two-on around three sunken linen support cords using the original abbreviated sewing pattern and original sewing holes.

7. The text block was rounded and backed, then lined with a reversibility layer of Kizukishi kozo fiber paper.
8. Volumes 2 and 4 in the set (dated 1785) still had remnants of white single front bead sewn endbands that were replicated on this volume. Despite guarding and mending, the text block remained too fragile for sewn endbands, so instead they were constructed off the book around a linen support and adhered to the spine with wheat starch paste in the manner of false endbands (fig. 19). The spine was then lined with an overhanging linen lining adhered with wheat starch paste.
9. New boards were constructed from two layers of four-ply museum mat board, as was done for the two

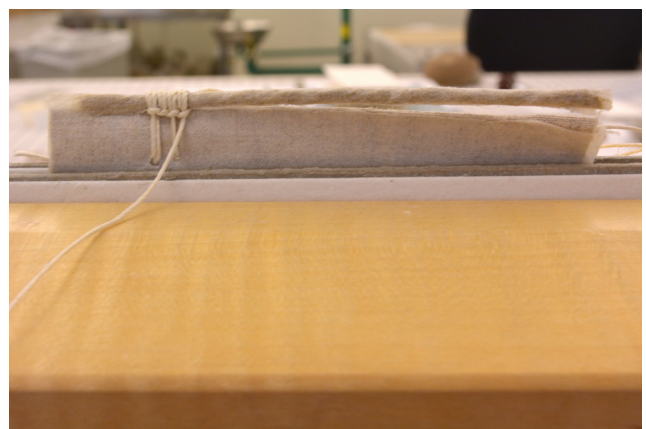


Fig. 19. *A System of Surgery, Volume 1 (1791)*. During treatment. Single front bead endband sewn off the book around linen cloth and a linen core stiffened with paste.

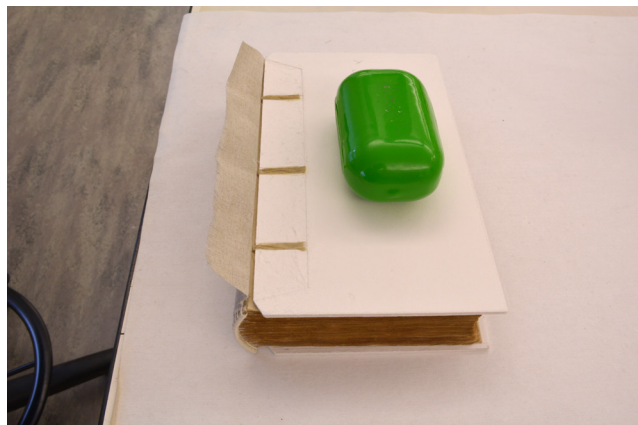


Fig. 20. *A System of Surgery, Volume 1* (1791). During treatment. Support cords inset into boards rather than twill tapes as described in the original Treatment 305 article.

treatments described previously. Paste paper covering material was made from Golden acrylics and wheat starch paste on Mohawk machine-made paper. A pulled pattern was used, similar to historic 18th century paste papers.

10. Cast composite leather was made for the spine piece and was backed with Tengucho kozo fiber paper before laminating to light-weight cotton fabric with a mix of paste and Lascaux 498HV. A layer of Kizukishi kozo fiber paper was subsequently adhered to the back of the fabric with wheat starch paste.
11. The book was rebound using the Treatment 305 structure, except linen support cords were fanned out and inset into the boards instead of cloth tapes (fig. 20). The book was covered in a quarter style with the cast composite material and paste papers. The new binding elements and new pastedowns were adhered to the boards with a 1:1 mix of Jade 403 PVA and 4% (w/v) methyl cellulose.



Fig. 21. *A System of Surgery, Volume 1* (1791). During treatment. Gold lines painted on top of the cast composite spine piece with acrylic paints after boning in blind lines.



Fig. 22. *A System of Surgery, Volume 1* (1791). After treatment. Front overall with view of screen printed spine title.

12. A spine label was created using dark red cast composite leather matched to the color of the original label remnants. A screen printing technique using EZScreen was used to mimic a gold-tooled spine title label. 3 Blind lines were boned into the new spine material and in-painted with gold acrylic paint to mimic gold tooling lines in a similar proportion to the original binding and the remaining two 1785 volumes (figs. 21, 22, 23).

#### CONCLUSION

After using the Treatment 305 structure for three different treatments, its usefulness and versatility for rebinding books from the late 18th to mid-19th centuries has been clearly demonstrated. What began as an initial interest in trying a different treatment structure has turned into a favorite rebinding choice for books from this period. The options for aesthetic variation seem endless, and this structure also allows for easy



Fig. 23. *A System of Surgery, Volume 1* (1791). After treatment. The book opens in a very flexible manner, and the illustrations can be easily viewed without creating stress points to neighboring leaves.



incorporation of original binding elements if desired. The adhesives can be varied and wheat starch paste can be used for all steps of the binding process, which is especially useful if many original binding elements are to be reused. The resewing method can also be changed, and original sewing patterns and similar supports can be used with successful results. This provides a structure closer to the historical binding but without the inherent weaknesses that are so often seen in bindings from this period. The resulting binding is stronger and vastly more flexible than typical late 18th to mid-19th century bindings and will be able to better withstand consistent use by patrons for many years to come.

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#### MATERIALS

Yame Kozo Hadaura paper  
Talas

<http://www.talasonline.com/about-us>

EZScreenPrint

<https://ezscreenprint.com/>

#### NOTES

1. Since paste was used to adhere the original covering material to the new boards, there was a significant amount of pull being exerted on the boards after drying, which caused them to wing up and away from the text block. This two-step process of adhering the double-layer pastedowns helped pull the board back down toward the text block, thereby flattening them. If a second layer of pastedown were not available, an interior paper board lining could have been used before applying the pastedown to achieve the same result.
2. Washing documents containing iron gall ink can cause iron ions to migrate in multiple directions in the paper substrate, which can lead to future discoloration and damage. Ideally, a phytate treatment should be performed if an iron gall ink-containing document is to be subjected to aqueous treatment. Since there were only two leaves with iron gall ink signatures, it was decided to forego washing or any aqueous treatment on these pages to prevent any risk of iron ion migration and subjecting two leaves to a phytate treatment for the sake of two signatures that were duplicated elsewhere in the book, which seemed extreme.
3. The label text was printed on a transparency that was used to expose a piece of EZScreen photosensitive screen (<https://ezscreenprint.com>). Heavy body and metallic Golden acrylics were mixed to match

the color of the original gold tooling, and the text was screen printed onto the cast composite leather label piece. This piece was trimmed to size and adhered with Lascaux 498HV to the new spine.

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