A REVIEW OF THE CONSOLIDATION SYSTEM USED IN THE CONSERVATION OF A JAPANNED CLOCK

Deborah Bigelow, Conservator and Liz Hickey, Associate Conservator, DEBORAH BIGELOW & ASSOCIATES, 177 Grand Street, Newburgh, New York 12500.

Abstract: An English tall-case japanned clock from the collection of the Art Institute of Chicago was conserved over a 15 month period stretching from the spring of 1988 through the summer of 1989. The problems posed by the clock were many, befitting a mixed media object of several substrate woods, complex surface coating strata, metal and fabric. Although the substrate was basically intact, the deteriorated surface coatings displayed many poorly executed restoration fills and coating materials which failed to emulate the transparent quality of the original japanning. The results of empirical examination and instrumental analysis, as well as the steps taken to stabilize and clean the clock will be briefly reviewed. The discussion will focus, however, on the materials chosen and the techniques used to replace missing surface coatings to create a final appearance visually compatible with the original japanning.

I. BACKGROUND

In 1949, the Art Institute of Chicago acquired an English japanned tall-case clock presumed to have been made in the early 19th century by George Steevens of Hindon. Although a wonderful example of its genre, the clock presented a very poor appearance and in 1987 was judged in need of conservation treatment by the museum's then curator of European decorative arts and sculpture, Lynne Springer Roberts and senior conservator of objects, Barbara Hall.

II. DESCRIPTION

The clock consists of three sections: long case with a door opening onto the interior works, bonnet with columns and a glass door presenting the clock face and bonnet cap which perches atop the bonnet. The clock measures over 10 feet in height (3006 mm) and is approximately 2 feet wide (575 mm) with a depth of 12 inches (294 mm).

Every presentation surface of the japanned clock is decorated with dense floral and geometric patterns encompassed by linework in a complimentary metal powder or paint. The door, both sides and the panel on the lower front of the case are further embellished with figures (human and animal) in a tableau of merchants buying and selling their goods amid an architectural setting and seascape on the door or elsewhere in simpler compositions of landscapes with architectural motifs.

Highly polished bronze capitals and base rings covered with an amber-colored transparent coating are mounted on the two round columns which frame the door and two quarter columns which are inset behind the fretwork panels on each side of the bonnet. The locks and hanging mounts are made from cast or stamped metal. Green silk is stretched behind five panels of gilded fretwork on the clock. Three turned brass finials (which appear to be replacements) rest atop the bonnet cap but, along with the works and clock face, were not examined.

III. AIM OF TREATMENT

At the outset, we established the following goals for our treatment of the surface coatings: (1) They were to be characterized as clearly as possible by cross section analysis using a fluorescent light microscope. (2) The surface was to be completely stabilized. (3) Visually disfiguring restoration materials were to be removed to recover the original surface. (4) Our reintegration of the surface was to proceed with a fill material that imitated the transparent qualities of the original japanning and that could be

applied and worked without damaging the original surface coatings. Finally, (5) missing decoration was to be replaced without incurring the need for a final overall coating which would serve to conceal the desired signs of age on the old japanned finish. All parties involved in the treatment expressed the concern that the final appearance of the clock not present the highly polished "mirror-like" surface that is characteristic of new japanning.

IV. TREATMENT

(1) Surface Coatings — Characterization

The original surface coatings were applied over substrate woods of oak and red pine (Endnote 1) in the traditional technique known as "japanning." In this case, thick layers of blue-pigmented and transparent yellow-hued varnish were applied. Over a white casein pain ground to produce an imitation of dark blue-green lacquer.

Sandwiched between the uppermost varnish layers, decoration appears in the form of gilded freehand-stencil designs on both flat and raised ground in contrasting gold and silver powders with striped borders in brown and red paint. Details were drawn by brush with black paint, sometimes on area accents of a crimson glaze. The varnish covering the raised gilded decorations is deep amber in color.

As alluded to above, the clock's surface coatings had been restored more than once with both the extend and poor quality of the previous repairs quickly apparent to the naked eye. While microscopy did not reveal the full extent of the restoration work – some of which was, subsequently, uncovered during our treatment of the japanned surface, it did confirm the existence of an overall coat of restoration shellac. Early in the clock's repair history of a coat of shellac was applied over most of the surface and was followed by brushwork to "punch-up" the decoration using two colors of metallic "bronze powder" paint for background color and a thin black oil paint for linework. Although it may have appeared acceptable then, the bronze powder paint has oxidized and now appears dramatically darker than the original gilding treatment alongside it. The restoration linework was applied ably; but the medium was heavy with solvent, and the lines were applied thicker and/or bled into the shellac or bronze powder paint producing a fuzzy image. (At no time was any restoration linework observed which matched the spontaneity and skill of the original.)

This restoration restricted our treatment procedure in the following way. First, the presence of the shellac coat limited any attempt at solvent reattachment of the original varnish layers to the casein paint ground by forming a skin over the surface which penetrated into each varnish crack blocking passage to the strata below. Mechanical removal of the shellac was tested but then abandoned when it did not facilitate a more effective reattachment of the original varnish. Furthermore, any attempt to remove this shellac coat resulted in the removal of the restoration work on the decorated areas. Following solvent tests on a sample spot, it became apparent that removal of this overpaint was not likely to result in the recovery of many original designs in satisfactory condition. Additional evidence in support of our hypothesis that the original designs were in poor conditions was provided by one element on the case door of a figure in a boat which had escaped previous restoration but was so vague as to be unrecognizable. Therefore, with the exception of several architectural elements on the case door from which we removed the bronze powder paint, our conservation treatment maintained the above-described restoration as part of the clock's final presentation surface.

This decision was reached once we realized that removing the shellac and topmost decoration risked doubling the already long time required by the project. Although it was acceptable, we noted sadly that the restoration decoration not only does not reflect the quality of original gilding and painting, but also, in some instances, does not reflect the color of the original. Where a decorative element was executed in silver-colored powder and would currently have a rich brown appearance, oxidized bronze

powder pint appears dark golden green. The original surface (best represented by areas of color on the bonnet cap) would have been a more subtly modulated interplay of blue-green, deep gold and bronzed silver with accents in opaque black and transparent crimson. Bands of linear stripes were executed in bronzed silver leaf and cadmium red – not as they appear today in gold-colored and silver-colored metallic powder paints.

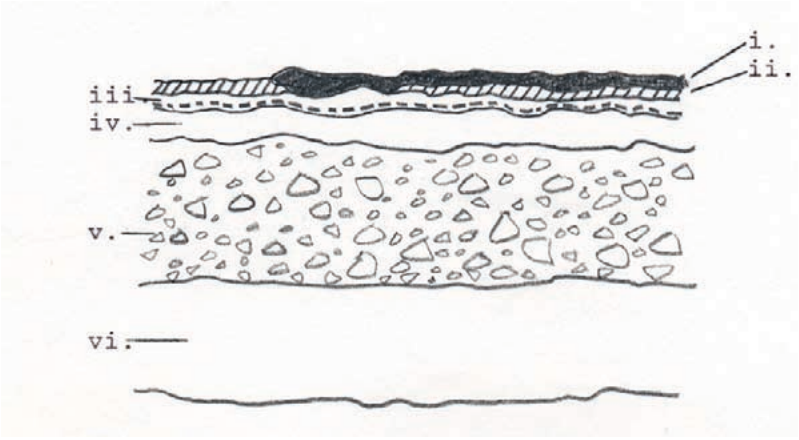
The following list identifies the strata which remain on the clock and does not include the additional restoration materials which were removed during the conservation treatment. Samples were taken from a raised design along the crack in the case door and from decorated areas on the bonnet and analyzed using fluorescence microscopy which confirmed the knowledge we gathered from our empirical observations and primary source research. (Endnote 2) The notations in the margin identify the layers found in the cross-section diagrammed below.

Restoration Layers (retained during treatment)
Black pain line decoration
Crimson paint glaze

i. Metallic ("bronzing") powders in an oil medium
ii. Shellac

Earliest/Original Layers

iii. *Oil-rich varnish layers
Black linear decoration
Crimson paint glaze
*Gold powder and red powder pigment in oil-rich varnish
Red ground
Raised gesso decoration
iv. Varnish layers without blue pigment particles
(not fluorescing as strongly for oil)
v. Varnish layers with blue pigment particles
(not fluorescing as strongly for oil)
vi. Casein ground
Wood (white oak)



Ten subsequent restoration efforts involved the local application of a variety of fillers and paints, among them bronze powder putty wax (found along the gilded borders), water-soluble gesso putty, a waxy black "auto body" type filler and oil, gouache and synthetic resin paints. All of these restoration materials were visually unacceptable for two reasons. The three fill materials were applied in a careless fashion, extending over the edge of the fill site and remained unsmoothed prior to application of the overpaint. In a raking light and to the touch the surface of the clock in these areas appeared and felt extremely rough. Furthermore, all the materials had the drawback of being relatively opaque in comparison with the transparent quality of the original varnish layers. All of the above-described restorations were judged disfiguring and/or unstable and were removed as described below.

Case Door

Only one structural problem will be discussed here. The case door was split through the substrate wood down the left-proper side, one-third of the way in from the edge. At the bottom of the door, the two sections of the broken vertical panel were bowed-out approximately one-half inch above the horizontal member in the panel construction. On edge the entire door was observed to be bowed and twisted in relation to the plane of the case. Previous restoration had resulted in a PVA glue join down the split with three wood braces screwed-in across the split on the back of the door.

Previous repairs were evaluated both physically and aesthetically, and the following decisions were made. The braces on the back of the door were removed by backing out the screws and injecting water under the wood to soften the PVA glue securing them to the door. With adhesive and screws on both sides of the crack, movement of the wood on either side of the join was severely restricted. Allowing the braces to remain, therefore, raised the possibility of a future split in the wood at another point across the door. In addition, it was decided that the PVA glue join was sufficiently strong and would maintain its bond in a climate-controlled gallery setting.

Although the join line is uneven for much of the length of the boards, there was the certain prospect of further damage to the surface coatings during an effort to remove the previous restoration. In addition, it was noted that the degree of warping would have made it difficult to line up the two sides without putting the boards under increased pressure.

The filler which had been used to bridge the gap between the two doors was the opaque gray gesso-type material with oil-based overpaint. It was not entirely removed, but was reduced to the level of the casein paint ground and, subsequently, provided us with the foundation upon which we built our repairs.

2. Stabilization

It became apparent during our examination of the clock's surface that the casein paint substrate was in stable condition, and that separation and lifting among the layers was occurring between the paint ground and the blue-pigmented varnish. In addition to the horizontal separation between the strata, there was a vertical crack pattern typical of aged varnish which is an indicator, too, of horizontal separation in the strata below.

The only area which was observed to have retained its surface coating stability with full color saturation was the top of the bonnet cap. Here a deep blue green color provided a key to the clock's original appearance in contrast to the predominantly olive green color of the degraded finish.

The restoration coat of shellac which had been brushed over the entire surface had penetrated into the japanning layers through the vertical cracks. While the lifting finish was, thus, being held in place by the shellac skin stretched over it, the same layer prevented solvent access to the lower strata. This coat

had been applied very rapidly without surface penetration as was evidenced by the material trapped in the layer: fragments of flaking paint, human and brush hairs and cotton fibres.

Following solvent tests, it became evident that we could not stabilize the existing surface coatings by reattaching the varnish to the casein substrate by penetrating through the shellac skin with a mixture of solvents. We proceeded, therefore, to use a 10% gelatin mixture in distilled water with a surfactant (Triton X-100) added to lay down the lifting varnish layers which are inaccessible. The protein in the casein paint made the choice of an animal glue particularly effective. The gelatin was brushed or injected warm under all lifting material; upon its cooling slightly, the layers were pressed down with a spatula over silicone release paper (We would now use silicone release mylar.) – without the addition of heat which might have caused the varnish coats to bloom.

The visibly lifting surface coatings were, thus, stabilized before removal of the undesired restoration fillers and paints. In many cases, the restoration fillers were serving as an adhesive holding the japanned layers to the clock. Later, upon their removal, any subsequently exposed and lifting japanning was reattached with the same gelatin mixture.

A second approach to surface coating stabilization occurred later in the treatment. Although concern had been expressed about the effect of reattachment solvents upon the restoration gilding and painting which lay exposed directly over the restoration shellac, the cold application of butyl cellosolve to the coatings on the case door produced a moderate but, nevertheless, desired color change in the surface coatings and did not effect the restoration gilding. This solvent was then brushed onto small manageable areas of several inches square over the entire original surface of the clock, allowed to sit for several seconds and then removed with a cotton cloth. Our concern was to keep the slight color changes over each area within the same visual range overall. To this successful end, the slight color change was accompanied by a gentle cleaning of the surface: removing the remains of any wax and loose surface dust and dirt. The surface sheen of the japanning at the end of this procedure was exactly what we desired for and retained as the final appearance for the clock.

3. Cleaning

Patterns of the gilded designs on areas of poor previous restoration were traced onto clear mylar to supplement our black-and-white photographic record. This was done for the bonnet columns, the floral designs on both sides of the bonnet above and below the fretwork window opening, the floral designs on both sides of the bonnet cap and upper moulding coves of the case and the architectural panels on the doors. Initially we made the assumption that the enhanced design work of the restoration, although clumsy, was faithful to the original. After cleaning the surface and recovering some of the lost designs, we realized that the restoration bore only a slight resemblance to the original. In the end we completed our restoration linework by referring only to the original in an attempt to capture some of its character.

Removing the undesired restoration required that we identify nine different fillers and coating materials or combinations thereof in use over the clock's surface. Initially, the UV light was used during the cleaning process; later, it was supplanted by a combination of natural and artificial light which seemed best for distinguishing between the earliest layers and those added later.

The restoration fillers were characterized as (1) a brown and (2) a gray-pigmented water-soluble gesso putty, (3) a black lacquer auto body-type putty. The restoration paints were characterized as (5) gouache or similar water-based paint, (6) acrylic tube paints in blue and green, (7) pigment in a synthetic resin (soluble in mineral spirits), (8) oil paint in brown and green colors, (9) a spirit-based color mixed with shellac and (10) bronze powder paint. Of the systems observed, both the gray-pigmented gesso putty and the black auto body filler were coated with oil paints to match the color of the background, shellac and bronze powder paint to carry forward the design.

In the first round of cleaning, distilled water and mineral spirits were used to remove inpainting layers (5) and (7); acetone was used to remove the acrylic inpainting (6) found primarily on the front inside of the bonnet; and ethyl alcohol was used to remove layer (9). "Rolling back" the bronze powder paint and shellac decoration on the case door's architectural panels was done with isopropanol gel (Endnote 3) which was applied by brush, allowed to sit until the swelled coatings could be rolled back with water and then neutralized with mineral spirits. Gel for the enzyme "Lipase" (Endnote 4) was applied to the gesso putty fills which upon softening were removed with water. The same gel softened the auto body filler which was then removed by mechanical scraping followed by an acetone wash. Both methylene chloride-based pain stripper and acetone gel (Endnote 5) were used successfully in conjunction with mechanical scraping with a #15 scalpel blade to remove the fillers and paints described under (3), (4), (8) and (10). These areas were neutralized by mineral spirits. Acetone, alone, was also an effective solvent for thin skinning of the overpaint.

The use of sandpaper was found to permit very fine reduction in layers where solvents could not be employed to make these distinctions. Sandpaper in the finer grits could not be used the beginning of the cleaning process because the surface was too rough with unsmoothed restoration fills. However, after the initial leveling and toward the end of the cleaning process, this mechanical technique proved easy to manage with effective results.

The extent of the previous restoration was such that removing it consumed approximately one-half of the final total treatment time.

Areas of important original design work were recovered; most notably, on the architectural elements of the case door, the columns of the bonnet and floral motifs on the front of the bonnet cap. It was particularly satisfying to recover the original windows on the architectural panels of the case door.

Restatement of Treatment Objectives

Again, three objectives governed our choice of a fill material. A fill was desired which would have a transparency similar to the adjoining varnish layers and one that would through its application process – echo the stratification of the original as understood through historical accounts (Endnote 6) and cross section microscopy. Secondly, the materials had to be workable and reversible without damage to the existing japanning. Finally, we needed to be able to replace the missing decoration without incurring the need for a final overall coating which would have obscured the signs of age on an old finish.

4. Reintegration-Fills

Losses to the casein paint ground were replaced with gesso (calcium carbonate/10% rabbit skin glue: distilled water) which was smoothed with 400 grit sandpaper and water-dampened cotton cloth pads until level with the casein layer. Gesso was carefully applied and smoothed without abrasion to the casein, was compatible in color and readily resoluble in water.

Of the transparent resins which were commercially available in the fall of 1988, Acryloid B72 (ethyl methacrylate) and Acryloid B67 (isobutyl methacrylate) available from Rohm & Haas, Soluvar mat and glossy varnish (1:1 mixture of F-10 n-butyl and B-67 isobutyl methacrylate with the addition of cabosil in the mat version) available from Binney & Smith and Winton retouch varnish (available from Windsor & Newton) were all considered in light of the above criteria and how they could be layered during build-up of the strata.

Our choice for the initial resin coats was Acryloid B72. In addition to its notable stability and water-clear transparency, it set harder than the others, could be worked thin and fast as a glaze and appeared to provide a deeper color saturation. Once the desired fill color was reached, it was possible to level the fill flush to the surface with layers of B67 without disturbing the B72. Although this had

a negative impact on our ability to apply decoration on top of the fill, it was the working method for much of the treatment. Had B72 been at the top of the fill, oil varnish size and toner coats or inpainting materials soluble in turpentine or mineral spirits could have been applied without interacting with or disturbing the acrylic resin film. In retrospect, the imperative to build up the fill sites without losing their hard-won mottled appearance did take precedence over the fact that finishing with B67 presented difficulties for ingilding.

Although we were concerned about the shiny appearance of the plastic resin, it has been our experience that all new resin coats (natural or synthetic) appear too shiny in comparison to aged natural resin surfaces. While it would have been possible to add cabosil to the B72 mixtures, it was not clear whether this additive would have a negative impact on our ability to build up a transparent fill. (In retrospect, given the degree of difficulty in achieving the desired results, we would not recommend adding a matting agent to the pigment resin mixtures.) It was decided to dull the surface mechanically or with a spray coat application at a later stage in the job.

Acryloid B72/10% in toluene was mixed with dry powder pigments in a variety of blue, yellow, green and brown hues. By the end of the clock's treatment, there were over 25 jars of pigmented acrylic resin. Dry powder pigments were chosen because an opacity of color was required that would allow the layering in the deep losses to proceed without reaching the desired color too soon. ("Orasol" dyes [available from Ciba-Geigy, Inc.] dissolved in B72 were also tested and produced excellent results. However, they reached the correct color too far below the uppermost layer, for to achieve their light and brightness the light-colored ground must be reflected through the dye. On the other hand, similar light effects could be reached closer to the surface with the paler colors of the opaque dry powder pigment resins.)

The method of achieving the appearance of aged japanning by repeated glaze applications was essential in avoiding the dull reflection of a single color mixed to match the loss – the treatment method of all the previous work. The blue base color was a close approximation of the original color. The colors that followed (yellow, green and brown) were mixed to enable a match with the aged surface and do not reflect the colors of the original layering varnishes. It should be noted that one disadvantage during blue glazing was the tendency of the pigmented resin to creep up the walls of the fill, creating a noticeably dark line. This was counteracted with a stippled application of yellow-pigmented resin along the interior walls. For filling shallow losses, the B72 resin was thinned to a 5% solution to enable the same mixing of color glazes.

Once the color was achieved, problems arose if we attempted to level our fills with B67 (which did not disturb the color) followed by B72 (which permitted ease in design reintegration at the top of the fill). This brushed layering resulted in bubbling of the resin which marred the final result. Excessive agitation of newly-mixed colors, or a too-rapid stippling technique also appeared to create the same surface problem with the resin. When the surface was sanded, acrylic resin dust settled into the pits and was extremely difficult to remove; the only solvent that aided in smoothing out the pitted finish was butyl cellosolve.

The clock areas were periodically stood upright to check on color matching. Toward the end of work on each fill, areas that required adjustment were inpainted with Magna colors (ground pigment in B72) or the above-discussed Orasol dyes in B72/10% in toluene.

Pigmented resin fills that were correct in color but which fell below the level of the surface were filled level with clear Acryloid B67/15% in mineral spirits. Originally, we intended to level the fill to just below the surface, allowing the decoration and toning coats to fall below the uppermost surface, as they do on the original. However, the extent and nature of the losses prohibited this approach, and it was considered imperative that the fills be level and mat in appearance to facilitate the application of the

gilding size. Although the original had a texture which resulted from the cracking of the varnish and the aging process, it was not possible to distress the surface of the acrylic resin, because the decorative layer had to be applied on a smooth mat surface. After decoration, it was judged too risky – given the hours involved in the project – to distress the surface.

Losses to the raised ground which are a common feature in japanned decoration were replaced with a putty made from Acryloid B67/20% mineral spirits, china clay and dry powder pigments (raw umber). This was applied on the case door along the crack by spatula and rounded over the edge of the crack to minimize any distortion caused by poor alignment. A protective coat of microcrystalline wax applied on either side of the door was removed following the smoothing procedure which was done with a solvent pad to avoid abrading the original surface.

Smoothing the acrylic resin was done with a toluene (for B72) or a mineral spirits (for B67) pad to remove any excess from the edges, followed by sandpaper within the boundaries of the fill to create a smooth, mat surface and a final pass with acetone to restore the surface sheen of the resin to a level acceptable with the final adjoining original surface. Because the gilder's size, gold powder or leaf and all toning and other decorative applications would be, ultimately, resting above the rest of the surface, the surface of the acrylic resin had to be optically matched to the aged japanning before proceeding to the next stage.

5. Reintegration — Decoration

On those few areas which were filled to the surface with B72, the ingilding proceeded without problems and will be described below. However, most areas of previous loss or areas of original design recovered during treatment had been leveled or interfaced with B67. On those areas, we discovered that oil size applied to hold the metallic powders and leaf beaded-up upon application or bled into the resin below, rendering it impossible to get a crisp design. For this reason, areas of B67 which required restoration decoration were masked off and given a spray application of a commercially-manufactured mat varnish (Krylon 1311). This spray coat, while not disturbing the B67, provided the surface to which the size could adhere.

On the restored raised design areas, the original orange-red bole was imitated by a thin coat of Magna colors mixed to match with B72 added to increase gloss.

Prior to application of the size, drawings were made of all the floral areas to be restored (some of which required us to carry forward the spirit of the design where none of the original remained), and the geometric patterns were examined for their construction. We believe that squared-off brushes in a variety of sizes were used for much of the original design work.

Prior to brushing 12-hour oil size, the surfaces were dusted with talc to prevent the gold powder or leaf from sticking to non-design areas. This had to be done selectively and with care due to the pitted nature of the original varnish which made removing the talc somewhat difficult.

Gold and silver powders were made in mixtures which, following toning, were intended to match the original. We used metal powders because microscopy revealed them to be the materials of original manufacture and because it was felt that using powder would make blending and toning easier. However, metal powders – when used in the japanning process – reflect light like metal leaf because they were often burnished when applied with a protein glue or are covered with numerous layers of transparent yellow or gamboge-tinted varnish. It was not possible to achieve the same luminous quality with one or two toning layers on top of powders in the restoration ingilding. Furthermore, it was still necessary to feather or blend all the powder edges. The panels on the case door were restored with gold leaf (with very good results) because their restoration occurred late in the treatment, and we realized that gold powder would not provide an adequately reflective broad surface. For these reasons, we would recommend that all future ingilding to a japanned surface be done with metal leaf.

Where necessary, the designs were given a crisper edge by scraping with a #15 scalpel, and the edges of all designs meeting up with an original were blended with a turpentine swab.

Following a series of tests, the toner chosen for use was Winton retouch varnish with the addition of dry powder pigments and a yellow maple oil stain and Orasol dyes for the gold ingilding. This was not reversible without removing our ingilding and could only be done after we were assured that it was the correct procedure. While our regular method of toner application was to brush directly over the decorative surface (repeated, if necessary), the architectural panels had the toning fluid poured onto them from the jar which was followed by a rocking of the door and flowing-out of the material. The excess was removed the following day with swabs of mineral spirits.

For gold pain stokes to match the previous restoration, gold powder was mixed with Lefranc & Bourgeois raw umber and ivory black paints. Silver-toned paint stripes to match the previous restoration, gold powder was mixed with Lefranc & Bourgeois raw umber and ivory black paints. Silver-toned paint stripes to match the previous restoration were made with Silvertone 2025 bronzing powder mixed with Lefranc & Bourgeois ivory black, raw umber and van Dyke brown in Winton retouch varnish. A red inpainting glaze was made with Winton retouch varnish with the addition of a small quantity of leeched oil color in Venetian red. Black lines were added with the same in ivory black.

V. CONCLUSION

Given our stated goals, the consolidation process was successful. We have attempted to indicate within the text where we might choose a different material or procedure in a future project of this nature. Acryloid B72 remains our first choice for filling japanned losses – but not dissolved in toluene which posed a health hazard that necessitated wearing uncomfortable organic respirators and gloves for long hours. In the future we anticipate working with the resin dissolved in a solvent that is not **as** unpleasant or toxic (acetone, perhaps). For surfaces which do not require any restoration decoration, a mixture of Soluvar mat and glossy varnish might prove a satisfactory alternative.

At the end of the treatment, we chose not to apply a protective coat of wax (Endnote 7). We felt that the appearance of the clock was satisfactory and that – to a certain extent – the original materials were protected by the restoration coat of shellac. We were also concerned with the effect of any spray application or rubbing action on the restoration ingilding which rests atop the resin surface. We do, however, plan to experiment with the protein matting agent *Zein* (Endnote 8) and with texturing the surface with a variety of materials that have been suggested to us over the past year.

Acknowledgments

The authors accept full responsibility for the conservation treatment described in this article, but would like to thank the following individuals for their help and advice: Gregory J. Landrey, Richard Wolbers, Douglas Adams, John Kitchin, Nancy Reinhold, Robert Mussey, Victor von Reventlow and Donald C. Williams.

Special recognition is due Conservation Technicians: Patricia Janney, Diane Arbeit, Peter Dickison and Cindy De Haven for their many daily contributions to the successful outcome of this project; and we would like to thank Barbara Hall and Lynne Springer Roberts of the Art Institute of Chicago for their support during the course of our work.

In closing, we would like to express our appreciation to John Hill for writing about the history of japanning and his treatment of the Pimm Highboy – an article which provided us with a crucial focal point from which our treatment evolved.

ENDNOTES

Endnote 1

The substrate woods were identified as being from the red pine group (*Pinus* sp.) and the white oak group (*Quercus* sp.) in correspondence with Harry Alden, then Wood Scientist at The Winterthur Museum, Winterthur, DE. Mr. Alden noted that both woods supported the assumption of English manufacture.

Endnote 2

Characterization of the surface coatings was done with the kind assistance of Richard Wolbers and Gregory J. Landrey at The Winterthur Museum, Winterthur, DE. Samples were mounted in polyester resin and examined under normal and ultraviolet light with two direct reactive fluorescent stains: Rhodamine B and Fluorescein isothiocyanate (FITC). Rhodamine B is described as a stain for lipids or drying oils, forming a red-orange flurochrome in their presence; FITC is described as a stain for proteins, reacting with amino groups in non-aqueous environments and fluorescing a yellow-green.

Endnote 3

The following recipe for isopropanol gel is derived from Richard Wolbers 1988 "Current Recipes" sheet:

300ml Isopropanol
120ml Water
12ml Ethomeen c-25
2g Carbopol 934

Endnote 4

The following recipe for the gel for the enzyme "Lipase" is from Richard Wolbers, *Theoretical and Practice Workshop on the Cleaning of Paintings*, Winterthur, DE.

100ml Water
.6g Tris-HCl Buffer
1.5g Hydroxypropylmethyl Cellulose
1ml Triton X-100

Endnote 5

The following recipe for acetone gel is derived from Richard Wolbers 1988 "Current Recipes" sheet:

200ml Acetone
200ml Water
20ml Triethanolamine
2g Carbopol 934

Endnote 6

For an excellent review of the japanning process, the reader is referred to two sources listed in the bibliography accompanying this paper: John S. Stalker and George Parker, *A Treatise of Japanning and Varnishing 1688*; and John H. Hill, "The History and Technique of Japanning and Restoration of the Pimm Highboy" in the A*merican Art Journal*.

Endnote 7

For a description of a wax-spraying technique, the reader is referred to the published account of Gregory Landrey, Nancy Reinhold and Richard Wolbers's conservation treatment of a Philadelphia pillar-and-claw snap-top table listed in the bibliography.

Endnote 8

This material was brought to my attention by Gregory Landrey and published in the article referred to in Endnote 7.

BIBLIOGRAPHY

Baird, Henry Carey. *The Painter, Gilder and Varnisher's Companion*. Philadelphia: Henry Carey Baird, 1854.

Dossie, Robert. *The Handmaid to the Arts*. London: J. Nourse, 1758 and 1764.

Guidotti, Alberto. *Easy method for making any kind of varnish from cina and japan practiced in France and England.* Rimino, Italy: Giacomo Marsoner, 1784

Heckscher, Morrison H. and Francis Gruber Safford with a conservation note by Peter Lawrence Fodera. "Boston japanned furniture in the Metropolitan Museum of Art." *The Magazine Antiques*, 129, May 1986, pp. 1046-61.

Hill, John H. "The History and Technique of Japanning and Restoration of the Pimm Highboy." *American Art Journal* 8, 23, November 1976, pp. 59-84.

Huth, Hans. *Lacquer of the West*. University of Chicago Press, Chicago and London, 1971.

Huth, Hans. "Art and Technique: European lacquer work and its influence on the decorative arts." *Plaisir de France*, No. 431, Vol. 1, 41, July-August 1975, pp. 24-29.

J.H., "Art of Japanning with true India varnish", *The Gentlemen's magazine*. Vol. 6. London: 1736, pp. 76-77.

Landrey, Gregory, Nancy Reinhold and Richard Wolbers. "Surface Treatment of a Philadelphia Pillar-and-Claw Snap-Top Table," in *Wood Artifacts Postprints*. New Orleans, LA: American Institute for Conservation, 1988.

Salmon, William. *Polygraphiae or The Arts of Drawing*. London: A. & I. Churchill, 1701.

Sayer, Robert, editor. *The Ladies Amusement, or the whole Art of Japanning Made easy*. London, 1760.

Scott-Mitchell, Frederick. *Practical Gilding, Bronzing and Lacquering*. London: The Trade Papers-Publishing Co., Ltd., 1905.

Stalker, John S. and Parker, George. *A Treatise of Japanning and Varnishing 1688*. London: Alex Tiranti, 1961.

Van der Reyden, Dianne and Williams, Donald C. "The technology and conservation treatment of a nineteenth century English papier-mache chair" in *Preprints*, pp. 125-142. Washington, D.C.: American Institute for the Conservation, 1986.

Wolbers, Richard and Landrey, Gregory. "The Use of Direct Reactive Fluorescent Dyes for the Characterization of Binding Media in Cross Sectional Examinations," in *AIC Preprints*, pp. 168-202. Vancouver, B.C.: American Institute for Conservation, 1987.

Wolbers, Richard. *Theoretical and Practical Workshop on the Cleaning of Paintings*. Winterthur, DE: Notes for workshop compiled by Richard Wolbers, 1988.

SUPPLIERS

Arnaic Chemical Co.
Edison, NJ
For: Ethameen C-25

Ciby Geigy, Inc.
Plastics and Additives
3 Skyline Drive
Hawthorne, NY 10532
For: Orasol dyes

Conservation Materials Ltd.
Box 2884
340 Freeport Boulevard
Sparks, Nevada 89431
For: Micromesh sandpaper
Silicone release mylar
Lefranc & Bourgeois paints
Contact: Douglas Adams

Daniel Smith
4130 1st Avenue, S.
Seattle, Washington 98134
Tel: 1-800-426-7923
For: Windsor-Newton gouache paints

Fezandie & Sperrle
Tricon Colors, Inc.
16 Leliarts Lane
Elmwood Park, NJ 07407
Tel: 201-794-3800
For: China clay
Dry powder pigments
Talc

Fisher Scientific Company
P.O. Box 12405
St. Louis, Missouri 63132
For: Chemicals listed in paper

B.F. Goodrich
Cleveland, OH
For: Carbopol 934

Gothic Color Company, Inc.
727 Washington Street
New York, NY
Tel: 212-929-7493
For: Gilder's whiting

Mohawk Finishing Products
Route 30N
Amsterdam, NY 12010
For: Natural resins, hide glue

Pearl Paint Company, Inc.
308 Canal Street
New York, NY
Tel: 212-431-7932
For: Krylon No. 1311 matte finish
Magna colors
Winton retouch varnish

Rohm and Haas
301 State Line
Kansas City, MO 64145
For: Synthetic resins – Acryloid B67/Acryloid B72

Sepp Leaf Products, Inc.
Suite 1312
381 Park Avenue South
New York, NY 10016
Tel: 212-683-2840
For: Full range of gilding supplies
Contact: Peter Sepp

Sigma Chemical Company
P.O. Box 14508
St. Louis, MO 63178
Tel: 800-325-3010
314-771-5750
For: Hydroxypropylmethyl cellulose
Triethanolamine
Tris-HC1 buffer
Triton X-100

Talas
213 W. 35th Street
New York, NY 10001
For: Mylar
Tel: 212-736-7744
Contact: Elaine Haas

Wood Finishing Enterprises
1729 North 68th Street
Milwaukee, WI 53210
For: Dragon's blood
Gum gamboge
Contact: Dale Persible

Wood Finishing Supply Co., Inc.
1267 Mary Drive
Macedon, NY 14502
For: Moser yellow maple oil stain