

## A LOAD TO BEAR:

# Papier-Mâché Furniture...

## Its Conservation & Care

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### AUTHORS' NOTE

**D**uring a hundred-year period between the mid-eighteenth and nineteenth centuries, a major industry flourished in England which had its origins in both architectural ornamentation and japanned tinware. The development of japanned papier-mâché led to an unparalleled trade that resulted in the manufacture of many articles of furniture. The inherent fragility of such furniture renders it particularly susceptible to damage, and there is little published on the care and conservation of papier-mâché furniture. A chair belonging to the Cooper-Hewitt Museum, Smithsonian Institution, which was sent to the Institution's Conservation Analytical Laboratory (CAL) for conservation treatment, serves as a case in point (Fig. 1). Examination by X-ray, infrared and ultraviolet radiography, materials analysis, and a study of his-

torical developments leading to the chair's manufacture were required before an appropriate conservation treatment could be determined <sup>17</sup>.

### DEVELOPMENT OF PAPIER-MÂCHÉ

"Papier-mâché" is a term which has been applied to innumerable three-dimensional objects having a paper core. The description can be confusing, since it has been used for very different paper structures. An historical overview serves to clarify terms while tracing the development from a composite of simple components to an extremely hard and water-resistant

*Fig. 1 Spoon-backed, papier-mâché chair with scalloped edges and box slip seat, c.1844. It is black lacquered or "japanned" papier-mâché with mother-of-pearl inlay. The paperboard upper portion is supported by wooden legs and seat rails. Photo Courtesy of the Cooper-Hewitt Museum, Smithsonian Institution/Art Resource, N.Y.*

material, workable enough to be turned on a lathe and strong enough to be used to build an entire village.

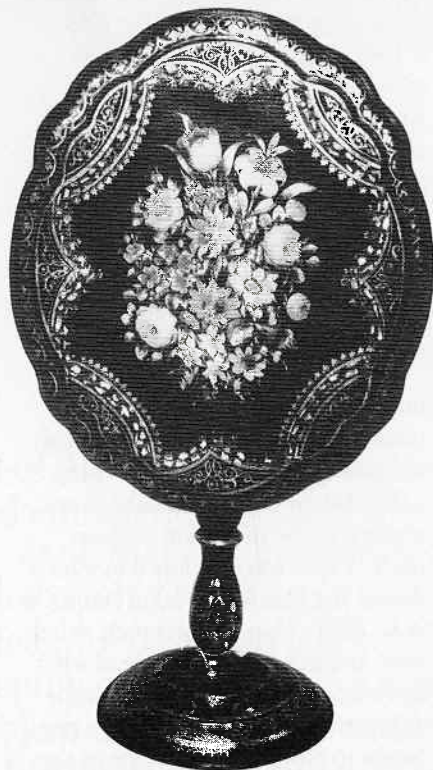
The origin of papier-mâché is as ancient as the invention of paper itself. Paper was developed in China during the Han Dynasty (c. 200 B.C.-A.D. 200). Han artifacts such as helmets and pot lids were made of what has been described as papier-mâché although they may actually be a precursor to pasteboard. <sup>4,13</sup> One of the oldest surviving artifacts is a falcon's



coffin from Persia <sup>4,7</sup>. The greatest innovations occurred, however, during the 18th and 19th centuries in England when a revolution in architectural ornamentation eliminated the problems of carving plaster or wood in situ. An inexpensive material could be made in a mold and applied separately. While the initial composition was called "compo", a later version, called "fibrous slab", combined plaster with vegetable matter such as hay, straw, nettles and bark. Eventually the plaster was replaced by pineapple and cacao leaves, peat, and horse dung. Slab was recommended for making houses, bridges, and carriage wheels, among other things <sup>5,10,14,15</sup>.

By the mid-18th century, slab was superseded by a paper mixture promoted by a Mr. Wilton of Cavendish Square, who used the material not only for architectural ornaments, such as mouldings, but also for small furniture and picture frames. Mr. Wilton

Fig. 2. *Papier-mâché tilt-top table, Domestic Life, National Museum of American History, Smithsonian Institution.*



reportedly employed two French women who "chewed paper...to keep the process secret..." <sup>4</sup>. This has led to the speculation that the French term, *papier-mâché*, was coined by the English since the technique was advocated by English paper hangers to extend their expertise to ceiling decoration. Also referred to as "paper stucco" and "pasteboard stuccoe", it fell into disuse as a ceiling ornament with the advent of stamped tinware <sup>5</sup>.

At about the same time, a japanner of tinware, John Baskerville, who was also a printer instrumental in the production of paper, experimented with paper panels as a base for japanware <sup>15</sup>. Japanware (Fig. 2) was an English imitation of Oriental lacquer (Fig. 3). True lacquer comes from the resin of a tree of the sumac family indigenous to the Orient and, in the East, dries quickly upon exposure to sunlight. Unfortunately, the lacquer did not set properly in the English climate, so its effect had to be duplicated by various varnish mixtures, in a process referred to as "japanning" <sup>4,8,9,10</sup>. These materials dried slowly, but the jappers could hasten the process with frequent "stovings". Since the exposure to heat would crack and warp wood, another base had to be found. Tinned iron was successful, but paper was sought as a cheaper and lighter alternative. While recipes for using pulped paper

existed, the variations in density and homogeneity provided a poor surface for varnishing.

By the late 18th century, Baskerville's apprentice, Henry Clay, succeeded in his predecessor's endeavor by developing a patent for heat-resistant paper panels. Ten sheets of rag paper were pasted on both sides with a mixture of cooked glue and flour, pressed into a metal mold and smoothed to remove air bubbles. The edges were trimmed and the sheets were drenched with linseed oil for waterproofing, and the ensemble was baked dry at 100°F <sup>4</sup>. This produced a rigid material which could be worked like wood, and came to be known as the "best" papier-mâché as opposed to the "common" papier-mâché made from macerated pulp. Clay primarily manufactured simple items such as trays, but as he had a two hundred percent mark-up, he became enormously wealthy (Fig. 4). It is interesting to note that the initials H.C. are found on the reverse of the Cooper-Hewitt chair.

In the mid-19th century, the English papier-mâché firm of Jennens and Bettridge received a patent that marked the next major development

Fig. 3. *Lacquer cabinet, Momoyama Period, Late 16-17th c. Courtesy of Freer Gallery of Art, Smithsonian Institution Washington D.C., Accession #2028.*





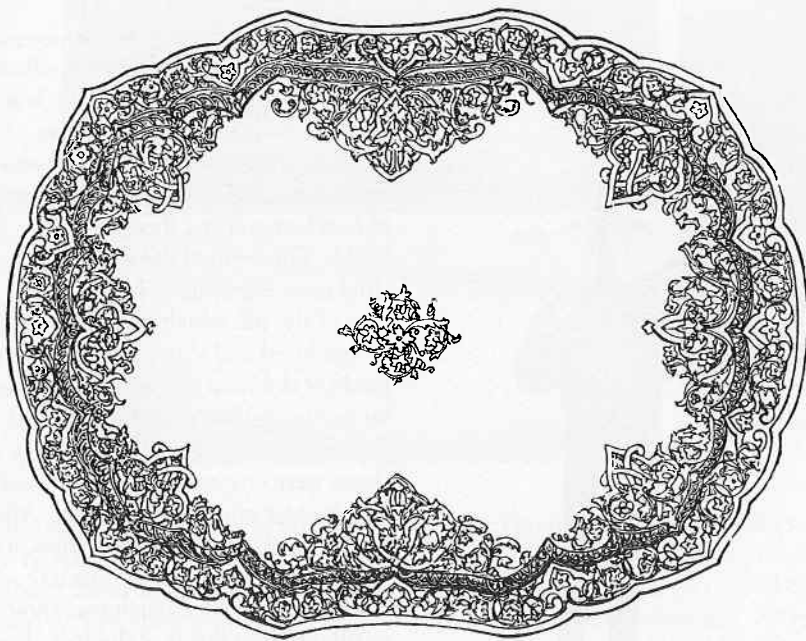


Fig. 4. Henry Clay papier-mâché Tea Tray. Color and gilding on dark ground.<sup>3</sup>

in the papier-mâché industry (Fig. 6). They made thicker panels by layering 120 sheets together at a time, enabling production of larger and stronger items, such as the Smithsonian chair. However, since these could take days to dry, Jennens patented a method whereby dry panels, or blanks, could be softened with steam to enable manipulation into a heated metal mold<sup>6</sup>. After pressing a counter mold into position, the steam-molded panels were dried by

Fig. 6. Theodore Jennens, British Patent # 11670, 1847.<sup>6</sup>

heat. The result was a hard, preshaped product of great strength. By reducing the number of steps and amount of time required to mold furniture, the firm revolutionized the process and opened the door to mass production.

The firm of Jennens and Bettridge also improved methods of japanning and decoration that are pertinent to the Smithsonian chair. In 1825 they received a patent for improvements in the process of mother-of-pearl decoration. Their process bypassed the need for skilled craftsmen to inlay decoration. The pearl pieces were ground and polished by workers to a thickness of 0.2-0.4 mm. These thin sheets of material were then stencilled with asphaltum and dipped in hydrochloric acid. The acid dissolved all the shell not protected by the asphaltum, leav-

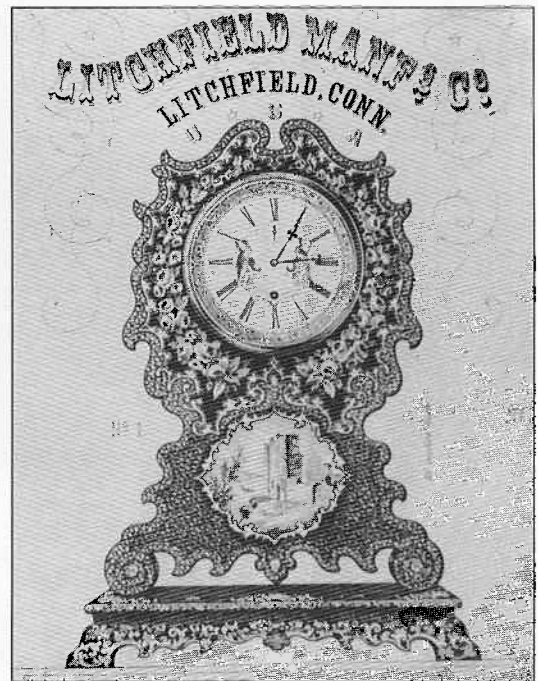


Fig. 5. Papier-mâché clocks, Litchfield Manufacturing Co. Catalogue. Courtesy the Collection of the Litchfield Historical Society.

ing pearl pieces corresponding in size and shape to the stencil pattern. The pieces were adhered to the prepared japanned surface immediately after the object was varnished, using the tacky varnish as the adhesive. The areas of decoration were then repeatedly coated with varnish and polished until the surface was completely smooth, giving the appearance of intricate inlay by craftsmen of consummate skill<sup>5</sup>. What appears to most 20th century eyes to be excellent craftsmanship is in reality a labor-saving method of decorating industrially mass-produced objects. Gilding and painting were often applied after the pearl (although this decoration has often been inadvertently removed by years of judicious cleaning and polishing by caretakers).

By the mid-19th century, the technology of varnishes was also undergoing dramatic changes that fostered increased and more standardized "assembly line" production of japanned furniture. As a result, even mass-produced furniture could be finished with highly decorative and durable finishes.<sup>3</sup>

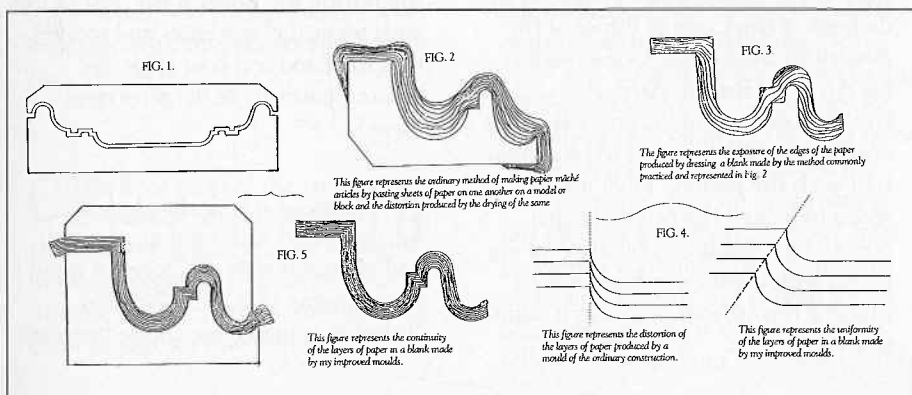






Fig. 7 Henry Clay papier-mâché articles of furniture - dressing table, chair and footstool. The looking glass swings freely from the scrolls.<sup>3</sup>

Ironically, Jennens and Bettridge's achievements in the mid-19th century were followed within several years by a decline in the demand for japanned furniture in England. As decoration became more bizarre and garish, objects evolved into more elaborate and impractical forms, moving from the simple trays and snuff boxes of early days to the piano cases and bedroom set shown in the Great Exhibition of 1851 (Fig. 7). Such overpopularization eventually destroyed the novelty of the material<sup>12, 15</sup>, and led to the demise of the firm in 1864. However, the secrets of the best papier-mâché techniques may have been carried by employees of Jennens and Bettridge to America, where the first papier-mâché factory was established in Connecticut: The Litchfield Manufacturing Company, which specialized in clock cases (Fig. 5)<sup>4, 15, 16</sup>.

## CONSERVATION TREATMENT OF A PAPIER-MÂCHÉ CHAIR

The Cooper-Hewitt chair had several damages which required conservation treatment (Fig. 1). The primary treatment objectives were A) the repair and inpainting of a damaged scallop on the top edge of the spoon-back (Fig. 8a & b); B) the replacement of missing shell decoration (Fig. 9); and C) the consolidation of the surface varnish. The primary conservation objectives were that the integrity of the piece not be disturbed, that all repairs be detectable, and that they be reversible, in keeping with the dictates of the Code of Ethics of the American Institute of Conservation for Art and Historic Artifacts. Infrared spectrographic analysis of the coating materials proved to be consistent with the period. Fiber microscopy indicated the original paper core to be a stable combination of rag fibers, with distinctive blue threads running throughout, and starch adhesive interlayers.

**A** Because of the size of the loss and its position in a somewhat vulnerable spot, the loss in the scallop was filled by an insert of paper sheets made by duplicating as much as possible the original 19th century process of hand-smoothing sheets into a mold. This assured the appropriate thickness, edge shape, and compression of the fill, which was subsequently inpainted and sealed. A mold was made of the most similar scallop edge by damming with plasticine and filling with silicon. Sheets of oriental tissue were coated with dilute wheat starch paste and pressed into it. After baking at about 100° F to dryness, a hard mass of paper was produced. This baked, molded paper was carved to fill different levels of the loss. It was then adhered into the voids with more paste, and dried in place under polyester web, thin blotters and soft weights. This produced a strong repair that was consistent with the nature of the original core but which could be easily distinguished and removed if necessary at a later date. The curator requested that the original form of the scallop be simulated by covering over the damaged area. To insure good adhesion, the overpaint (visible in ultraviolet illumination) was removed, exposing an earlier repair made of a clay-like substance (distinguished by infrared illumination). Layered paper was then adhered to this with starch paste, filling in the missing contour. Over this an isolating layer was applied, followed by a layer of acrylic gesso to match the original surface contour and provide a base for inpainting. Inpainting was done in the area of loss with reversible materials and topped by a localized seal coat (Figs. 8a: before treatment & 8b: after treatment).

**B** The front side of the chair was decorated with mother-of-pearl, and approximately 40 pieces of inlay were missing (Fig. 9). The term "inlay" is actually inaccurate because,

Fig. 8a

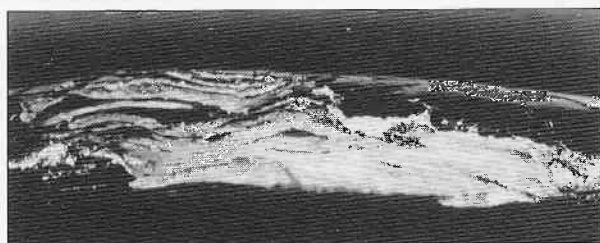


Fig. 8b

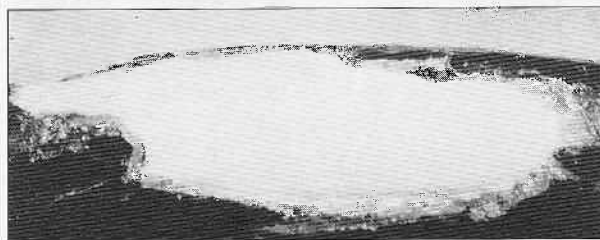


Fig. 9

although the mother-of-pearl appears to be set into the surface, it is actually affixed to it. In addition, the material used on this chair is probably not mother-of-pearl but decorative shell similar to abalone. The curator expressed a strong preference for replacing the missing decoration, since the chair was part of a collection, interpreted for its design significance. The areas of loss provided evidence that the procedures patented by Jennens and Bettridge in 1825 had indeed been used, since the grinding patterns from the back of the original pearl were imprinted in a varnish adhesive over the black coating. The recesses where losses had occurred were cleaned and smoothed with dental tools where the substrate itself had been damaged. Rubbings were taken to indicate the shape of the more complex losses. These rubbings were glued to prepared abalone shell with hot hide glue. The outline indicated by the rubbing was cut out using a jeweller's saw. The paper pattern was removed by soaking the pieces in warm water, and final trimming was executed with fine rifflers and needle files. (Fig. 9)

**C** The final stage of the treatment dramatized why conservators often recommend against the use of many modern commercial polishes to clean historically significant furniture. The chair required a final surface coating

for two reasons. First was the need for consolidation of the entire original surface, which had an overall craquelure with minor cleavage. Although the cleavage accompanying the cracking was negligible, the surface varnish was extremely friable. This varnish had discolored, obscuring much of the decoration underneath it. However, since the varnish itself contained much decorative detail, the curator chose to preserve it. The second reason for application of a surface coating was to provide an isolating layer to form a base for application of gold leaf. Various coatings were first tested discreetly under one of the chair arms. The test patch adhered well without adverse effect to the chair, so the selected coating was applied to the entire surface. However, as the coating dried, it became apparent that at some time in the past the chair had been polished with a commercially available product containing silicones. This had not been detected in the test area since the underside of arms were not polished as vigorously as more visible surfaces. Over 90% of the surface of the chair began to develop "fish-eyes" and "islands" as a reaction to the presence of silicones. Consequently, the entire additional coating had to be removed, followed by thorough solvent cleaning. Several new coating test patches were then made on areas previously contaminated by silicone, and a new coating was chosen for its adhesive quality. It was brushed on, followed a week later by a final protec-

tive film. Inpainting was done with pigments in a special medium in areas of the paper repair and other small fills. Gold leaf was applied to the areas of gilding loss. Glazing the new gold and inlays with dyes in shellac approximated the visual character of the original decoration and concluded the treatment.

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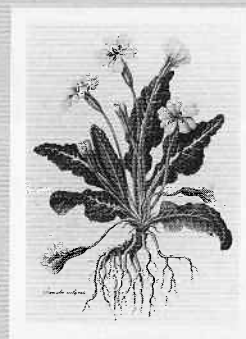


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