UPHOLSTERY CONSERVATION

by Kathryn J. Gill*

The aim of this presentation is to highlight, through a series of case histories, some recent developments, typical problems and practical considerations involved with the conservation of textile coverings and foundation materials attached to the frames of museum quality seat furniture. Emphasis is placed on some tried and tested methods of re-attaching the original textile elements to their frames, after conservation treatment.

Introduction

Upholstered works of art are very complex structures which bring together a diverse range of materials including textiles, in both raw and processed states, animal skins, wood, metals and adhesives. These materials are built up in a series of layers, under varying tensions, onto a rigid frame, generally of wood or metal, attached with a variety of fasteners, usually metal, most commonly tacks and staples.

The materials degrade at different rates (particularly if the piece has been partially re-upholstered at a later date), posing complex ethical considerations and practical problems for the conservator when faced with determining the most suitable treatment to make the piece safe for storage and display. Some of the questions that have to be addressed before working on a piece, include the following:

- Are all the materials original?
- If not, when were the later additions made?
- Are these additions a significant part of the history of the piece?
- Is the original form and the visual interpretation distorted in any way by later additions?
- Are the later additions causing damage to the original materials due to the type of materi als used or the method of application?
- What is the condition of the overall piece and the individual materials?
- What is the type and source of damage and degradation?
- What treatment would be necessary to make the whole object safe for its intended future use?
- To what extent do you disturb the original state of an object in order to carry out treat ment?

In some instances, adequate conservation treatments can be carried out in situ. However, this is not always possible. If the condition of the interior foundation upholstery is damaging the outer cover, for example, or if the springs need to be compressed to prevent them from forcing through the overlying fabric, it may be necessary to remove the surrounding upholstery materials to gain access to that area for treatment. If so:

- Could the materials withstand being removed and re-applied after treatment?
- If indeed the materials are in good enough condition to be removed and replaced, could/

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should the covers be re-attached with the original tacks, in the original holes?

- Is it acceptable to modify the original method of attachment, in an attempt to reduce ten sion and areas of stress brought upon the textile due to the way that it had been applied to the frame originally and to avoid inserting more tacks and staples into an al ready weakened frame?

Of course, as in any other area of conservation, all objects are assessed individually and treatments are proposed depending on the needs and requirements of that individual piece.

Bearing all of the above considerations in mind, in this particular presentation, the problems that are being addressed are the practical concerns related to re-attaching original textile elements to their frames, after conservation treatment. Some tried and tested methods are presented through a series of case histories. The pieces of upholstered furniture which have been selected have their original foundation materials either totally or partially extant, and, with the exception of one piece, they all retain their original outer coverings. All have been retired as functional pieces of furniture, with the exception of one privately owned piece which is used occasionally.

In nearly all of the cases presented, in order to preserve the materials, part or all of the upholstery materials were removed, conserved and re-attached to the frames after treatment. The case histories include two late 18thC American easy chairs, a side chair from the first quarter of the 20thC, a late 19thC English side chair and two early 20thC French side chairs.

1. PHILADELPHIA EASY CHAIR, c.1760-90 (figs. l-4)
Primary wood, mahogany; secondary woods, pine, chestnut, poplar;(restoration, oak).

Description
This large fully upholstered winged easy chair was covered in a modern upholstery, the profile of which was incorrect for the period. Basically, the piece was overstuffed and the outer arms were incorrectly shaped. Although the frame had been re-upholstered many times, remaining intact beneath the modern upholstery materials were the original foundation materials covering the inner wings, consisting of two linen layers, (distinguished from each other in this text as, ‘top linen layer’ and ‘first linen layer’), horsehair stuffing and straw stuffed roll edge, making up the inner wings, (figs.l & 2). The original linen layers were attached to the frame with hand wrought iron rose headed tacks. The curled hair stuffing, sandwiched between the linen layers, was anchored with lengths of linen twine into the first linen layer.

The remaining upholstery sections -- the inner back, seat, loose cushion and fixed outer cover -- were missing.

Condition
The main body of the top linen layer and the layer covering the roll edge were structurally quite sound. However, due to a combination of the sharp edges of the embedded tack heads and the repeated addition and removal of tacks, staples and nails from subsequent upholstery coverings, the area of linen around the tack line of the wings was no longer attached to the wood frame. The tack line area around the outer arm and the panels in the top linen layer and the first linen layer were more intact; however, the threads

surrounding most of the tacks had been severed by the embedded tack heads. The linen twines holding the hair filling to the first linen layer ripped through the weakened linen at these points due to the weight of the unit of curled hair filling. The hair although slightly flattened, had retained its basic shape and remained quite flexible. The straw filling making up the roll edge was very brittle.

Due to the condition of the individual linen panels, particularly around the tack line, it would be necessary to give them the full support of a new fabric. In order to carry out the treatment, the panels would have to be removed from the frames.

Aim of treatment

Although considered part of the history of the piece, a decision was made to remove the modern upholstery so that the original elements f could be made structurally sound enough to remain with the chair frame, rather than being permanently removed and put into storage. Since this piece is privately owned and subject therefore to occasional use, the chair had to be re-built with techniques that would withstand the weight of a sitter. Those areas devoid of upholstery would be rebuilt with new material around the original elements, aiming for a profile more in keeping with the date of the frame. The original materials would be stabilized and techniques selected to reduce further damage to the already tack-punctured wood frame. The new upholstery fabrics would be attached with the minimum amount of metal fasteners. Wherever possible, stitching techniques would be employed to secure the new upholstery materials.

Treatment

Due to the fact that the tacks in the wing section were embedded quite deeply into the frame and that the linen surrounding the tacks was so brittle and already detached from the tacked edge in many places, it was thought that more damage would be caused to both the linen, tacks and surrounding wood frame if the tacks were actually removed to release the linen. Therefore, the few remaining threads, held under the tacks in these sections of the top linen layer, were gently eased from under the embedded tack heads without removing the tacks. Similarly, since many of the linen threads under the remaining tack heads were severed, it was not necessary to lift the tacks completely from the frame in order to remove the linen. The tack heads were not as embedded into the wood frame as those in the wing section. The tacks were raised approximately 1/8” proud of the surface of the wood frame, sufficient to allow the linen to be gently eased around and over the tack heads. This would prove to be a distinct advantage when the panels were replaced after conservation treatment since it would not be necessary to use a hammer to drive the tacks back into the frame, an action which would vibrate the frame and perhaps dislodge the brittle straw filling in the roll edge.

The curled hair filling was removed by clipping through the bridal ties that were holding the hair to the linen base. All the textile materials were thoroughly vacuum cleaned to remove loose surface soils. During this process care was taken not to disturb the original profile of the unit of curled hair.

Due to its weakened condition, the linen encasing the straw forming the roll edge was worked on in situ. It was supported with a layer of nylon net. A polyester crepeline fabric was considered as an alternative support fabric because of its longevity, however, the nylon net was preferred since its somewhat elastic qualities, due to the bobbin net structure, eased well over and around the changing contours of the three-dimensional form. In addition, the nets ability to grip rather than slip over the surface of the

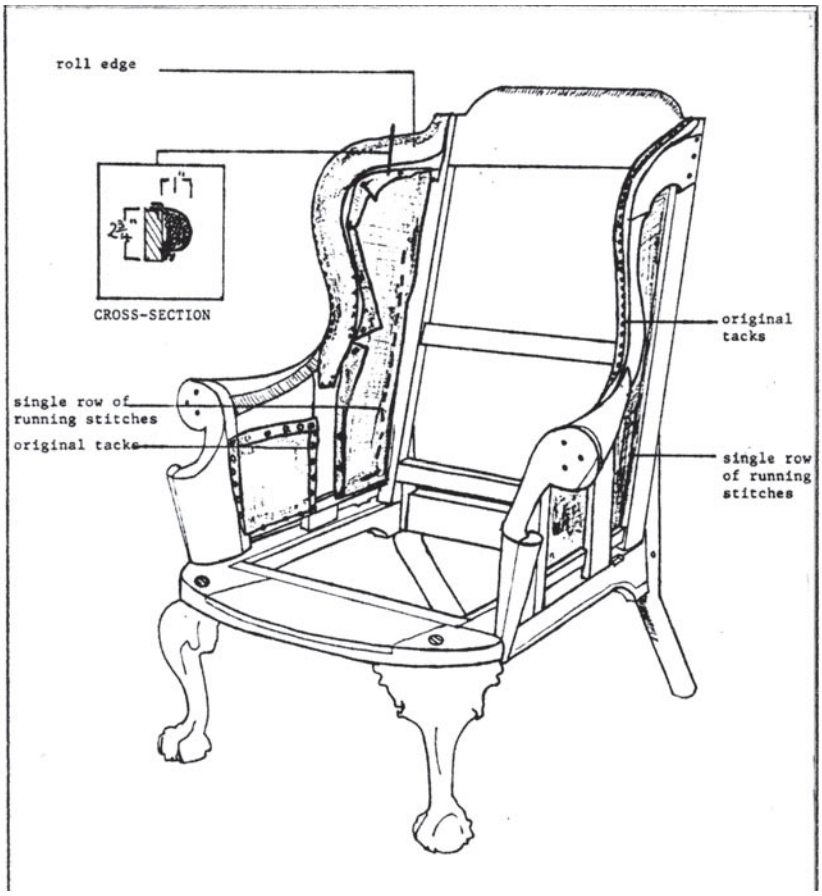


Fig. 1 - Diagram showing the first linen layer and roll edge

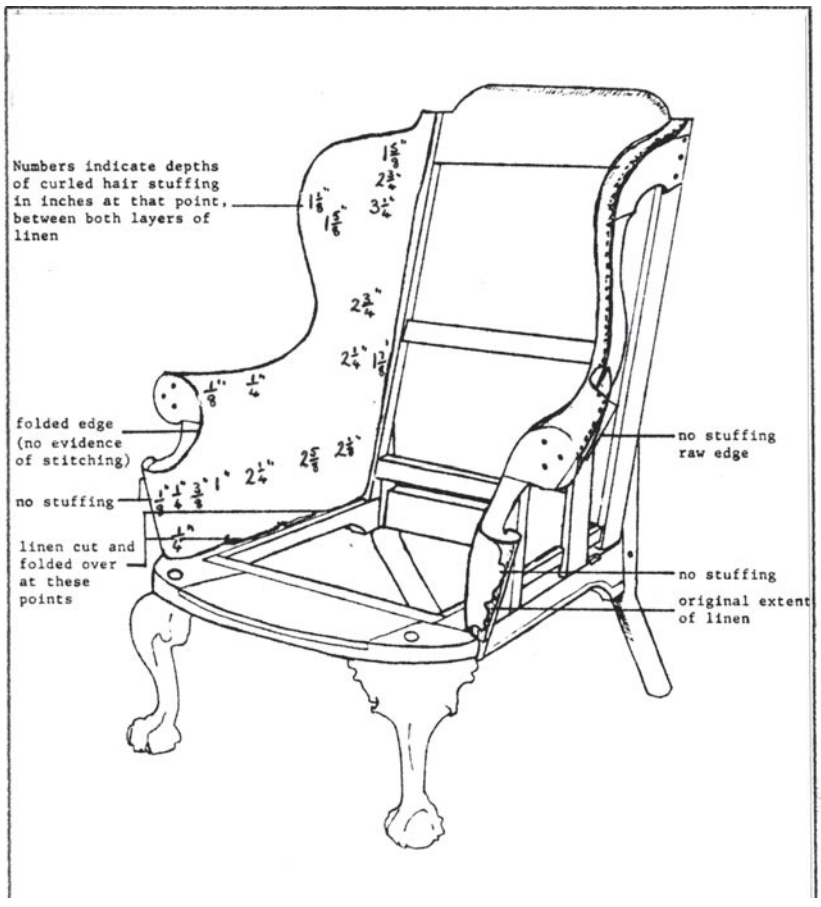


Fig. 2 - Diagram showing extent of the original foundation materials

linen was a distinct advantage over the polyester. Ease of handling and its resistance to fraying were also advantageous qualities, particularly when it came to re-attaching the supported linen to the frame since it was not necessary to hem the edges of the panels. This avoided unnecessary bulk at corners which may have interfered with the overall crisp line of the chair after re-upholstery. The net was also chosen for its semi-transparent quality -- when placed over the surface of the linen it did not obscure the construction details of the upholstery. To provide a more evenly tensioned, firm support than metal fasteners, a decision was made to attach the net directly to the wood frame with an adhesive. The adhesive selected was a grade of carboxymethyl cellulose mixed with distilled H2O, (Hercules, grade 7XL; 13mls. H2O: 19 CMC). Prior to treatment tests were carried out on some comparable wood and net samples producing very encouraging results. In the tests, a good bond was achieved between the wood and the net. The adhesive had been mixed to a thick consistency so that it could be applied in a thin line, (approx. 1/4"), in a very controlled manner. Due to its relatively slow drying time, the drying process was accelerated with the aid of a heated air gun (with fine nozzle attachment which allowed the air to be directed to one specific area). This also enabled the net to be positioned, and set in small sections without assistance of pins or other clamping devices. Furthermore, the accelerated drying time did not allow the adhesive to penetrate as deeply into the wood.

The linen panels were given a full support by being sandwiched between and stitched to two layers of nylon net -- previously dyed to a color which would blend with the overall tone of the linen fabric. This sandwiching fabric provided an overall support, which when extended over the missing areas, created an edge which could be attached to the wood frame. All layers were held together by stitching with a polyester multifilament thread.

After conservation, the supported linen was repositioned and the net support which extended across the tack holes, was eased back over the head of each tack. It was possible to push the partially lifted tacks back into position with the thumb, thus avoiding imposing unnecessary vibrations on the frame and fragile roll edge with a hammer.

Due to the weight of the unit of hair filling, and the fact that it was to rest on a vertical plane, it was necessary to add an intermediate layer of new linen, directly over the original layer. The hair was held to the linen by a series of linen twines, threaded through various points in the linen support fabric, and tied. The original profile of the hair stuffing was retained. The new linen support layer was attached to the frame with staples. Monel metal staples, (copper and nickel alloy) were applied with an airpressure gun. To make removal easier, to hold down a larger area of fabric, and to prevent the bar of the staple from biting into the weakened warp and weft threads, a piece of acid free card, a little larger in dimension than the bar of the staple, was positioned over the linen before the staple was inserted. In this case staples were chosen over the more traditional tacks since it was felt that the fine ends of the staple would cause less damage to the textile than tacks. Additionally, application with a staple gun eliminates the vibrations that would otherwise occur from the action of hammering the tacks, vibrations which would be sufficient to dislodge the straw filling. The monel metal eliminates the risk of damage to the textile from corrosion products.

The top linen layer was supported in two layers of net using the same method applied to the lower linen layers, as described earlier in the text. Again, to provide a more evenly tensioned, continuous support,

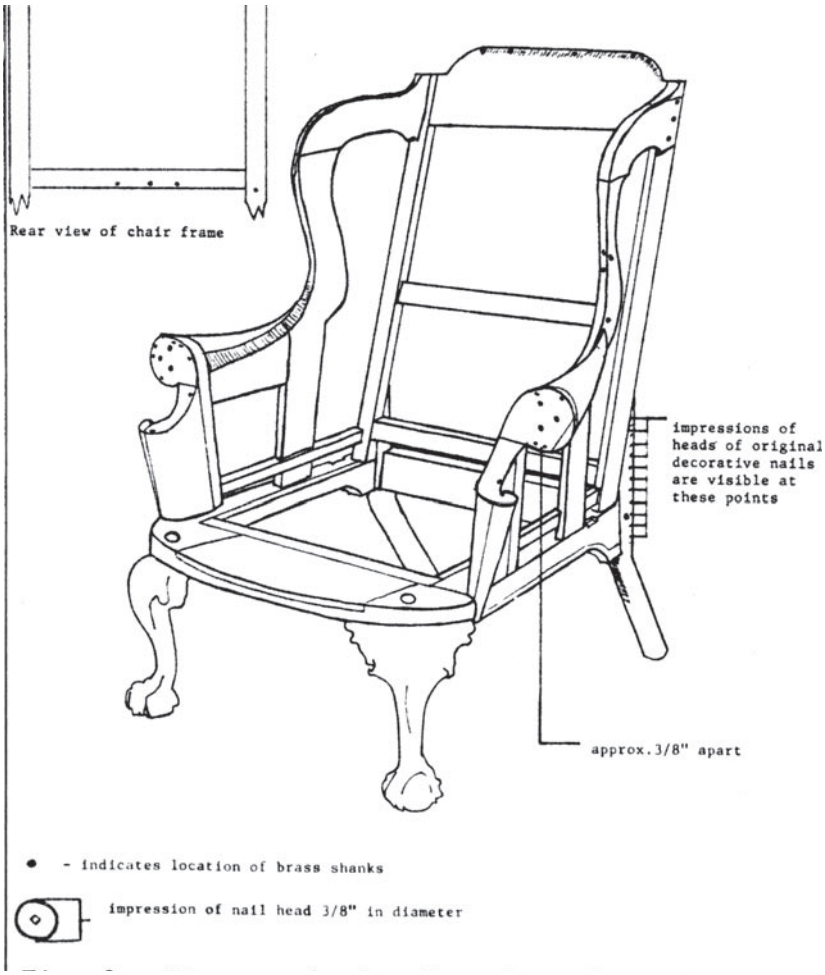


Fig. 3 – Diagram showing location of remaining original brass shanks

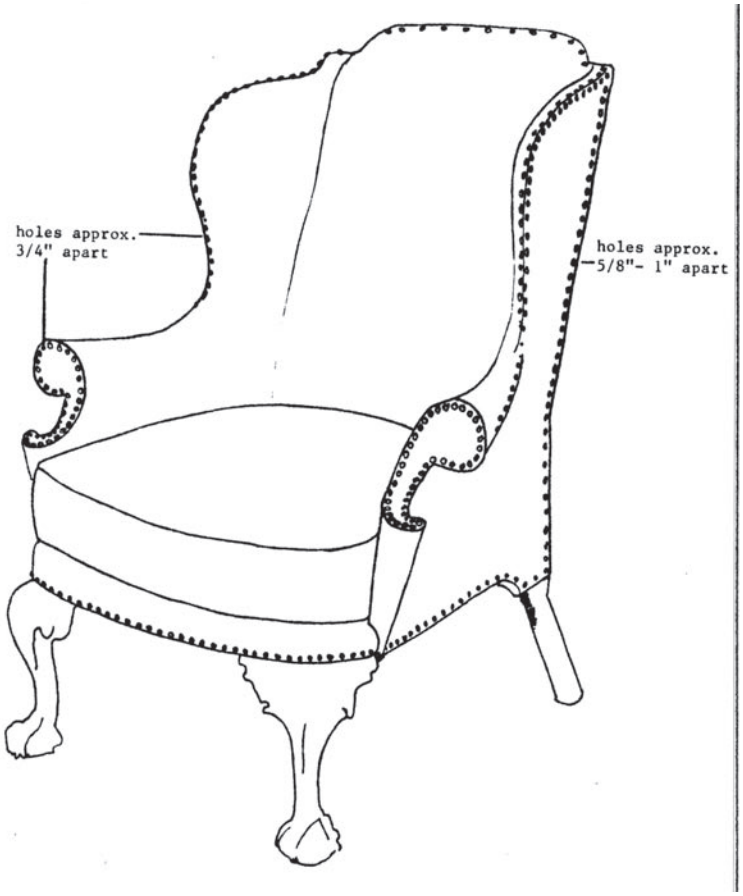


Fig. 4 – Diagram showing probable extent of decorative nails

than would be possible with metal fasteners, the linen was anchored to the frame by adhering the net with CMC directly to the wood frame. Due to the fairly open structure of the net, it was still possible to see the original tacks in the frame beneath the layers of net.

Although it was necessary to use a certain amount of staples, in an attempt to reduce further damage to the wood frame, the new upholstery fabrics were attached, wherever possible, with a stitching technique. To minimize the tension normally imposed on the chair frame by the seat webbing, the webbing and subsequent layers of upholstery were stapled to a new, independent sub-frame, (constructed of marine-grade plywood), which was attached to the original seat frame with long screws through three existing holes in the front and sides of the seat rail.

To re-build the new upholstery, linen and cotton fabric, cotton webbing, polyester sheet wadding and a non-woven polyester fabric were chosen over the more traditional, materials generally used in the upholstery trade, (such as jute webbing and cotton wadding).

A close fitting covering of linen was applied, shrouding both the new and original foundation materials and providing a ground to which the outer silk covering and trim could be stitched. This completely eliminated the need for metal fastenings to apply the new outer covering of silk damask.

Observations Made from Studying the Frame
Examination of the tack holes on the frame revealed that the frame had been re-upholstered many times. Additionally, several brass shanks of square cross-section were found embedded in the wood frame. This suggested that the chair was originally finished with decorative nails (figs. 3 & 4). It was surmised that originally the nails extended around the face of each scroll, along the front and side edges of each wing, the outer arm, the top edges of the upper back and the two outer edges of the back upright. The nails probably extended along the lower edge of the side and front seat rail, however, since this section of wood had been replaced at some point, there is no evidence to support this assumption.

New decorative nails were not introduced since they would cause too much damage to the frame. A technique of converting decorative nail heads into buttons by replacing the shank with a metal ring, is a practical alternative on a smaller scale; but, since more than 500 nails were required in this particular project, the technique was infeasible.

Since the foundation upholstery materials are only accessible if the new upholstery materials are undone, a detailed set of diagrams documenting the construction, materials and dimensions of the stuffing and location of the decorative nails were prepared (fig.1 - 4).

2. PHILADELPHIA EASY CHAIR, c.1790 - 1800 (figs. 5 & 6)
Primary wood, mahogany; secondary wood, yellow pine.

Description
This fully upholstered Federal-style winged easy chair, with commode seat, had with the exception of the seat cushion, all the original upholstery foundation materials intact. Originally, the chair would have had a slip cover.

Aim of Treatment
The aim of this treatment was to make the piece safe for display and study purposes. Since the chair was primarily a study piece, it was desirable that the method and materials chosen for the treatment not conceal any information related to the construction of the foundation upholstery.

Condition
The outer panels were quite weak. The panels had completely worn away along the front seat rail, front and side of the scroll arms, upper sections of the inner and outer back revealing some of the underlying layers of upholstery. The curled hair filling in these areas has sagged away from the frame. The sharper edges of the wood frame had worn through the linen in several areas.

The linen fabric covering one section of the padded commode seat had at some time been released, exposing the curled hair filling.

Treatment
The method chosen to support the outer covering was to encase it in a semi-transparent fabric providing a support for the loose pieces of fabric and the displaced curled hair filling, without concealing information showing the way in which the upholstery had been constructed.

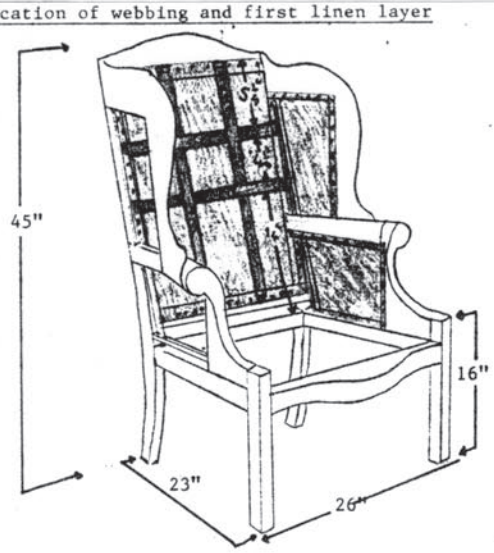
The net was chosen as the support fabric for the same reasons outlined for the previous case history. It was dyed to a tone that would blend with the overall tone of the outer cover. Again, polyester crepe line was considered, but, since the edges of the support panels were to be seamed together, the loose tabby weave was too easily distorted and bunched when stitched together. This was not a problem with the bobbin net structure.

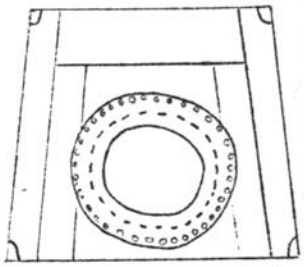
All the work was carried out in situ. Prior to encasing the upholstery in net, the fragmented upper section of the outer back panel and the underlying linen layer along the front seat rail, were supported by stitching to separate bands of net. The top surface of each panel was covered in a layer of net. The net extended across areas where the linen was missing. After the net was pinned to the linen, the edges of each support panel were trimmed and turned inward, carefully lining up the folded edge with the location of the original seam lines. The folded edge of each net panel was pinned and stitched with a polyester multifilament thread to the adjacent panel, being careful to avoid stitching through the original linen seam lines directly below. It was necessary to provide additional support to the linen along the upper inner wing by attaching it, in a series of short rows of spaced running stitches, to the net.

To provide protection to the particularly brittle section of the linen panels attached to the underside of the seat rail -- as well as to provide a way to finish off the edge of the net panels without having to stitch into the linen itself -- each net panel covering the four outer panels was extended beyond the lower edge of the seat rails. A casing constructed of the same net was stitched to the lower edge of each net panel. A tape of polyester fabric was threaded through the casing, drawn and fastened to itself under slight tension with a tab of ‘velcro’. The loose section of the seat pad was covered with net. In order to attach the net without using an adhesive, the tacks were partially lifted from the wood and the net was slipped over the head of each tack. The tacks were pushed back down into their original holes, gripping the net at the same time. The remaining free edge of the net was passed over the outer cover and stitched to the panel at the underside of the seat.

Location of webbing and first linen layer

Fig. 5





Overhead view of commode seat

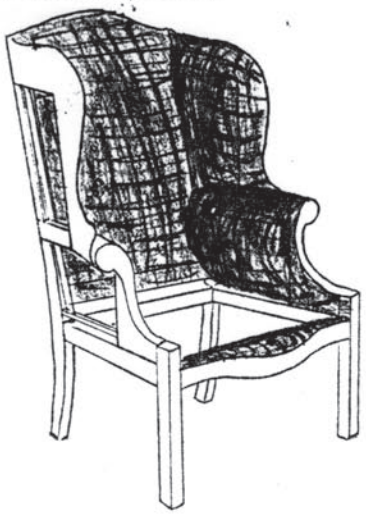
The inside back has an open interlaced layer of webbing, 2 x 2 arrangement; the webbing is 1 3/4" wide and has a chevron weave.

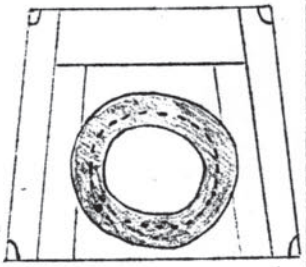
A single layer of linen is tacked over the inner back, inner wings and inner sides.

The curled hair filling lies directly over the linen. The hair is probably held in place with linen ties, i.e. loops of twine, stitched through the hair and the lower linen layer.

Upholstered areas and profiles

Fig. 6





Overhead view of commode seat

Shaded areas indicate stuffed areas

Upholstered areas:	inner back, wings, sides, front seat rail and commode seat; (loose seat cushion and outer slip cover are missing)
Stuffing:	curled black, white and brown hair; several small feathers found lodged between upholstery and seat rail suggests the filling in the missing seat cushion was of feathers.
Depth of stuffing:	seat rail: center $\frac{5}{8}$", edges $\frac{3}{8}$"; commode $\frac{3}{4}$"; arm, (deepest point) $3\frac{1}{2}$"; wing, (deepest point) $2\frac{1}{2}$"; inner back, (deepest point) $2\frac{3}{4}$".

As a result of conservation treatment, the loose linen is now protected and information regarding the construction of the upholstery remains visible through the support fabric. Additional information that was accessible during conservation treatment was documented in a series of diagrams, two of which are reproduced in this report (figs.5 & 6).

3. AMERICAN-DESIGNED SIDE CHAIR OF ENGLISH MANUFACTURE, c.1875 - 80 (fig.7)
Primary wood, rosewood.

Description
The side chair had a fixed upholstered seat which was covered in a green dyed silk and metal thread fabric, attached along all four sides of the seat rail with iron tacks. The edges of the cover, extending to the show wood of the seat rail, were at some point decorated with braid. The braid is now missing.

The foundation upholstery was original. The outer cover was probably original, however an extra set of tack holes were found in the cover and in the tack rail of the frame, suggesting that the cover was at some point removed and re-applied with a new set of tacks.

Condition
The silk warp threads, positioned at right angles to the front roll edge, were broken and several of the weft threads had unraveled, exposing a large section of the underlying cotton layer. The foundation upholstery appeared to be in excellent condition.

Aim of Treatment
Due to the type of support required to make the piece safe for display and storage, it was necessary to remove the outer cover for treatment. It was decided not to reapply the textile to the frame in the previous manner (with tacks) due to the amount of damage already subjected to the tack rail and to the weakened frayed edges of the outer cover from previous tacks and from the animal glue used to adhere the gimp braid.

A method of re-attachment was devised that would use the minimum amount of metal fasteners to re-attach the cover and also provide a ground to which the new gimp braid could be stitched, eliminating the use of adhesives.

Treatment
The textile was removed from the seat, surface cleaned and supported by stitching to a piece of suitably dyed silk fabric. The loose threads were realigned and couched down with a fine multi-filament polyester thread. The raw edges of the panel were held with a row of herringbone stitches.

The support fabric was of a larger dimension than the panel itself, since this excess fabric was necessary for the re-application of the panel to the upholstery. The panels were re-positioned and attached to the frame with monel metal staples. In order to provide the stitching ground with a firm, straight edge to which the gimp braid could be attached, a narrow strip of acid-free cardboard was placed over the fabric along the tack line before the staples were inserted. Since the cardboard also assisted in holding down the fabric, the number of staples used were considerably less than the amount of tacks used in the

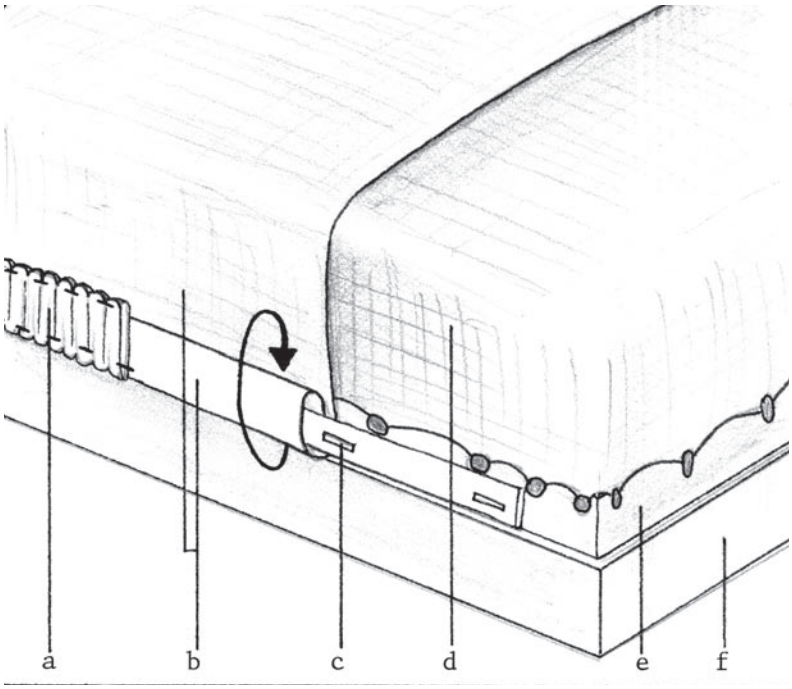


Fig. 7

Diagram of seat corner to show the method of attachment of conserved outer cover and gimp braid.

a - Gimp braid, stitched to (b) along upper and lower edge of braid.
b - Supported outer cover; the extension of the support fabric is wrapped around and tucked behind the strip of acid-free cardboard.
c - Cardboard strip stapled to the frame.
d - Foundation upholstery.
e - Tack rail.
f - Show wood.

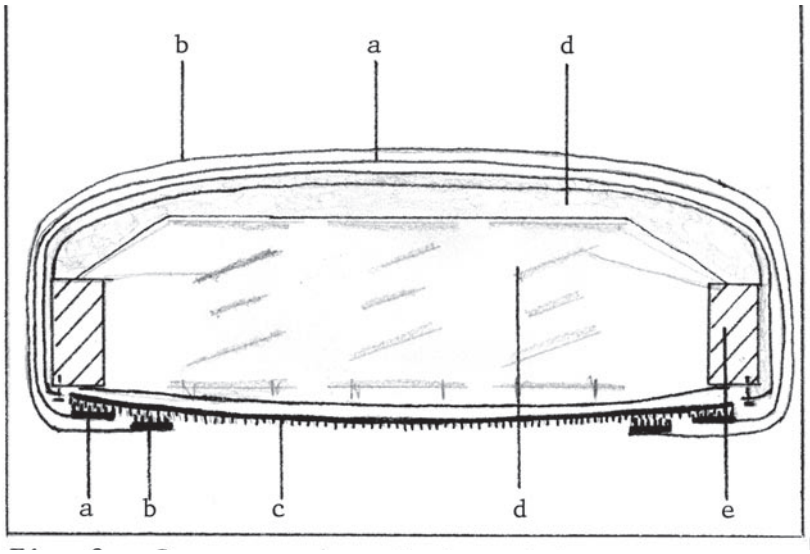


Fig. 8 - Cross-section of the upholstered seat to show the method of attachment of the protective cover and the slip cover to the 'velcro' fabric panel.

a - Protective cover secured to underside with 'velcro'.
b - Slip cover secured to underside with 'velcro'.
c - Panel of 'velcro' fabric.
d - Foundation upholstery.
e - Wood frame.

previous covering. The excess fabric was trimmed and wrapped over the front surface of the card strip, the raw edge being tucked between the card and outer cover. The gimp braid was stitched directly to the support fabric and to the cover, (fig. 7).

4. FRENCH SIDE CHAIR, c.1925 (fig. 8)
Primary wood, palissandre.

Description
The side chair had an upholstered seat and back. It was covered in its original silk fabric. It was attached with iron tacks to the underside of the seat and tack rail of the inner and outer back. The back panels and the area surrounding the four legs were trimmed with a flat braid.

Condition
The silk covering the seat and inner and outer back was extremely fragile and was too weak to remove for treatment without the risk of being irreparably damaged. The convex contoured seat and inner back upholstery units offered a degree of support to the silk panels. Unfortunately, the outer back panel, not having this additional support, had pulled away from the upper tack edge. As a last resort in order to save this unsupported brittle panel, a decision was made to remove it completely. It was mounted and placed into flat storage.

Aim of Treatment
The aim was to keep the remaining panels with the chair, make them safe for handling and storage, and stable enough to accommodate a slip cover for occasional short term display.

Treatment
The panels were covered with a layer of polyester crepeline to prevent the loose threads from being displaced further. Polyester crepeline was chosen because its smooth slippery surface would not catch on the loose threads or dislodge the panel when the slip cover was applied.

The seat cover support was designed to wrap around and attach to the underside of the seat; likewise, the back cover attached to the rear back panel. To keep the construction simple, and to obtain a close fit over the curved surface of the seat, the support cover was edged with ‘velcro’ and attached to a corresponding panel of ‘velcro’ fabric laid over the underside of the frame.

The advantage of this method of attachment is that it remains totally independent of the frame itself and the fit of the covers can be finely adjusted by simply releasing and re-attaching the ‘velcro’.

5. FRENCH SIDE CHAIR, designed by RUHLMANN, c.1925 (fig. 9 & 10) Primary wood, ebony.

Description
The side chair has an upholstered seat and back. It is covered in the original pink silk damask fabric, which is attached with iron tacks adjacent to the show wood. The method of attachment J.S unusual. At first glance it suggests. that the upholstery is attached to a separate frame, however this is not the case. The frame and upholstery are all one unit. The raw edge of the fabric has been folded under and a tack has been inserted in the section of the fabric between the raw edge and fold line (fig.9).

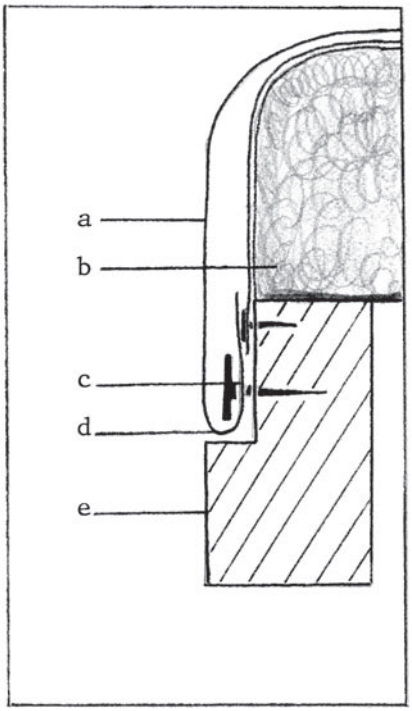


Fig. 9 - Cross-section view of the seat upholstery to show the original method of attachment to the outer cover.

a - Outer cover.
b - Foundation upholstery.
c - Outer cover folded back after inserting tack row, thus concealing the tack heads.
d - Fold.
e - Show wood.

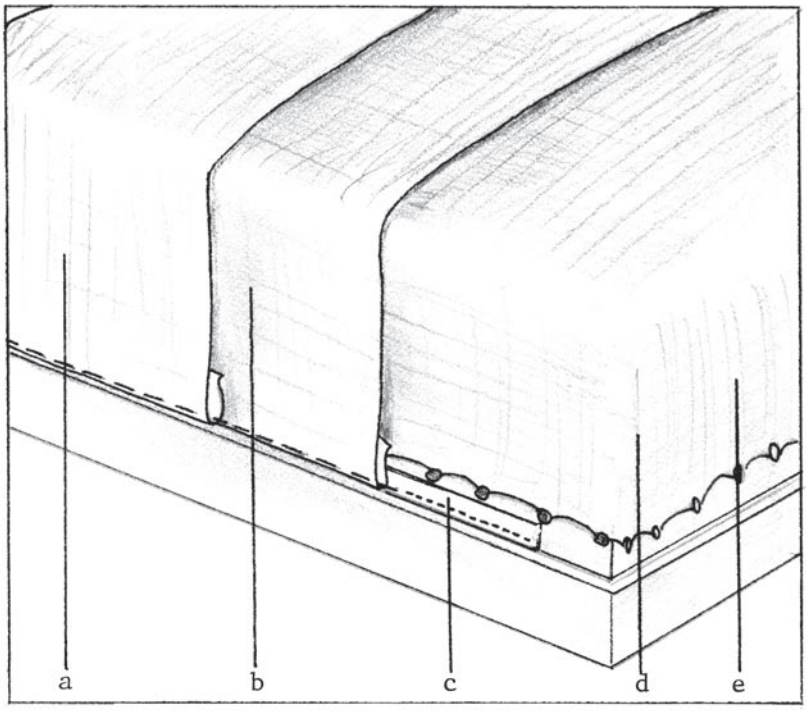


Fig.10 - Diagram of seat corner to show the method of attachment of the conserved outer cover and sandwiching fabric.

a - Semi-transparent sandwiching fabric stitched to the folded edge,(c).
b - Supported original cover stitched along folded edge to (c).
c - Folded cotton tape adhered to tack rail (e), providing a stitching ground for (a) and (b).
d - Foundation upholstery.
e - Show wood.

Condition
The silk fabric is very weak. Due to the combination of the stress subjected to the warp and weft along the folded edge of the silk cover and earlier repair work along this same line, the cover has become separated from the frame.

Aim of Treatment
Conservation treatment has not yet commenced on this piece of furniture, however the aim of treatment will be to make the cover safe for occasional display and storage. In order to find the most suitable method of attachment various samples have been tested. The following techniques have been proposed.

Due to the original method of attachment, it would not be possible to apply a protective cover over the silk since there would be no way of securing it to the frame without causing further damage to the silk. Therefore the cover would have to be removed for treatment and the original method of attachment would have to be modified. The textile would be removed leaving the original tacks in the frame and a stitching ground would be created along the tack line to which the conserved cover and semi-transparent sandwich could be stitched.

As illustrated in fig.10 the stitching ground would be created with a long strip of fine cotton fabric, folded and stitched along its length, approximately 1/8" away from and parallel to the folded edge. This strip, approximately 1/4" wide, would be adhered to the tackline with methyl cellulose, the folded edge being as close to the show wood as possible. The adhesive would be applied over the area from the raw edge and up to -- but not beyond -- the row of machine stitching. If the adhesive were applied beyond this line it would not be possible to pass a needle through the folded edge of the fabric.

Obviously, the disadvantage of this technique is that it conceals part of the tack line which holds information about the way in which the cover was applied is concealed. However, this information would be documented in the treatment report with photographs.

The advantage of this method of application is that minimum strain is put on the textile, because it is evenly supported and, if it ever needed to be removed, the technique is easily reversed. Although a method of application differing from the original has been used, the finished appearance remains unchanged.

Summary
These case histories illustrate the importance of selecting those conservation materials, methods of support and types of re-attachment of the upholstery layers to the wood structure which cause minimum intrusion and stress on both the textile elements and the frame. They also cite the importance of assessing the balance between the various treatment options and the affect on the overall integrity of the piece of furniture.