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## Treatment Techniques for the Vellum Covered Furniture of Carlo Bugatti

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This presentation focuses on the treatment of vellum and parchment. The specific application to the Bugatti furniture pieces is discussed in light of the special constraints of the vellum and parchment being adhered to furniture frames. The critical factor of environmental conditions is emphasized.

Vellum and parchment are seldom used to make furniture, but are certainly challenging for a conservator when they have been. Carlo Bugatti designed many wild, exotic pieces of furniture around the turn of the century which increasingly used more and more vellum until finally, entire wooden frames of his furniture were covered with vellum (Figs. 1 & 2). (Jean, his grandson, designed the famous Bugatti cars.) Carlo Bugatti began designing furniture in 1880. By the mid-1890's undecorated or lightly decorated vellum panels were characteristic of his furniture. The vellum panels were surrounded by elaborate inlaid borders of white and yellow metals, pale wood and ebony or repousse metalwork. He was awarded the Silver Medal at the Paris Exposition Universelle of 1900 for this work. By the 1902 International Exhibition of Decorative Arts in Turin, where he was awarded the Diploma of Honour, vellum completely covered the wooden structure of the furnishings. Elegant stylised patterns, insect forms, or images were painted directly onto the vellum with gold and water colors or dyes.

Not only are these pieces of furniture wild visually, but the adhering of skin to wood creates wild tensions. Vellum and parchment are extremely hygroscopic and naturally expand and contract with seasonal relative humidity variations. These skins can be quite tough sometimes and will warp pulp boards when glued down on a bookbinding. Parchment and vellum can also be easily torn or cracked when the skin is thin and/or the conditions are too dry and stressful. The expansion/contraction rate of wood is quite different than parchment or vellum and Carlo Bugatti's secret glue preparation (which is still secret, by the way) is beginning to show signs of fatigue. This has most likely been exacerbated by storing the furniture in dry conditions or near heat. The complete mounting of skin to wood causes the contracting or expanding skin to struggle with the more stable wood which usually results in something giving by tearing or breaking (Fig. 3)

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The skins used for this furniture are shellacked. Since the shellac is in reasonably good condition, and the water color and gilt images are both above and below the shellac layer, the surface of the vellum was not treated other than to dust and occasionally dry clean.

There are a large number of variables to consider when working with skin. It is important to take into account the overall system of a piece of furniture when deciding how to approach an individual mend. Being familiar with the materials, with their wide ranging characteristics, and with the various approaches for their conservation starts the process of skin conservation.

The words vellum and parchment refer to skins which are prepared with lime in exactly the same way. They have had different specific meanings over the centuries. Sometimes they have meant the same thing or even the opposite meaning depending on the country. The modern British definition of parchment means skins prepared from sheep; vellum means skins prepared from calf, goat or other animals. Bugatti used sheep, calf and goat for his furniture, although the goat seat covers may have been a later replacement. His furniture is most often described as being covered with vellum, so the term vellum will be used for this presentation.

Since most works of vellum are found in early manuscript books, documents and maps, conservation techniques have been developed for these materials. The principles used for their conservation are basically the same to be used for furniture. Being familiar with how vellum and parchment are prepared provides a basis for understanding their working properties, sensitivities and limits. The techniques used to treat and mend these skins are based on the methods used to prepare them.

Vellum manufacturing is essentially a simple process, but the skill of the craftsman will make the difference between a soft, flexible skin and a stiff, brittle one. The skins come to the vellum maker from farmers, from cattle ranches and abattoirs. They are carefully selected to be free from blemishes and scars, which means only about 10% of the skins are suitable. Even so, many manuscripts have pages with holes and scars.

The skins are limed in a paddle tank which loosens the hairs. The skins are usually dehaired using an unhairing knife over a wooden beam. This is the side known as the hair side. One of the main differences between vellum and leather is that after dehairing the pelts in lime, leather has the lime removed and is then tanned in acid which is an irreversible process. Vellum is not tanned and the lime can be removed in water.

A machine can be used to remove the fleshings, which is the loose connective tissue on the underside of the skin. This can also be done two-handed with lunar knives, which pushes the soft flesh before the knife. This side of the skin is known as the flesh side.

The skin is stretched on a frame with wooden pegs for even tensioning (Fig. 4). The hair side is usually shaved dry - it is more resistant to the knife. A process called scalding is sometimes undertaken using another circular or lunar knife, pumice stone, cold and warm water. This further purifies the skin and can give a gelatinous surface to the hair side.

Finally a slow tensioned drying begins. The drying must be gradual to give a flat opaque skin. Dr. Reed, who wrote Ancient Skins, Parchment and Leathers in 1972, further explains that since vellum is dried under tension, the network of protein fibers are realigned to be parallel with the surface (Fig. 5) instead of the random orientation of leather fibers (Fig. 6). The vellum fiber bundles are fixed in this position by the matrix of ground substance that dries to be hard and glue-like. The ground substance is a mucous-type secretion (mucopolysaccharides, some proteins, lipid bodies and some inorganic salts) which is naturally present in skins. It is this ground substance which reacts easily to humidity changes because it has a high water binding capacity.

This is useful to remember when working with skin as a conservator. If dried too fast, after humidifying to flatten, distortion can result. The introduction of moisture is a sensitive procedure. Too much moisture can remove lime and/or if not redried under tension, the fiber bundles can revert back to the random arrangement of raw skin. Changes in dimension, form and opacity can occur. The aim of parchment conservation is to hydrate and tension as closely as possible to the manufacturing process.

### Examination and Identification

There are a number of approaches and techniques which can be applied to a problem involving skin conservation. The basis of the techniques used at Trinity College in Dublin, Ireland, where I studied parchment conservation with Anthony Cains, is to use only structurally similar materials when mending skin to avoid struggles between the different expansion/contraction rates. Gelatin is used for the adhesive; parchment and goldbeater's skin or fish skin membrane are used for the mending materials. These materials will expand and contract at similar rates to the original parchment. When the mending material or adhesive is dissimilar to the original parchment, cockling and even tearing can result with changes in relative humidity.

When using parchment to mend, it is best to use the same animal as the original for structural and visual compatibility. But, determining the animal used to make the original skin is one of the most difficult things to do. The characteristics may have all been scraped or pumiced away in the preparation of the skin. The following are a few of the characteristics of modern skins which can be used as indicators.

Calf skin is generally even in color and thickness. It has pronounced crease patterns at right angles to the spine. It also has pronounced veining. Goat skin tends to be uneven in thickness, with a pronounced spine. The grain pattern is

more prominent with brown hair follicles often still visible, even on the flesh side. Sheep is uneven in thickness and often has yellow staining from lanolin. It can have a greasy feel. The general ribbing pattern is more apparent in the neck area. The grain is usually a fine follicled texture. The tightness of the fiber network varies on a skin: for example, the areas around the spine are compact and around the flanks, or axillae, looser. This is quite evident in sheep. This characteristic effects strength, flexibility and moisture permiability.

The establishment of the hair and flesh sides is also important so that the repairing vellum will correspond and not curl in the opposite direction to that of the object. Vellum will almost always curl in the direction of the hair side. The hair side, the outer or grain side of a skin, will often be gelatinous in look and smooth with grain pattern or hair follicles occasionally visible. This is from the treatment of the skin and the shaving action of the knife. The flesh side, or inner side, is usually much softer, more absorbant, and loose looking upon close inspection. If the flesh side has been shaved with a knife and prepared to have a smooth finish, it is difficult to tell hair and flesh sides apart. When the hair sides have been pumiced (pounded) to prepare the skin for the ink, which makes it velvety, it is also difficult to distinguish hair from flesh.

### Cleaning

Once the documentation and examination is completed, parchment can be dry cleaned with conventional brushes, soft erasers, and in the case of furniture, a low suction vacuum might be considered. Performing miracles on water staining and grime can't really be expected since the skin cannot be immersed in water. Stains and surface dirt may be reduced with swabs and a little moisture.

The removal of water soluble adhesives like paste and animal glue needs to be thorough to avoid stiffness and cockling, but not so thorough that the lime is removed from the skin. When removing paste or glue, the less moisture used, the better. When the hair side has been pumiced, it is very likely to go transparent when wet, particularly if pressure is applied. Working under a microscope is a good idea. Ethanol and water is often helpful in varying concentrations. Heat is disastrous, it will congeal the fibers and make the skin shrink. What cannot be removed at this time can be removed during the humidification process when the adhesive will often swell.

### Humidifying and Flattening

Before any major work can be done, the parchment should be flattened. The aim is to use methods related to the parchment manufacturing process. So the skins are humidified and stretched. It is a sensitive operation because too much moisture can cause transparency, distortion, offsetting, or even loss of flaking pigments if moisture is introduced too quickly. If not dried under tension, the fiber bundles can revert back to the random arrangement of raw leather. It is helpful to know the

characteristics of the particular skin being worked on. Try out one piece first. Get a feel for how much humidity is needed to flatten or manipulate if there is some distortion.

Humidifying can be done in a number of ways. The roll pack is a quick approach for items which have no danger of offsetting or flaking pigments. The item will be in distant contact with the moisture and the risk for transparency and/or excess water absorption is greater. The roll pack consists of a plastic sheet on the outside to contain the moisture, wet linen, at least 3 sheets of non-woven polyester web, the item, and 3 more sheets of polyester web. All are rolled up and set aside for 15-30 minutes depending on the skin. Some may even require hours if hard and thick enough. It is important to keep the spine direction of the skin parallel to the roll. This method is good for thick, hard pieces of parchment and was used for the Settee seat panel after removing it from the frame. It took several hours for the humidity to penetrate the skin. The skin expanded in the process and was initially pliable. But upon drying it repeatedly returned to its cockled state, although a bit flatter. There were indications that some hot liquid had been spilled on the panel. The panel seemed to be permanently contracted in the upper corner.

The safest method for humidifying is the humidity chamber. It is also the slowest. It is good for overall, even humidification for an uneven skin and the best for a skin which has been pumiced on both sides. The open, velvety surface of those skins make them sensitive to color change and they have a tendency to go transparent or gray.

After removal from the humidifying operation, the skin is pinned out on a press board with bulldog clips. The clips should have their faces flattened so that the pressure is not concentrated at the end point which would cause indentations. Blotters are inserted in between the faces of the clips. The clips are placed next to each other, then pinned to the press board. Manipulation of distorted areas of skin can be done now. The skin has expanded during the humidification process, and with proper tensioning hits its flat point just before it is dry. It is not a good idea to make the system more tense than necessary: it could dry too taught - so it is pinned out a little slack. The relative humidity of the room is important to keep in mind. If too dry, sometimes it is best to slow down the process by placing silicone release paper above and below the item.

## Mending

Mending can be done in a variety of ways. The mending process should be designed with care and the mend applied with due consideration for the final appearance and function. The choice of mending material is important for a non-damaging mend. It should not impose its own will on the vellum. Since the mending skins are hygroscopic and not as old as the original, it is best to use a similar animal and match hair and flesh sides. This may keep the expansion/contraction rate relatively similar. This is also the reason pharmaceutical, clear gelatin or parchment size is used for the adhesive. The

mending skins can be tinted with surface aniline dyes, then humidified and flattened before use. This process relaxes the skins which reduces the likelihood of cockling when gluing the mend to the original.

Fish skin membrane and Goldbeater's skin are very thin forms of parchment which are useful for mending. These materials are strong, resilient, they can deform without breaking, and are almost transparent. This makes them a suitable mending material for fragile, thin skins, for areas near images or for holding down curling joins. The fish skin membrane is made from the air or swim bladders of certain fish - sturgeon, cod, hake and whiting. Goldbeater's skin is made from the layers of connective tissue of cattle intestines. They should be degreased first with acetone or ethanol, then pumiced for better adhesion and to reduce the shine. It is quite difficult to handle them when applying the hot gelatin, so they can be stabilized temporarily by mounting lightly onto heat set tissue. The heat set tissue is removed after the mend is adhered and dried.

For some mends, only membrane may be necessary to support the brittle, thin skin. Infilling may not be structurally necessary. The membrane can support the infill and the area of the brittle skin.

In the case of the Bugatti settee (Fig. 7), the seat back had two round areas in which the parchment had been drummed on. That is, the parchment was stretched around the frame and adhered only on the rim. The round, flat area with the image of a young woman's face was not stuck down. The tension was uneven and when the relative humidity dropped, the parchment tore (Fig. 8). This particular area was under a lot of tension, like a drum head, and showed potential for the tears to continue across the image. Consideration was given to the various options for mending. Surface mending in situ with the transparent fish skin membrane was chosen because it was felt that the system was so tense, any disturbance could promote further tearing (Fig. 9).

In other cases, missing areas can be filled in with tinted parchment using a butt join to cause as little tension as possible. Fish skin membrane can support the mend on both sides. This method was chosen to mend one of the desk chairs. The slashed hole in the seat was filled in with parchment, tinted with dyes and shellacked, then the mend was supported with an overlay of fish skin membrane on both sides.

Major holes can be mended with skin: choosing the skin to match as closely as possible the original, keeping in mind the grain, weight, coloring, spine direction and hair/flesh sides. The skin can be thinned very carefully to the appropriate thickness, and pounced if both sides of the original are pounced.

The feet of the Bugatti settee had been worn and torn away. They looked like they had sat in a small swamp for a while. The wood had chipped away and was repaired by a furniture conservator to return it to the original shape. Paper mends were adhered first, following the original, and to build up the thickness. The missing areas were traced onto the repair skin. The overlay was shaped with the sanding sticks creating a long bevel from the infill area to a feathered edge. The flesh side is

sanded away because the strength of the skin is in the corium, just under the epidermis. The mends were carefully adhered to the feet (Fig. 10). In some cases, it was necessary to support the mend with an overlay of fishskin membrane.

Another option for mending is tacketing or thonging. Early vellum manufacturers and scribes used tacketing to mend holes in skins. Strips of vellum or thread were used. Tacketing was considered for the settee back, but the tension of the system overruled that possibility. It was the method chosen for the seat panel and the wardrobe shelf (Fig. 11). The extent and location of the tears, along with the normal expansion and contraction of the skins, made them too vulnerable. No adhesive mend would have held very long to the seat panel or the shelf.

### Environmental Conditions

Finally, the most important aspect to consider when caring for a piece of parchment is the environmental conditions, particularly for a piece of furniture covered in parchment. It must be kept away from sources of heat, and out of direct sunlight or other light sources. Heat will cause the parchment to contract, dry out and harden. The struggle between the more stable wood and the inevitable expansion/contraction of parchment will be there even without the added catalyst of heat. The ideal environment for parchment is between 55 and 60% RH and 65-70° F. Another problem for the Bugatti furniture is the metal stripping. After the settee spent the afternoon in front of French doors with Southern exposure, the metal stripping was quite hot to touch. It is probably burning the parchment. Filters can reduce light exposure, but careful consideration should be given to the sensitivity of parchment covered furniture. In addition, the water colors used in these Bugatti pieces will continue to fade if kept in sunlight.

Ideally, any work done on vellum should be done at the same temperature and relative humidity as its storage, exhibit or living space. Seasonal changes should be kept in mind when designing the mending system. Dry winter conditions will contract the skin, smooth out cockling, and strain any suspension system. If the mending work has been done in the summer, during humid conditions, the mends may strain to the point of breaking when the skin dries out and contracts in the winter. This happened to the desk chair's tacketed mend (Figs. 12 & 13). The tacketing had been done during the more humid autumn conditions. The tacketing broke as the skin contracted and pulled apart after wintering in a sun filled room. It cannot be more emphasized that the mends or tacketing be weaker than the original. When the system is strained due to inevitable contraction when hot or dry, the mends should give way, not the original. The repair of this mend will have to wait until next winter. The summer expansion will relax the skins, and the mend will pull back together.

As you can see, there are a large number of factors involved in caring for skin. Animal, condition, function of piece and most importantly, environmental conditions must all be considered when choosing a method for treatment. These factors begin a vocabulary to use when faced with a new adventure in the skin trade.



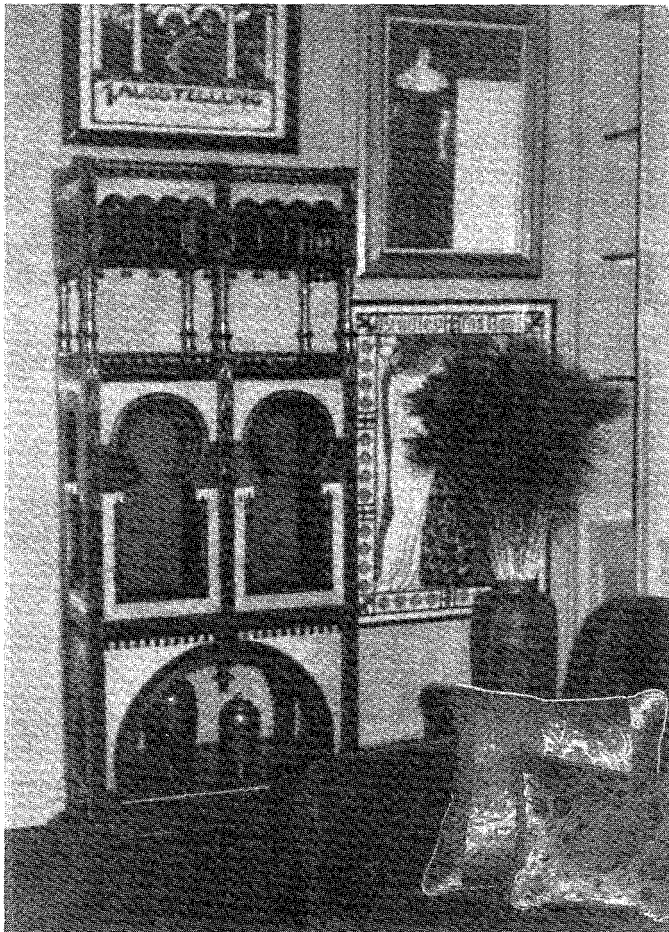


Figure 1

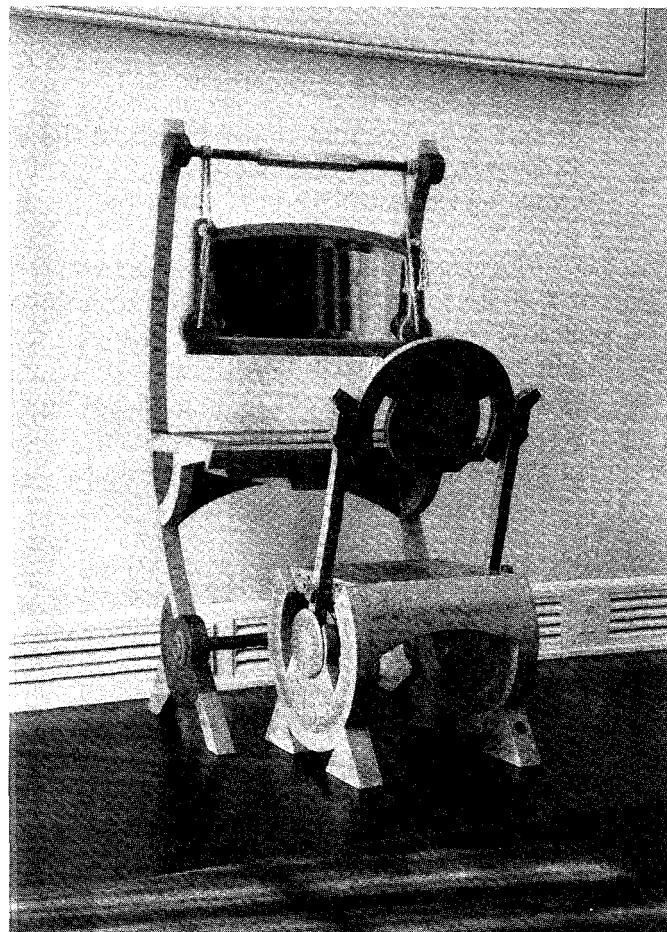


Figure 2

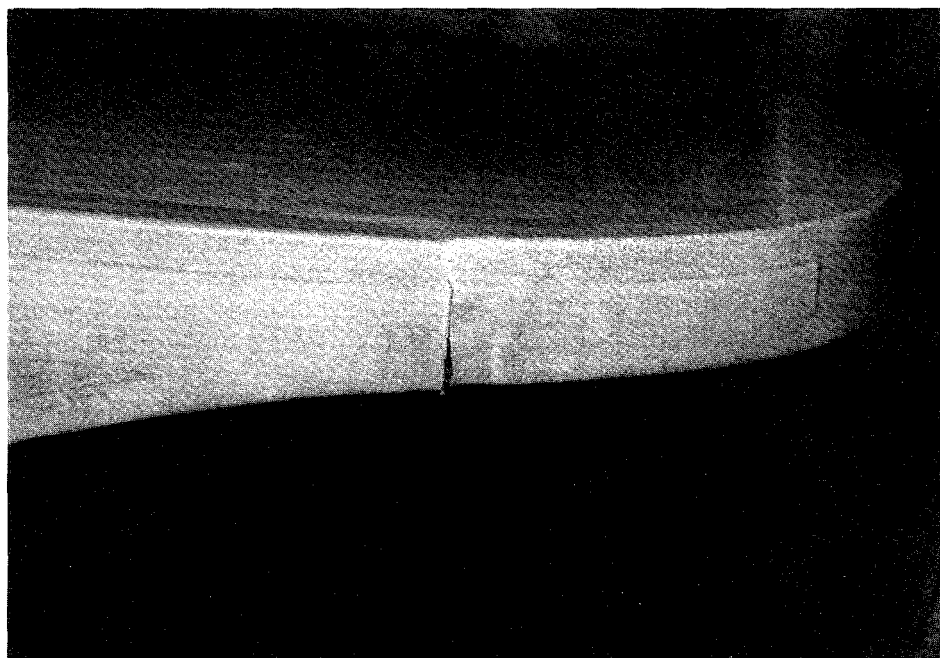


Figure 3





Figure 4

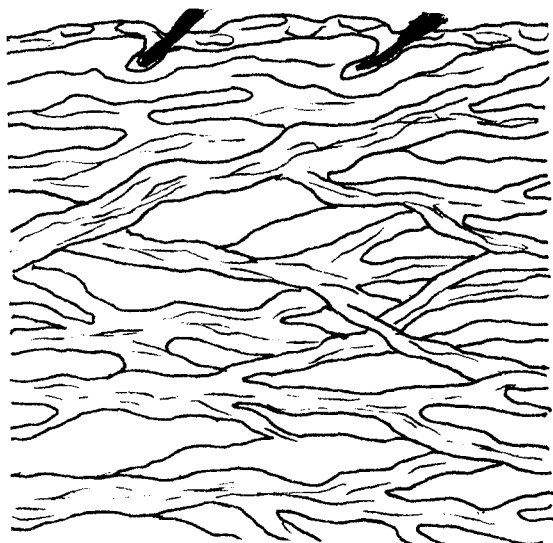


Figure 5

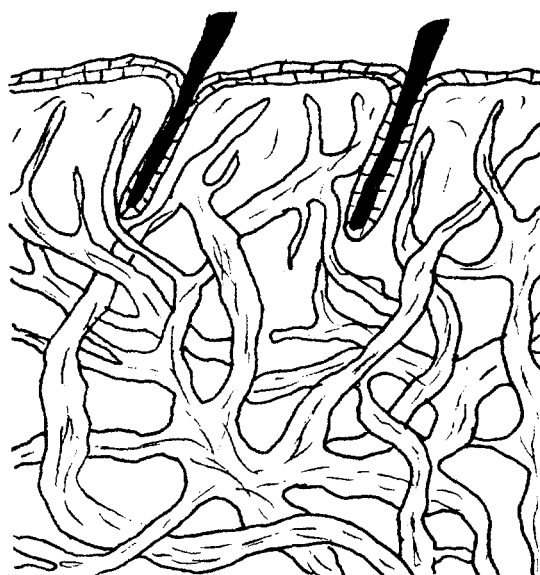


Figure 6

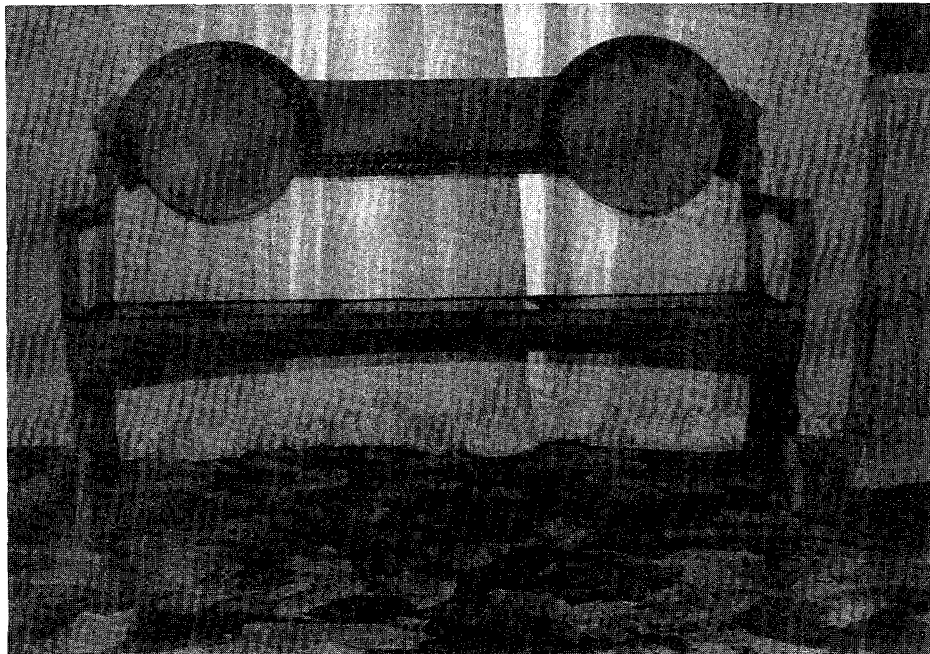


Figure 7

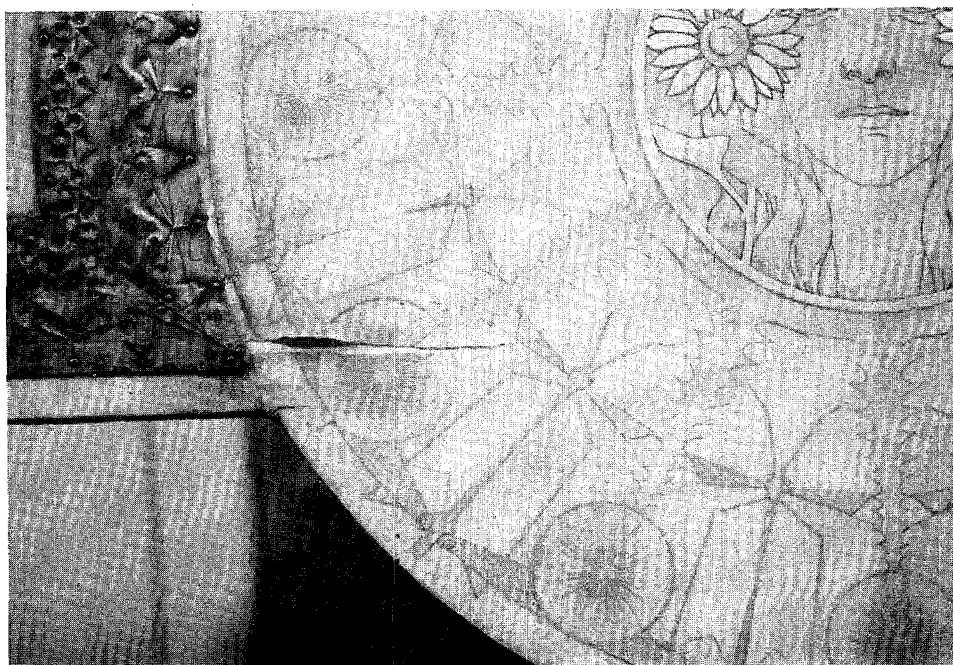


Figure 8



Figure 9



Figure 10

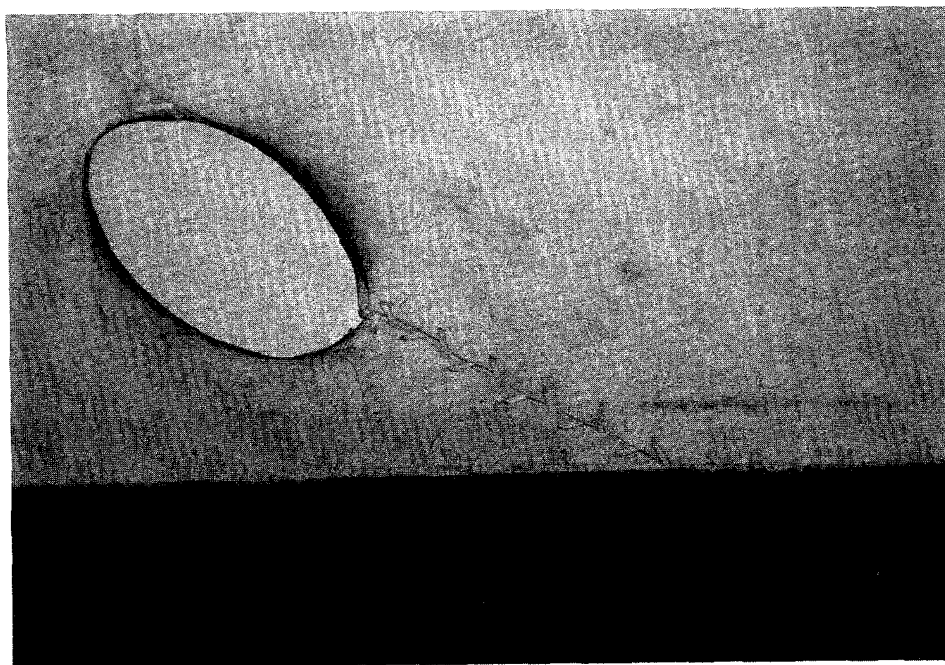


Figure 11

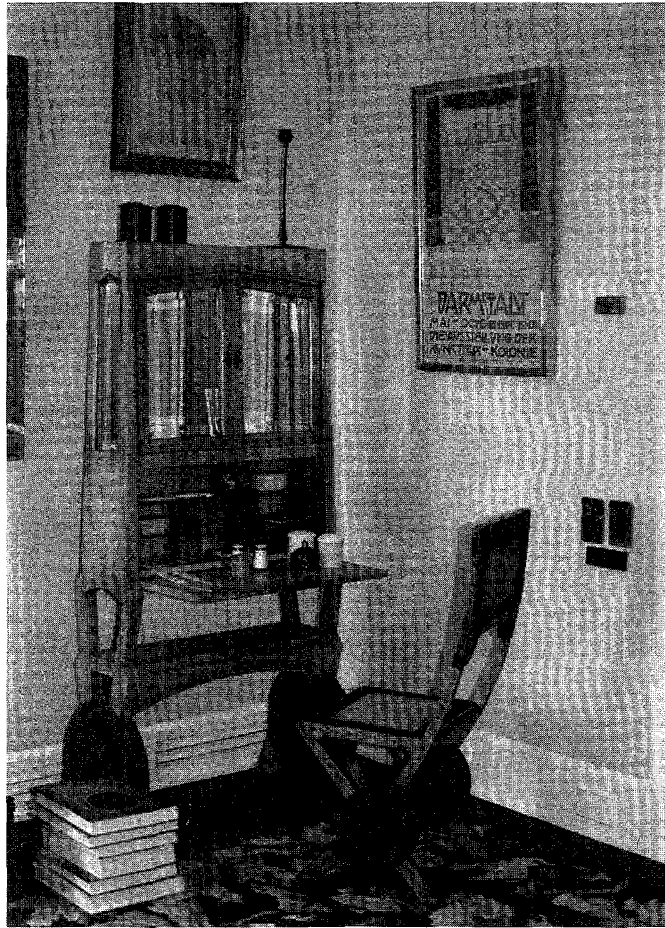


Figure 12

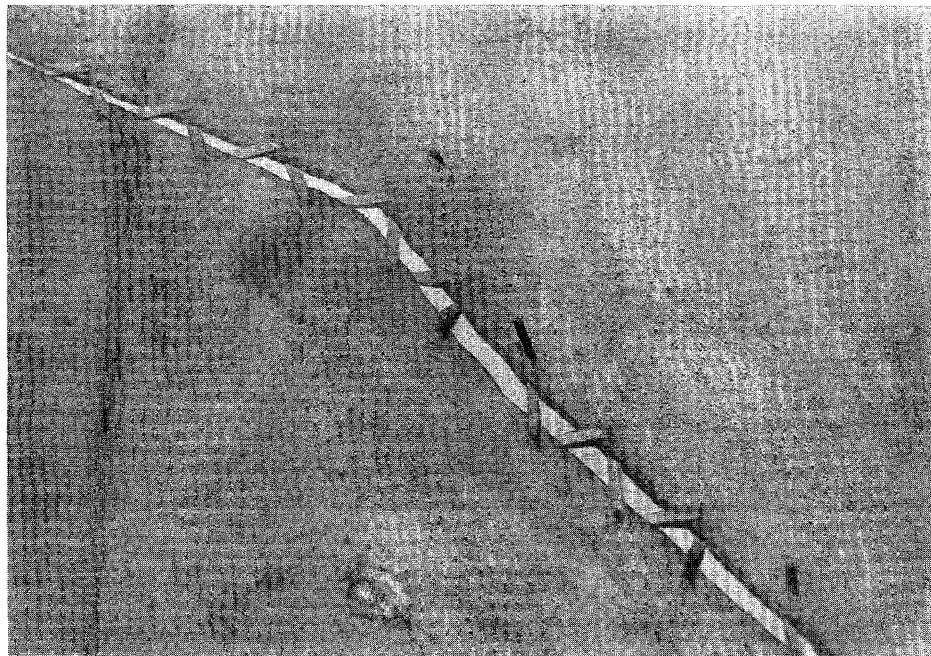


Figure 13