A TREATMENT FOR PANEL PAINTINGS

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Custodians of old paintings are all too familiar with the response of paintings on wooden panels to their atmospheric environment. Panel paintings exposed to our annual cycle of summer humidity and winter kiln-drying interior conditions are quite likely to behave as impromptu humidity gauges. Even institutions fortunate enough to have air-conditioning must face this vexing problem whenever they contemplate lending paintings.

For many years a commonly accepted preservative treatment for panel paintings has been cradling. A cradle is an attractive piece of cabinetmaker's craft when well made, and that is usually the case. A typical example is shown on page 120. The construction, which is quite standardized, consists of crisscrossed wooden battens attached to the back of the panel, which has been planed smooth to receive them. The battens parallel to the grain of the panel wood are glued to it; the transverse ones are free, passing through notches or slots cut in the panel side of the fixed members. These battens, in theory, reinforce the panel and prevent it from warping, while at the same time allowing for expansion and contraction across the grain. The question is how well the theory fits the actual behavior of a painted wooden panel.

It is generally known that in untreated wood the changes in dimension with atmospheric variation—expansion with humidity and shrinkage with lack of it—are chiefly across the grain. The changes with the grain are negligible. It is less well known that such changes in a painted panel take place chiefly at the back of the panel, those at the painted side being extremely slight. (Tests made at the Courtauld Institute in London have shown that this is true even under exaggerated laboratory test conditions.) This explains the familiar panel warp, convex on the painted side. The active force operates in a curve rather than laterally (as allowed for in the cradle).

Furthermore, over a long period of time wood shrinks permanently and progressively. It continues to respond to humidity variations, but it never returns to its original state. Any treatment that does not provide for this progressive warping, as well as the movement due to temporary atmospheric changes, can be expected to cause trouble.

The cradle's design reflects misapprehension of these facts. Its cross-members are made free, to allow for lateral movement which does not take place. On the other hand it opposes by fixed rigidity the inherent tendency of the panel to assume what would be a simple, relatively harmless over-all warp. This tendency is an active force measurable in many foot-pounds of energy, which must find some release. The commonest result is the transformation of the all-over warp into a series of local warps. These pinch and lock the supposedly free transverse cradle members so that the cradle's one claim to functional design is canceled. Between the corrugations actual splits are now likely to develop. At these splits there is danger that the paint will be crushed and sheared.

Not all paintings that have been cradled have suffered noticeably, although in the healthy cases observed other preventives have usually been present, such as heavy coatings of wax or paint on the back, which have tended to inhibit warping and thus to reduce the conflict between panel and cradle. Unhappily, however, our museums and private collections are crowded with tangible evidence that most cradles not only fail in their purpose, but actually endanger the preservation of both panel and paint.

For the benefit of those who may have overlooked or misunderstood this evidence, certain voices of acceptable authority have been raised...
many times, both there and at the Metropolitan Museum. It is designed to correct an inherent tendency, rather than to combat it. If we can inhibit a panel’s response to humidity changes, the unwelcome results will not develop. There will be no excuse for resorting to the strait-jacket constriction of cradling.

The treatment is not put forward as a universal cure-all; the problem is too complex and too variable for simple, fool-proof remedies or mass-production methods. The details can, and should, be varied considerably according to the specific requirements of each case. But the following steps are characteristic of most operations.

First, controlled moisture is applied to the reverse, causing the panel temporarily to resume its original flat state. Conveniently, the wood tends to do its own regulating in this process—shallows warps flatten slowly, acute ones rapidly—until at the end of this stage the panel is perfectly flat, without external pressure or internal stresses. To facilitate moisture

at American Association of Museums meetings and in print. For instance, an excellent study of the problem by David Rosen was published in the Magazine of Art for November 1941. But cradling, firmly entrenched behind a barricade of established tradition, and representing an important item in the repertory of the art-restoring trade, continues to flourish. This may be understandable in a business which is but slowly emerging from the cupping and blood-letting stage of its development, but unfortunately the practice is not confined to commercial operations. For example, it was recently announced that all the panel paintings in a museum collection of national importance had been newly cradled.

It is hoped that publication of one of the several alternative treatments may help to stimulate a more thoughtful approach to this problem. The following brief outline describes a technique developed some years ago by the Department of Conservation of the Fogg Museum of Art. It has since been employed successfully

Painting from a private collection, one of a series attributed to Simone Martini. The corrugations follow the horizontal panel grain.

Cradle on the back of the panel above. The fixed horizontal battens follow the grain, and the vertical members are free.
absorption, channels are cut in the reverse. These grooves also serve other purposes. They reduce the panel’s capacity to re-warp by rendering discontinuous the side prone to shrink. They also provide anchorage for additional construction. The channels are cut in depth and spacing proportional to the thickness of the panel, minimizing the danger of later corrugation or splitting.

Next, all the reverse surfaces of the wood are impregnated, under radiant heat, with a penetrating, thermoplastic adhesive. The Museum’s formula is bleached beeswax, seven parts, Singapore dammar resin, two parts, and gum elemi, one part. This adhesive runs freely at a safe temperature, about 150 degrees Fahrenheit. Mixed to a thick paste with inert filler—such as chalk or whiting—it also forms the “mortar” for cementing the elements to be added. The photographs on pages 122 and 123 illustrate a typical form of the latter construction. Redwood, because of its lightness, resilience, and resistance to moisture, is used for the strips that fill the channels and cover the back of the panel surface. Unbleached Irish linen forms a uniting web, and hardwood dowels, bedded in trenches, supply longitudinal rigidity. A final sealing layer is composed of linen in the wax-resin adhesive. The various elements are set in the mortar one by one. Local heating, to keep the mortar fluid under manipulation, is supplied by enclosed radiant heat lamps and by a small, electrically heated iron, having a special wedge-shaped bit for spreading and working the mortar. Lightly installed press-jacks or moderate weights are used to hold the parts in place until the mortar cools enough to take hold.

The technical data which dictated this method are too extensive to be included here, but they are available for professional reference. A few general comments may serve to outline the operating theory. As already stated, the basic purpose is to discourage movement rather than to oppose it by constriction. The panel is thoroughly barricaded by a thick layer of non-absorbing materials against the chief cause of movement—atmospheric fluctuations. Moreover, its capacity to move is greatly reduced by the channels cut in the reverse and filled with inerts, wax and redwood. The several added components are notably bland, stable, and unresponsive, but each supplies a kind of strength which is roughly comparable to that of the original wood. Wax is one of the most permanent of organic materials, and one of the best moisture barriers. The resinous ingredients add firmness and adhesive qualities. The inert filler adds hardness. Among woods, redwood combines with lightness and resilience high resistance to rot, uniform grain, and adequate strength. Unbleached linen has high tensile strength and long life, especially when sealed against moisture by the wax. The sizes are commensurate; the slots cut in the panel are close

*Side view of the Saint Bartholomew panel, showing the fairly acute all-over warp. The distortion is unsightly rather than dangerous.*

*The Museum’s Saint Bartholomew is from the same series, painted on the same wood, with horizontal grain. It has not been cradled.*
The photographs on these two pages show steps in the treatment described in this article.

Moist cotton wicks are laid in channels cut in the back of the panel.

The panel has flattened out after absorbing moisture.
Redwood strips are set in the channels with wax-resin adhesive and inert filler.

Hardwood cross-pieces and linen fabric in the same adhesive add reinforcement.

The back of the panel after the treatment is completed.
enough together and shallow enough to prevent "washboarding." The redwood strips fit the slots snugly. The balanced variety of mutually compatible materials, and their isolation one from another by the wax mortar, prevent any one element from putting a strain upon the others, or upon the panel as a whole. The physical operations involved are messy but not difficult to master, and the equipment needed is not too extensive for a modest museum laboratory. The process is safe, requiring little pressure and relatively low heat. Removal of the entire backing, should it be necessary, can always be accomplished simply by re-warming the adhesive. Considered as a unit, the construction represents an assembly of passive elements firmly united, like a clubfull of old gentlemen, in common acceptance of immobility.