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Applied Decoration for Historic Interiors Preserving Composition Ornament

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U.S. Department of the Interior
National Park Service
Cultural Resources
Preservation Assistance

Anyone who has ever walked through historic houses and large public buildings, visited an art gallery, picked up a picture frame in an antique shop, or even ridden on an old carousel has been close to *composition ornament*, but has probably not known what it was or how it was made. This is not surprising, since composition or "compo" was conceived as a substitute for more laboriously produced ornamental plaster and carved wood and stone, so was intended to fool

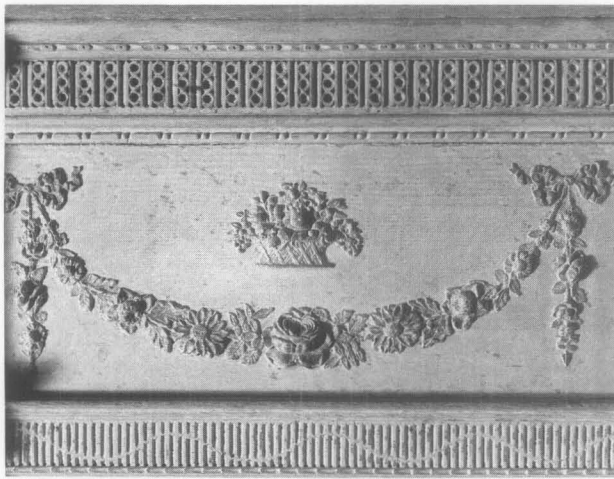
the eye of the viewer (see Fig. 1). The confusion has been heightened over time by makers who claimed to be the sole possessors of secret recipes and by the variety of names and misnomers associated with the material, including *plaster*, *French stucco*, and *Swedish putty*, to name a few.

Many natural or man-made materials can be made soft or "plastic" by the application of heat and are called "thermoplastics." Composition is a thermoplastic material used to create sculptural relief. It is soft and pliable when pressed into molds; becomes firm and flexible as it cools; and is hard and rigid when fully dry. Typically formulated with chalk, resins, glue, and linseed oil, this combination of materials gives compo its familiar light-to-dark brown color. It is the only one of the so-called thermoplastic materials to be used extensively in architectural decoration because of its low cost.

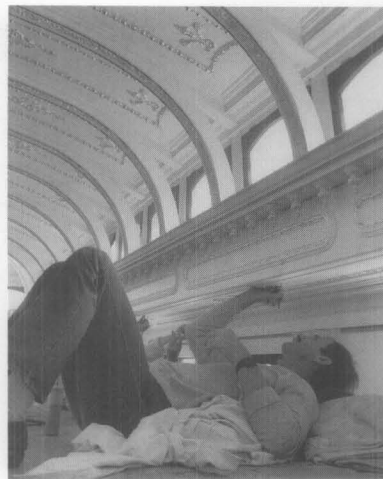
Generally adhered to wood, historic composition ornament is most often found decorating flat surfaces such as interior cornice and chair rail moldings, door and window surrounds, mantelpieces, wainscot paneling, and staircases—indeed, anywhere that building designers and owners wanted to delight and impress the visitor, but stay within a budget. While composition was cheaper than carved ornament, it was still meticulously hand made and applied; thus, it was more often used in "high style" interiors. But the types of structures historically decorated with composition ornament were more democratic, encompassing residential, commercial, and institutional buildings, and even including specialty applications such as the social saloon of a steamship (see Fig. 2).



Figure 1. An American mantelpiece in the Adam style dating from the early 19th century illustrates composition ornament's reputation as a first-rate imitator of wood. Only the allegorical design, flower baskets, floral swags or festoons, flanking fleur-de-lis ornamentation and pilaster capitals are compo; the panels and simple moldings are carved wood. Photo: Courtesy, Philadelphia Museum of Art: Given by Mrs. Thurston Mason in memory of her sister, Miss Anna P. Stevenson.



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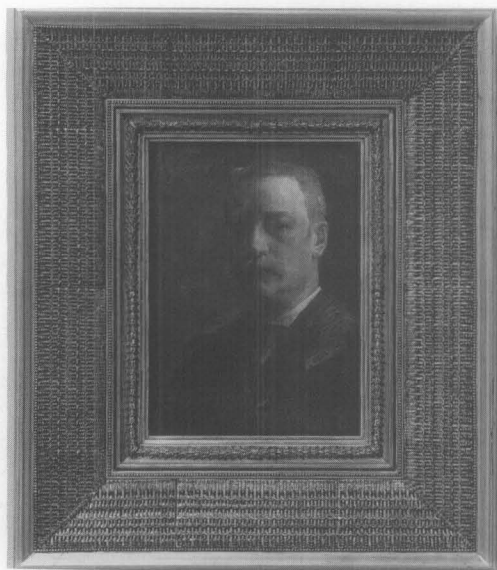
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Figure 2. Composition ornament has been used in America for over two hundred years in a variety of applications: (a) a floral festoon and basket in the Adam style for an 1803 mantelpiece; (b) the social saloon of an 1866 steamship, S.S. China; (c) scenery panels on a 1916 Allan Herschell carousel; (d) ceiling decoration in a 1920s hotel; (e) the coffered ceiling of the National Archives library, 1938; (f) a modern reproduction of a Stanford White-designed frame; and (g) 1990s compo ornamentation for a re-modeled residence. (a) Courtesy, Gold Leaf Studios, Inc.; (b) Philip L. Molten; (c) Elizabeth Brick; (d) Courtesy, J.P. Weaver Co.; (e) Courtesy, National Archives; (f) 06.218: Self Portrait of Thomas Wilmer Dewing (1851-1938). American, 1906. Oil on wood panel: 50.8 x 36.8 cm. Courtesy, Freer Gallery of Art, Smithsonian Institution, Washington, D.C.; (g) Courtesy, J.P. Weaver Co.

With proper understanding of the material, historic composition ornament may be successfully cleaned, repaired, or replaced in sections. Unfortunately, because composition is often misidentified as plaster, stucco, or carved wood, the use of inappropriate methods for removing paint is a major cause of its loss (see Fig. 3). The purpose of this Brief is to assist historic property owners, managers, architects, craftsmen, and preservationists in identifying existing composition ornament, determining the extent of repair and replacement needed and, finally, selecting the most sensitive, non-destructive method of treating it.

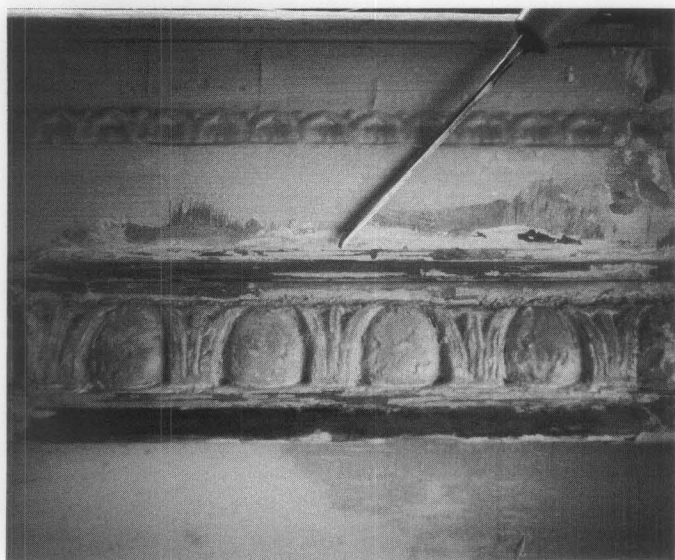


Figure 3. When this historic composition window surround was mistakenly identified as plaster, then treated with a caustic paint stripper, a section of it was destroyed. Photo: Bryan Blundell.

De-Mystifying the Mix

While various types of moldable composition date to the Italian Renaissance, architectural use of composition did not begin to flourish until the last quarter of the 18th century. During this period, many composition ornament makers in Europe and America supplied the public with complex sculptural decoration. Also, the overly complicated and often intentionally mysterious earlier recipes were now reported to be comprised of a few basic ingredients: animal glue, oil (usually linseed), a hard resin (pine rosin or pitch was cheapest), and a bulking or filling material, generally powdered chalk or whiting (see also Sidebar, *Compo: The Basic Ingredients*).

Compo mixes have been the subject of a good deal of variation and there has never been a set recipe, but the ornament manufacturers of the later 18th and early 19th centuries understood in general terms what their material was and what it could do (see Fig. 4). The advantages of the material were described by a prominent American maker, Robert Wellford, in his advertising broadside of 1801:

"A cheap substitute for wood carving has long been desirable for some situations,

particularly enriched mouldings, etc., and various were the attempts to answer the purpose, the last and most successful is usually termed Composition Ornaments. It is a cement of solid and tenacious materials, which when properly incorporated and pressed into moulds, receives a fine relieve; in drying it becomes hard as stone, strong, and durable, so as to answer most effectually the general purpose of Wood Carving, and not so liable to chip. This discovery was rudely conducted for some time, owing to Carvers declining every connection with it, till, from its low price, it encroached so much upon their employment, that several embarked in this work, and by their superior talents, greatly improved it."

In brief, compo is perhaps best understood as an early thermoplastic that allowed the rapid reproduction of complicated detail for popular use.

Making Composition Ornament: A Process Unchanged

Since the craft has essentially remained the same over time, a description of its historic manufacture is also applicable today (see Fig. 5).

In one container, chunks of amber colored pine rosin or the cheaper black pitch were heated in linseed oil until they melted together and combined completely. In another container (often a double-boiler), previously soaked chunks of animal glue derived from skins and hides were cooked and blended into a uniformly thick solution. The two liquid components were then stirred together. This "batter" was made into a pliable "dough" in a way familiar to any baker. It was poured into a cratered pile of whiting and first mixed with a spatula until it was thick enough to be kneaded by hand. Vigorous folding and kneading in of more whiting was done until the composition had a consistency like modeling clay and was completely uniform.

To mold a decoration, the compo was first warmed in a steamer, and the mold prepared with a thin coating of oil and a dusting with talcum powder. A piece was then kneaded and folded to produce a smooth and wrinkle-free surface on one side. The good side was placed down over the rigid mold, and pressed in loosely with the fingers,

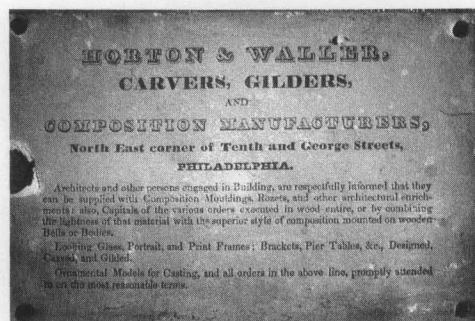
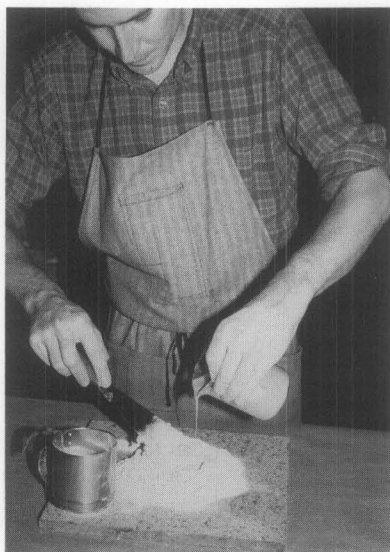


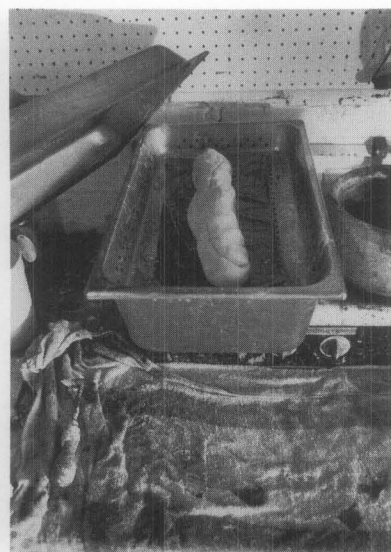
Figure 4. Compo ornament could be applied to simple and complex surfaces, including cornices, friezes, architraves, pilasters, and chimney pieces and to looking glass and picture frames. Manufacturers' ads such as these were commonplace in 19th century America, particularly in eastern cities. Left: Zane, Chapman, & Co. Right: Horton & Waller. Photo left: Courtesy, Jonathan Thornton. Photo right: Courtesy, Gold Leaf Studios, Inc.



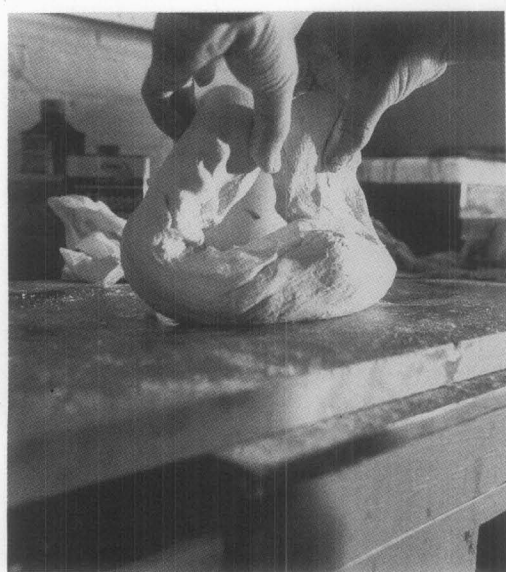
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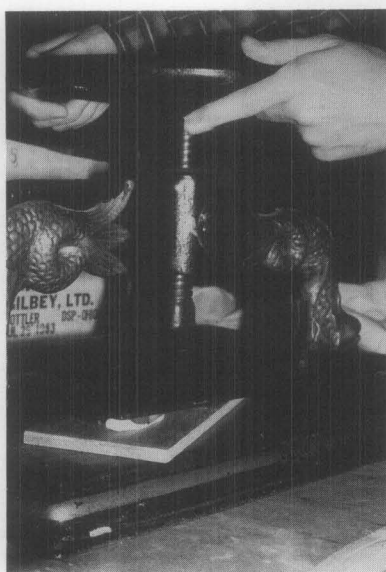
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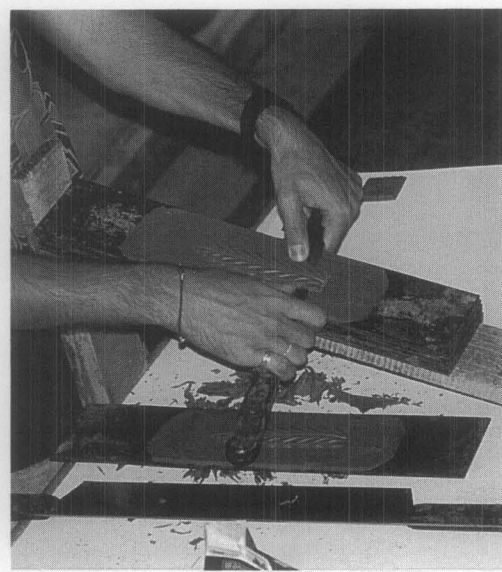
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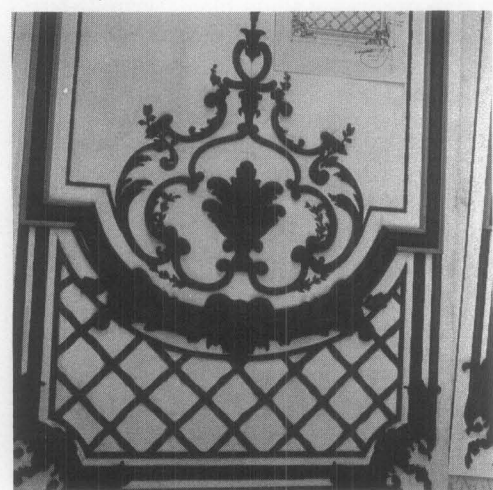
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Figure 5. The steps of making composition ornament: (a) pouring compo "batter" into a pile of whiting on a warm granite slab; (b) an almost finished ball of composition; (c) warming compo in a steamer; (d) kneading compo; (e) pressing or squeezing compo into a mold using a screw press; (f) slicing ornament from a pressing board; and (g) a compo design made up from several "squeezes." Note its familiar brown color prior to painting, staining, or gilding. Photos: (a)(b) Jonathan Thornton; (c)(d) William Adair; (e) Jonathan Thornton; (f)(g) Lenna Tyler Kast.

leaving excess above the surface of the mold. A damp board was placed over this and the "sandwich" placed in a screw press and squeezed so as to force the compo into the finest detail. It was then removed from the press and turned over so that the mold could be lifted straight up, leaving the compo stuck to the board. Upon cooling to room temperature, the compo gelled, becoming tough and rubbery (the gelling property is due to the glue component which is chemically identical to edible gelatin). At this stage, it was sliced off the board with a thin-bladed knife. The remaining mass of composition still adhered to the board could also be sliced off and reused.

Composition ornament was often fixed to an already prepared wooden substrate at the factory while it was still fresh and flexible, but could be dried and shipped to the final user, who would make it flexible again by steaming on a cloth stretched over a container of boiling water. Instructions for doing this, as well as suitable brads for "fixing," were supplied by some manufacturers. Because of the glue component, steaming the backs of ornaments would make them soft and sticky enough to self-bond without additional glue. Soft ornaments were softened nailed through or pressed down on top of previously driven headless brads (also called sprigs). Strings and

wires were often included in the mass during pressing to serve as internal armatures and reinforcements. These measures preserved the integrity of the ornaments even if they cracked.

Originally meant to copy other materials such as wood, plaster, and stone, composition had its own unique properties and advantages that were soon exploited in both technical and artistic terms. It has distinct characteristics in each of its three states: pliable, rubbery, and hard. When warm and pliable, it can be modeled by a skilled worker and it is capable of receiving the finest detail when squeezed into a mold. After it has chilled to room temperature and is gelled, it is rubbery, flexible, and tough. The detail is essentially set and cannot be easily damaged as the ornaments are manipulated (see Fig. 6).



Figure 6. This finished length of compo molding is stuck to its pressing board. The newly made piece will be sliced off the board, then applied. Photo: Jonathan Thornton.

Gelled composition ornaments can be easily bent over curved surfaces without cracking, and unlike a rigid cast material such as plaster, they can be stretched or compressed somewhat to fit a design without damaging the detail. An egg and dart motif, for example, could be made to come out evenly at the corners without making a partial egg or dart. The sculptural vocabulary from the maker's mold collection could be re-arranged at will into larger decorative schemes. In fact, any smaller component of a decoration from a single mold could be sliced free and inserted into any location.

Composition could be carved to heighten detail, correct defects, or undercut ornaments—that were, of necessity, straight-sided—so that they would release from the rigid molds. This could be done in the gelled state or, with more difficulty, after it had finally hardened to stone-like solidity.

Finally, when completely hard, it could be given a polished marble shine with nothing but a damp cloth. It could be stained, coated with any sort of paint, varnish, or oil gilded without any further preparation (see Fig. 7).

Molds and the Creation of Patterns

A technical discussion of composition is not complete without an examination of the molds used to create the ornament. These were the ornament maker's largest investment in time and expense, and were the key to the craft (see Fig. 8).



Figure 7. The coffered ceiling of the 1938 National Archives library in Washington, D.C. features egg-and-dart composition molding finished with a dark brown stain. While compo design is more often light and delicate, here, it has a bold, massive quality. Photo: Bryan Blundell.



Figure 8. Several historic and reproduction compo molds are shown to underscore the variety of materials used to make them: 1. applewood mold 2. pearwood mold 3. boxwood mold encased in beech 4. boxwood mold 5. sulfur mold encased in maple 6. pewter mold encased in pine and oak 7. positive pattern for pitch mold carved in pearwood 8. pitch mold encased in oak 9. composition mold encased in maple 10. epoxy and polyester molds reinforced with glass fabric. Photos: Jonathan Thornton.

Composition molds were always made of rigid materials that would withstand the considerable pressure used in pressing the ornaments. All of these materials and methods have been used in sculptural crafts since the Renaissance. The comparative listing that follows helps explain their advantages and disadvantages.

Wood was carved in reverse to create a negative matrix. This was highly skilled work often performed by a specialist carver, and required a large initial investment in time, but wooden molds would essentially last indefinitely if properly maintained. A further design advantage of reverse carving is that fine incised lines will show up as fine raised lines in the final ornament. (Fine raised lines are notoriously difficult to carve or model in relief.) Molds carved from dense and close-grained fruit woods such as apple and pear seem to have been common in the 18th century. In the 19th century, the most intricate molds were carved in boxwood, often encased or framed by larger and cheaper pieces of timber for ease of handling and to prevent splitting.

Metal alloys such as brass, bronze, and pewter made excellent molds capable of yielding the highest level of detail and were virtually indestructible in use. They were expensive due to the intrinsic value of the metal and

because their production involved a variety of complex and skilled steps performed by modelers, pattern makers, and founders. Few historic metal molds have survived, possibly as a result of wartime scrap drives.

Sulfur melts into a clear fluid at about 115° C and could be poured over a positive clay model or another compo ornament. A sulfur mold resembles hard plastic, but is more fragile. Even when framed in wood and reinforced with iron fillings, as was common practice, it was especially vulnerable to breakage. A figural design, such as a frieze of *The Three Graces*, was much easier to model in relief than to carve in reverse, and sulfur was one of the few materials that could be used to make a hard mold from a clay model.

Composition itself could be squeezed over a hard relief pattern (such as another manufacturer's ornament) to make a mold. Composition shrinks as it hardens and so the mold was always smaller than the original. It is also fairly brittle when hard and, like sulfur molds, would tend to crack in the press. Composition "squeeze molds" were ideal for pirating another maker's patterns!

Pitch molds became popular during the late 19th and early 20th centuries. A warm and soft mixture composed primarily of pine pitch was poured into a recess in a wood block or frame. It was then turned over and squeezed down onto an oiled wooden pattern. Pitch molds might crack with age or in the press, but as long as the carved pattern was retained, they could be easily re-made.

Historical Survey

Early History and Renaissance. Press-molded decoration has been used with various soft plastic materials for centuries. For example, it is known that medieval sculptors press-molded organic mixtures to decorate painted sculptures. But because mixtures based on organic binders such as glue, oil, resins, and waxes are prone to various sorts of degradation, actual survivors are rare.

The direct ancestors of the composition craft are most likely found in the Italian Renaissance; however, composition mixtures were not extensively used for architectural decoration during this period, probably due to building traditions as well as relative expense. It is worth noting that this was an age of experimentation with materials and rediscovery of Greek and Roman designs. Press molded mixtures called pastiglias were used to decorate wooden boxes and picture frames as early as the 14th century (see Fig. 9). Moldable compositions were discussed by various Renaissance writers. The recipes are extremely varied and include, among their more common and understandable ingredients, gypsum, lead carbonate, wood and marble dust, eggs, pigments, sheep's wool, and various oils and resins.

The 18th Century. The first flowering of architectural composition in America took place at the end of the 18th century when ornaments were both imported from England and produced by makers in every major eastern city. All of the conditions were right: molding technologies were well established (architectural *papier mâché*, which, like composition, was produced in molds, had gained widespread acceptance during the middle decades of the century). The raw materials were produced or imported in volume, so the cost of the composition ingredients came down as the cost and availability of highly skilled labor went up. Economic and social conditions favored

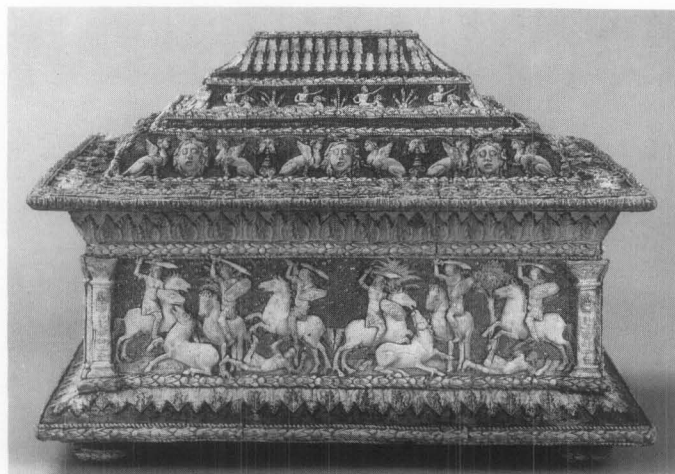


Figure 9. A 16th century pastiglia box from Italy features battle scenes from ancient Rome. Pastiglia was a forerunner of composition as we know it today, and one of a family of press-molded and applied interior ornamentation materials. Photo: Pastiglia Casket. White lead pastiglia decoration on gilt alder, 1.29.9 cm. Italy, Venice, 1st half of 16th c. © The Cleveland Museum of Art, John L. Severance Fund, 81.8.

centralized "manufactories" in the production of various arts and crafts.

Design trends also fed into a favorable reception for composition. A more faithful reinterpretation of Greek and Roman design eventually termed "Neoclassical" had taken hold in Europe, championed in England by the architect, Robert Adam, after his return from study in Italy in 1758 (see Fig. 10). Although Adam played no direct role in the "invention" of composition ornament, as has sometimes been said, he patronized English craftsmen who were making it and was generally receptive to new and innovative materials. One early maker, sometimes cited as the "inventor" of composition by his contemporaries, was John Jaques. His name appears in London advertising by 1785, but he was probably in business before then (see Fig. 11).



Figure 10. Shown is an elegant Robert Adam composition overdoor design in Kedleston Hall, Derbyshire, England. Adam had an enormous influence on 18th century Neoclassical design in England and America. Photo: Jonathan Thornton.

As a result of Adam's influence, designers of applied ornament in both Europe and America began to take advantage of a molding process that was ideally suited to producing the detailed, but repetitive, motifs of classical decoration—acanthus leaf, egg and dart, festoons, swags, and paterae—as well as classical themes depicting Greek and Roman gods and goddesses (see Fig. 12). And as the Neoclassical style became more popular, composition ornament makers increased in number.

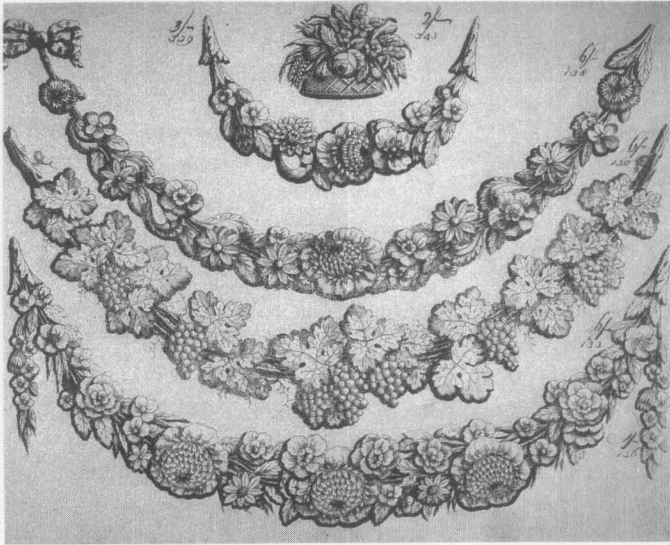


Figure 11. This page of festoon designs is from a Jaques catalog published in England and imported to America in the first decades of the 19th century. Note the similarity of these designs to those shown on the mantelpiece in Fig. 1. Photo: Courtesy, The Winterthur Library: Printed Book and Periodical Collection.



Figure 12. The Nightingale-Brown House, in Providence, Rhode Island, was built in 1792. Original composition ornament can be seen in the flat area above the door molding; matching ornament was used in the room over the mantel. Photo: Courtesy, Irving Haynes and Associates.

The 19th Century. During the early decades of the nineteenth century, Neoclassical—encompassed in America by the terms Federal, Empire, and Greek Revival—was in the ascendancy. Composition makers continued to increase and also to find new uses for their material. Composition picture and mirror frames became common and some makers advertised the suitability of composition ornaments for casting iron firebacks and stoves. Composition ornament was explicitly advertised for exterior use as well, although very little has survived. The interiors of houses and public buildings in every prosperous American city were decorated with composition (see Fig. 13).

When the classically derived Federal and Empire styles gave way to the various revival styles—Rococo, Gothic, Renaissance, and Italianate—composition makers simply made new molds to accommodate them. (Although Rococo and Renaissance styles were not common for architecture in America, they *were* common for furnishings and interior decoration and, in consequence, for composition ornament.)

Along with a proliferation of styles in the mid-to-late decades of the century, there was a parallel growth in the number of moldable and castable materials that shared

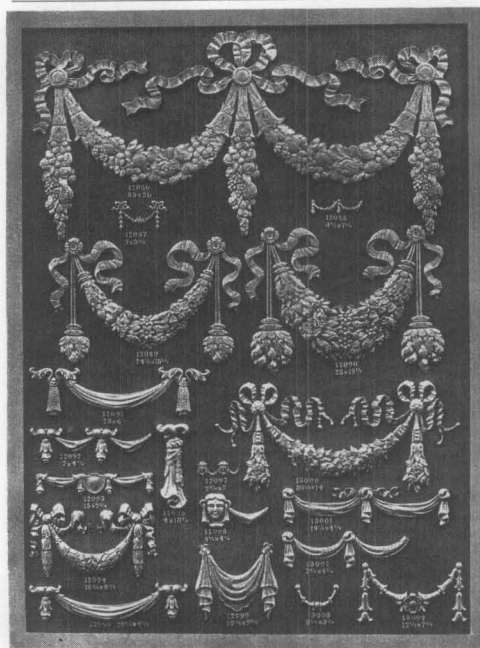


Figure 13. Top: Since rooms with fireplaces were centers of social activity in early American houses, mantelpieces often received special decorative attention. This early 19th century mantelpiece in a Philadelphia residence features a panel depicting A Country Dance flanked by floral swags and sculptural busts of Milton and Shakespeare. Bottom: Several American and English makers produced versions of a frieze entitled, *The Triumph of Mars*. This one, ca. 1800-1810, is in a modest "single" house on John Street in Charleston, South Carolina. Note how several layers of paint are obscuring the detail. Photo top: Gold Leaf Studios, Inc. Photo bottom: Jonathan Thornton.



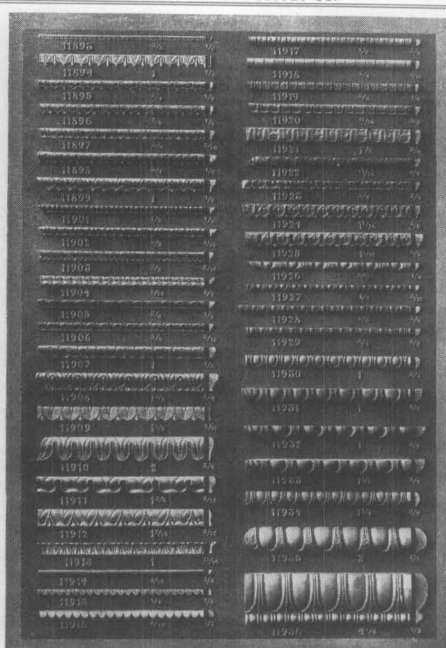
some features of the composition craft, such as *carton pierre*, *gutta percha*, *fibrous plaster*, *shellac compositions* and, eventually, *celluloid* and *hard rubber*. Composition continued to be the preferred material for detailed decoration on wood where the size of the ornament did not make its cost prohibitive. The publication of practical books by and for craftsmen, beginning in the 19th century, disseminated recipes and procedures to a broad audience and de-mystified the craft. Period composition ornaments called "imitation wood carvings" were widely advertised in manufacturers' catalogs (see Fig. 14). Balls of prepared compo became available from some art supply shops in large cities for use by small volume craftsmen.

During the later years of the century, the Arts and Crafts Movement—as preached by William Morris and his associates and followers—became increasingly important in design and philosophy. Morris stressed honesty to the material in design, exalted spirituality of hand work and rejected manufacturing, mass production and the distinction between "high" art and craft. These trends were



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Figure 14. Shown are two pages from a current manufacturer's catalog, *Ornaments for Woodwork-Furniture featuring festoons and clusters, fabric swags, and egg-and-dart molding*. The Decorators Supply Corporation in Chicago, Illinois, was established in 1893, and is in business today. Photos: Courtesy, Decorators Supply Corporation.



Figure 15. Naturalistically carved lily pattern molds reflect the early 20th century Arts and Crafts movement in the United States. Photo: Jonathan Thornton.

to affect both technology and design in the 20th century. Composition ornament would have been anathema to Morris and his elite clients; most composition production during the last years of the century is best described as Victorian Eclectic.

The 20th Century. The Arts and Crafts and related styles, such as the more decorative Art Nouveau, were well rooted in America by the beginning of the century (see Fig. 15). Pitch molds made from relief-carved patterns had become common in America. The carving tool marks could be accentuated in these patterns in keeping with current vogue. Open-grained woods, such as mahogany, were often chosen so that the finished composition ornaments would have a wood-like grain that showed through stains and varnishes (see Fig. 16). A uniquely 20th century application of composition ornament was in the lavishly decorated movie palaces of the Depression era (see Fig. 17).

As interest in architectural embellishments declined, particularly as a result of the austere post-World War II

styles, so did the composition trade. Many old firms went out of business and their molds were dispersed or destroyed. The few that remained concentrated on restoration projects or were sustained by diversification into other materials. By the 1950s and 60s, composition as a material and craft had been all but forgotten.

An upsurge in hand craft production that started in the late 60s and has continued to the present—as well as increasing interest in historic preservation—has led to the renewed study of old methods and materials, including composition. The few manufacturers that remain have seen a large increase in their business, and an increasing number of people recognize composition as a unique ornamental material and want to conserve, restore, or create it (see Fig. 18).

Compo Deterioration and Damage

To some degree, the longevity of historic composition ornament is related to the ratio of ingredients in the original mix and to the skill of the craftsman in applying it. But it is far more dependent upon interior climatic conditions and the long-term effects of heat and dampness on both the compo and the wood substrate.



Figure 16. The Austin Morey residence, in the Indian Village Historic District of Detroit, Michigan, was designed by architect Louis Kamper, and built between 1902 and 1903. Part of Kamper's design included this grand oak staircase that was decorated with composition ornament. Note the "ghost marks" of missing composition in the close-up. Photo: Robert J. Rucinski.



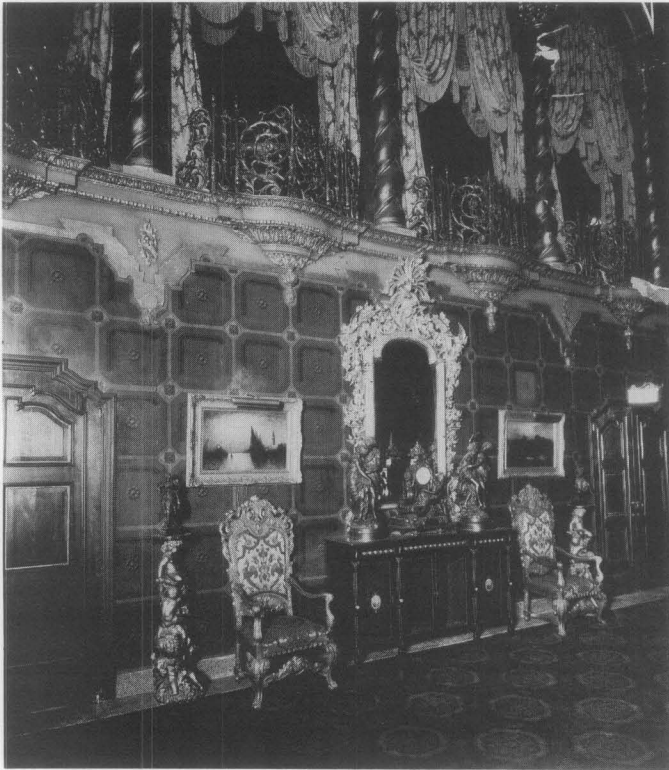


Figure 17. The Ohio Theater in Columbus, Ohio, was lavishly decorated with gilded plaster and composition ornament. Walls, ceilings, mirror frames, furniture, and carpets—predominately red and gold—were designed by noted theater architect Thomas W. Lamb in 1928. Photo: Rapid Photography Inc.

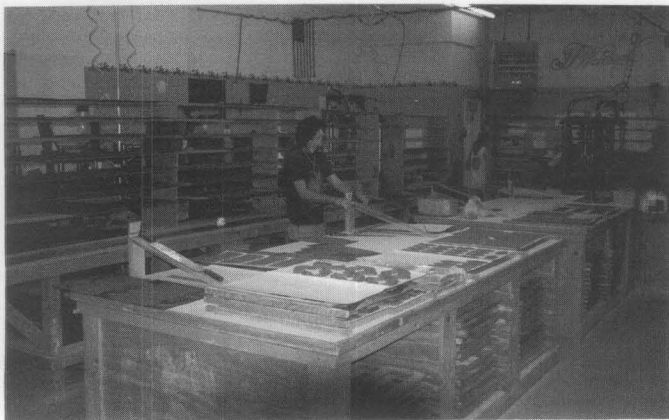


Figure 18. Shown is the contemporary studio of the J.P. Weaver Company, currently located in Glendale, California. The company has manufactured and sold architectural composition ornament continuously since 1917. Note the long work table and well organized mold storage units behind. Photo: Lenna Tyler Kast.

Variables in mixing and application. Dried compo is inherently hard and somewhat brittle; its increasing brittleness over time is primarily due to the oxidation and hardening of the linseed oil component. The drying oil, in turn, contributes to age cracking. Thus, during initial manufacture, if the oil content was low and the dry filler content (chalk) high, shrinking and cracking over time is less likely to occur. Originally, the compo was probably attached using small, headless brads (1/4") that penetrated the hardening compo as well as the wood substrate. They were used to keep the compo from shifting or warping after it was set in place. If an insufficient number of brads was used by the craftsman during the application process, the compo simply falls off as cracks develop.

Interior environmental conditions. Compo was conceived as a durable substitute for hand-carved wood or marble and decorative plaster; its potential for structural failure is generally due to substrate failure rather than to the compo mix itself. Theoretically, composition will move with atmospheric changes due to the moisture-sensitive glue component. Its breakdown typically occurs when the wood base expands and contracts at different rates than the compo during extreme temperature and humidity fluctuations. Especially when it is close to a source of heat, such as directly over a fireplace, compo develops fissures or shrinkage cracks. Contemporary heating systems in old buildings also contribute to the drying and cracking syndrome.

Planning for Treatment

Simple stabilization and repairs to existing ornamentation can most likely proceed based solely on an analysis of existing conditions (see paragraphs on *Surface Cracking* and *Delamination*, below).

Historical research. For more complex work, a building owner, curator, or conservator should research the history of the building to find out when it was originally designed and constructed; who lived in it at various times; how the building was used; and which features were original and which were added later or removed (see Fig. 19). Some of this information may be found in the National Register of Historic Places.

Questions about the building's interior spaces and their decorative detailing also need to be asked, particularly when portions of the ornamentation will be replaced. Have the interior spaces evolved with successive occupancies or uses? In addition to compo, were other decorative materials used and are there differences in patterns that help date the work? For example, plaster and compo may have been used in the same room, but applied at different times. Receipts from workmen's bills may often be used to establish the dates of decorative detailing.

The historical research dealing with the original construction of the building and its use over time should, in turn, be linked to the scope of work that will take place. Stabilization, conservation, and repair are maximized within the treatment, Preservation. Generally speaking, restoring decorative ornament to a specific earlier period is not recommended unless its historical significance outweighs the potential loss of extant ornament that

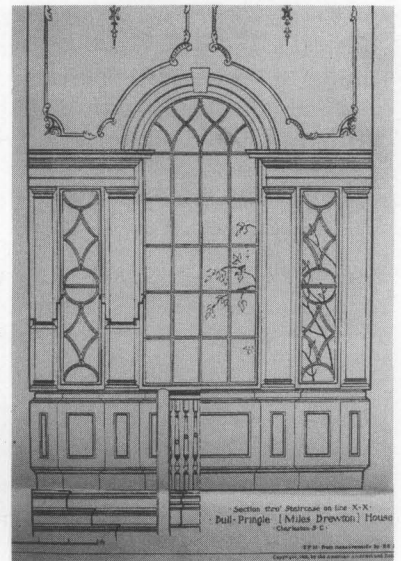


Figure 19. A drawing from the 1930s shows original ornament on the wall above a Palladian window in the 1760s Miles-Brewton House, Charleston, South Carolina. When the ornament was subsequently removed and lost, this scale drawing was used as documentation to fabricate matching ornament. Photo: Jonathan Thornton.

characterizes other historical periods. But if a significant interior is missing original features and physical and documentary evidence are conclusive, replication may be appropriate in order to interpret a particular time.

Existing conditions analysis. After historical research is conducted, but before starting work, an analysis of the surface and substrate should be undertaken. These are some of the issues a conservator considers. First, if a surface is painted, the ornamentation material needs to be identified. Is it wood, plaster, composition ornament, or some other type of applied ornamental material? Usually, some of the ornamentation is chipped or broken. Close examination of the exposed material is the first step. If it is white through the entire thickness of the ornament, then it could be plaster or stucco; if it is a darker brown material, it is more likely to be composition.

After having identified the presence of composition ornament, its overall condition can be evaluated. Layers of paint may obscure fine detailing as well as deterioration problems. Degrees of damage and deterioration should be recorded. These are typical questions that need to be answered. Is the surface merely "crazed", requiring no action or limited repair, or are the cracks severe enough to require replacement? Are pieces missing? Are the attachment brads rusted or missing? The condition of the substrate is also important. Is the wood surface intact, or is it in need of repair? After answering key questions, the conservator will make random tests to differentiate original compo from later repairs, some of which may well have been done with plaster, rather than compo (see Fig. 20).

Deciding how to proceed depends upon the overall interpretive goals of treatment. For example, is the interior being restored to an earlier time? In this case, later repairs may be removed and the original appearance replicated. Or is the interior being preserved with limited replacement of lost or damaged historic materials? Not all conditions are foreseeable in conservation work and contingencies must be incorporated into the treatment plan to be considered realistic. As the project progresses, the conservator generally determines the work that needs to be done, and the order in which it should be undertaken.

Treating the Problem with Care

The scope of work is generally based on several factors, including the historical significance of the building's interior, the degree of damage or deterioration of the compo, and the overall interpretive goals of project work. Several examples of repair and replacement follow in order



Figure 20. The Octagon House, in Washington, D.C., was constructed between 1801-1802. During recent project work, it was discovered that early repairs to the composition ornament in this doorway had been made with plaster. The plaster repairs were removed during restoration of the doorway to its original appearance. Photo: Lonnie J. Hovey, AIA.



Compo: The Basic Ingredients (clockwise from front center)

Chalk: Chalk is whiting in solid form. It is a type of white, soft limestone.

Glue: Before the invention of synthetic adhesives, glue meant animal or hide glue. This was made by boiling animal skins to extract a protein—collagen—in water, then condensing and drying the collagen until it was in solid form. A variety of types and grades were, and are still, available. Two are shown here.

Linseed oil: This is a yellowish drying oil obtained from flaxseed that is used in paint, varnish, printing ink, and linoleum; it is a key ingredient in composition ornament.

Resin: Resins are organic materials present in wood and exuded from various trees and shrubs. In unrefined form, they often consist of a mixture of solid natural polymers, oils, and volatile aromatic substances.

to suggest a typical scope of work within preservation and restoration projects. Treatments are listed in hierarchical order, from the least intervention to the greatest.

Paint removal. Interior ornament is usually painted many times over during its lifetime and, as a result, the sharp surface detail of the original pattern is obscured. Before attempting to remove paint, it is always advisable to obtain professional advice on the ornamental material to be cleaned as well as the nature of the coatings that are covering it. And whatever the project work goal, at least one sample of intact, well-adhered paint layers on a feature should be preserved for future historical research.

Based on the purpose of treatment, these are some of the questions a conservator routinely asks. How many layers of paint are there? Is it important to trace one layer to a particular occupancy of the building? If so, the stratigraphy (or layering scheme) will be determined prior to paint removal. After the correct layer is identified, the color can be matched. Or, is the building being rehabilitated? If this is the case, period-typical paint colors may be appropriate.

For purposes of this Brief and the guidance paragraphs that follow, it is assumed that all layers of paint are being removed in order to reveal the fine detailing of the composition ornament (see Fig. 21).



Figure 21. The same theme on two early mantelpieces, *A Country Dance*, dramatically illustrates the visual difference between cleaned and uncleared composition ornament. When old paint layers are removed, the exquisite detailing is revealed. Left: George Read II House, 1801-1803, New Castle, Delaware; Right: First Harrison Gray Otis House, 1796, Boston, Massachusetts. Photo left: Gold Leaf Studios, Inc. Photo right: David Bohl. Courtesy, Society for the Preservation of New England Antiquities.

The next step is to consider various methods of removing paint from the ornament without damaging it, or without being exposed to dangerous substances in the strippers or in the old paint itself! It should be noted from the standpoint of health and safety that most Federal and Empire period compo was meant to imitate marble; thus, the highly toxic white-lead paint was by far the most common original coating.

Caustic strippers based on lye should be avoided for two reasons. First, they will damage and dissolve compo both because they "chew up" the protein structure of the glue and, second, because they are water-based and compo remains soluble in water (see also Fig. 3). If a stripper will damage the protein of your hands, it will do the same to compo!

A conservator will more often use organic solvents, such as methylene chloride, in conjunction with small implements such as a dental tool or toothbrush. (A small area is always tested first to establish the safety and effectiveness of any technique. Improper use of stripping tools can damage intricate surfaces beyond repair.) A solvent is applied according to manufacturer's recommendations, permitted to soak into and soften the paint, then re-applied as necessary, as the conservator gently removes paint from the intricate carved surfaces (see Fig. 22).

It should be emphasized that any amount of exposure to toxic chemicals without proper precautions can cause severe health problems. A hooded, air-fed, personal unit is desirable when using methylene chloride-based strippers if fume hoods or paint spray booths that exhaust effectively to the outside are not available. Organic vapor masks may not

be as effective in protecting against methylene chloride exposure because the filters quickly become exhausted; however, a vapor mask with properly rated organic solvent cartridges can provide an acceptable level of safety when cartridges are regularly changed (see Fig. 23).

Some conservators have had excellent results heat-stripping excess paint layers using *heat guns* and dental tools. This is highly skilled work and its success depends upon the composition ornament being much older than the paint layers that lie on top, but has the capability of working as well or better than chemical methods in the hands of an expert. Precautions must be taken against lead fumes where removal of lead paint is involved.

Cleaning mixtures based on *enzymes* are also used by conservators. This is an effective method because enzyme mixtures can be formulated for very specific purposes (i.e., to dissolve only oil-based paints from protein-glue based compo). They dissolve paint without affecting the wood substrate. But, on the other hand, work can be very slow and the expense would only seem justified on small and rare or important museum objects. Enzymatic cleaners are

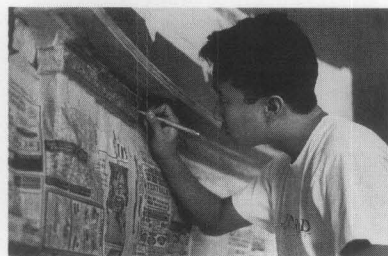


Figure 22. Careful dry scraping of a chimney piece to remove paint residue signaled the successful conclusion of a conservation project at the Octagon House, in Washington, D.C. Photo: Lonnie J. Hovey, AIA.



Figure 23. Methylene chloride fumes can be deadly, so protecting the worker is imperative. Left: a hooded, air-fed unit. Right: a vapor mask with organic solvent cartridges. Photo left: William Adair. Photo right: Lonnie J. Hovey, AIA.

dependent on a high level of skill, technical knowledge and professional training, but they are earning a solid place in the repertoire of professional conservators.

Increased concern about the environment may well render the toxic methylene chloride strippers obsolete in the near future. Manufacturers have already produced "safer" strippers based on *dimethyl esters*, and further research will probably yield other alternatives to chlorinated solvents. Slower acting solvent-type strippers may well be safer to the underlying composition ornament, but additional research and use are needed before making definitive statements.

In summary, most damage to compo occurs during the removal of layers of paint; this is a critical process and should not be attempted without consulting a conservator and should not be undertaken by painting contractors unless they are highly skilled and have had extensive experience in this very delicate procedure.

Proper disposal of residual chemicals and debris must be undertaken to avoid contaminating the environment with solvents and lead, and such disposal is, in fact, now required by federal, state, and local ordinances. The company responsible for removing chemical waste should be licensed to dispose of it, otherwise the property owner may be held accountable if disposal laws are violated.

Refinishing compo ornament usually follows stripping. According to historic evidence uncovered and depending on the existing and desired appearance of the room, compo can be stained, painted, gilded, marbled, or glazed. Paint types may include distemper, alkyd oil, or latex. A thin coating is recommended so the intricate surface detail is not clogged.

Surface cracking. Surface cracking indicates age and, thus, the history of the ornamentation itself (see Fig. 24). It does not necessarily mean that cracks have to be fixed. But if cracking interferes with the overall design pattern, then the conservator may elect to fill the cracks with suitable fill material. For example, "light weight" spackles bulked with microballoons are excellent because they are soft and compressible and will accommodate changes in the size of cracks due to moisture fluctuation. After stabilization, the surface is finished to match the existing area.

Delamination. Delamination or separation of the compo from the wood substrate is the simplest repair problem to remedy. The conservator begins by testing cracked areas with slight finger pressure to determine which parts of the design need consolidation. Compo sections that have separated from the substrate, but are otherwise intact, can be glued back in place using emulsion type adhesives such as "white" glues or a clear, solvent-release adhesive (see Fig. 25). For vertical surfaces, the glue is painted onto the back of the delaminated compo as well as the wood base and, when slightly tacky, re-attached, and held with clamps until dry.

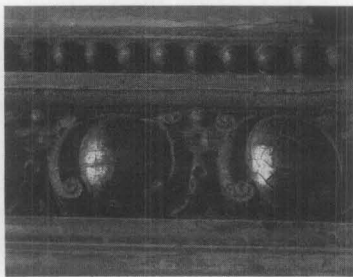


Figure 24. Treatment would be optional for the age cracking that has occurred in the egg-like portions of this composition ornament. Photo: William Adair.

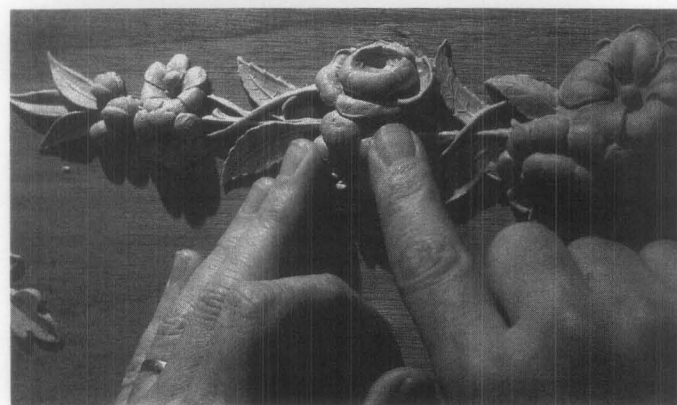
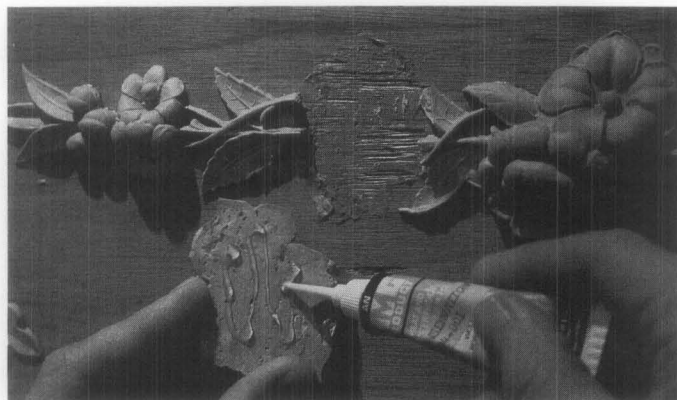


Figure 25. (a) Adhesive is being applied to this 19th century composition ornament that has de-laminated from its wood substrate; and (b) The compo fragment is held in place until the quick-setting adhesive takes hold. Photos: Jonathan Thornton.

Professional conservators often formulate their own adhesives based on stable synthetic polymers (plastics) dissolved in solvent that will be more reversible, should the need arise, and also offer better long-term stability than many commercial adhesives.

Repairs to broken or damaged compo. When some original compo has been lost, additional work is required to make a repair. One particularly easy and inexpensive method of repairing broken ornamentation is to use non-hardening clay ("plastilina") or polymer-based modeling materials as an impression material to make a mold. After a mold is made from existing ornament, missing or deteriorated portions of the historic design can be duplicated with a durable gypsum plaster (see Fig. 26). Especially in cases where economic considerations dictate procedure, use of this substitute material may be helpful because it is cheaper. Alternatively, an existing studio mold may sometimes be used to make small replacement pieces in a repair project (see Fig. 27).

In another scenario, a repetitive design on a mantelpiece may be damaged or portions missing. Especially if the compo design is complex and several portions of ornament need to be replaced, rigid polymer molds with traditional compo are recommended for the repair work. The mold is created using a section of the original ornament as a model. After replacement pieces are fabricated, they are attached using brads, or finish nails (see Fig. 28). The pointed end of the nail is clipped blunt with snips to avoid possible splitting of the wood substrate. The nail is first hammered into the surface, then countersunk, and the resulting hole filled with gesso putty or additional compo.

Finally, a ready-made replacement piece can be ordered from the catalog of a compo manufacturer, but it is unlikely to be a perfect match to an extant historic decoration

Replacement of missing compo ornamentation. Once-attractive compo may become damaged to such a degree that the remaining fragments are removed by an owner and the entire surface painted over. Thus, if there is some existing composition ornament in a room, such as an overdoor or chair railing, the conservator would most likely look for evidence of other ornament that is now missing.

For example, a mantel may appear as a flat, unornamented surface to the untrained eye, but after many layers of paint are removed by the conservator, shadow images are revealed (see Fig. 29). These images or "ghost marks" are left by the hide glue component of the original mix. Although the glue is water soluble, it will not be completely removed by an organic stripper such as methylene chloride. (But if earlier inappropriate paint removal methods were used, such as water-based strippers, caustic strippers, or mechanical sanding, ghost marks from the glue would be destroyed.)

When the paint stripper dries, a ghost mark left by composition ornament appears slightly darker than the surrounding area where no compo had been attached. In addition, small, square-headed, 1/4" brads used to reinforce the original compo may be embedded in the wood.

In summary, detailed physical evidence, as well as written and pictorial documentation, can provide a valid framework for replacement at a particular site. With careful detective work, missing historic ornamentation may be successfully identified and replaced with matching ornament (see Fig. 30; see also Fig. 19).

Restoration of a "period" interior. When ornamentation is extensively deteriorated and missing, owners often want to re-create the historic appearance through restoration. Physical evidence and other documentation may be used as a basis for the restoration; it should be remembered, however, that as the amount of surviving material diminishes, the greater the chance for inaccuracy when attempting to depict the historic appearance. Choosing restoration as a treatment thus requires exacting documentation prior to work and meticulous attention to detail in the work itself.

Conclusion

Despite its popularity and widespread use as a decorative material, the history of composition ornament has yet to be thoroughly studied. Individual craftsmen have acquired fragmentary knowledge about some designs and historic methods; historians and students of interior decorative design have accumulated knowledge about patterns, artisans, and methods of manufacture and distribution; and curators of historic collections that include compo are knowledgeable about the objects under their care. The combined knowledge of these individuals, together with examples and images of compo ornament from a variety of sources, needs to be synthesized to address the complex issues involving compo repair and preservation. The future of the study of composition ornament, as well as many other facets of architectural, decorative, and fine art history, lies in this sort of cooperative effort.

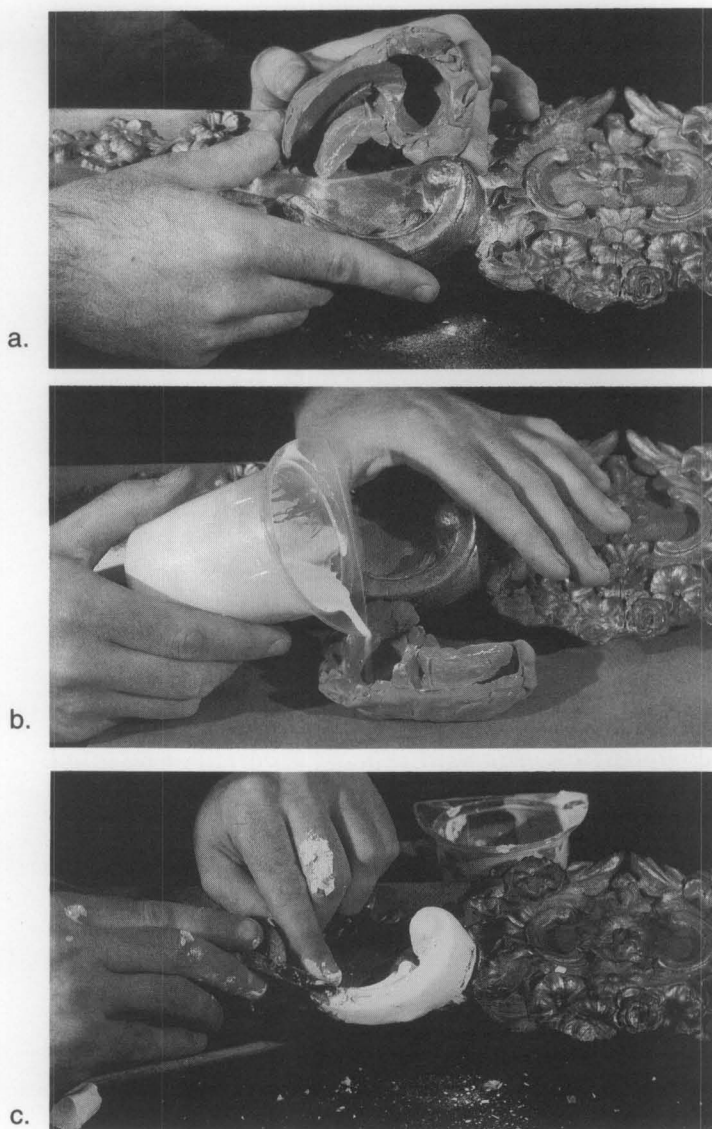


Figure 26. When a small amount of ornamentation needs to be replaced, (a) plastilina clay is recommended as an impression material. Next (b), a plaster-like, liquid material is used to cast the replacement piece. Finally, (c) the new piece is smoothed and fixed in place. Photos: Roland White.



Figure 27. When a compo frieze depicting *The Triumph of Mars* was found to be damaged, improperly restored, and its intricate design clogged with paint, the first step was to replace a missing wheel on the chariot. Because molds depicting classical themes are part of many professional studio collections, it was possible to fabricate a new wheel from the rubber mold shown here. Photo: William Adair.



Figure 28. A conservator is replacing broken pieces of compo ornamentation on a mantel during restoration of the Nightingale-Brown House in Providence, Rhode Island. Photo: Courtesy, Irving Haynes and Associates.

Whether applied interior ornamentation such as composition ornament is being repaired or restored, treatment should always be preceded by careful documentation and planning.

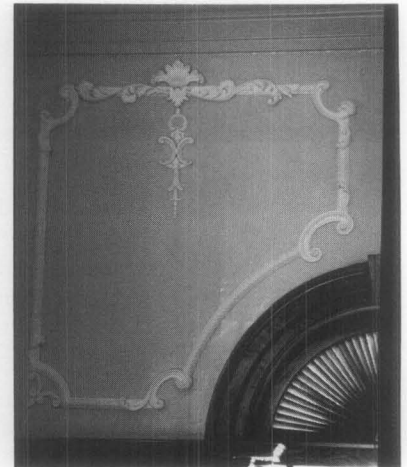


Figure 29. The ghost marks of compo past—floral swags or festoons—are in clear evidence on a mantelpiece in the back bedroom of the George Read II House, New Castle, Delaware. This physical evidence will be used to assure their accurate re-creation in a restoration project. Photo: Courtesy, Gold Leaf Studios, Inc.



a.

Figure 30. Based on documentary and physical evidence, missing composition ornament was accurately re-created for the Miles-Brewton House, Charleston, South Carolina. First (a) the conservator used molds to fabricate ornament in small pieces and lengths; and (b) the new ornament was attached to thin birch plywood backing with glue and brads to create larger sections. These sections were then fastened to the original paneling with stainless steel screws. Photos: Jonathan Thornton



b.

Composition and Other Applied Interior Ornamentation

As explained below, compo is a polymer-based material; however, several related materials used to create sculptural relief were sometimes referred to as "compositions" because they combined various ingredients to achieve new and hybrid properties. These related decorative materials can be polymer-based, plaster-based, paper-based, or wood-based. The following terms and definitions are important to know because they provide a background for identifying compo and other applied interior ornamentation *prior* to treatment.

Polymer-based Materials

Polymers are organic, i.e., carbon-based materials comprised of repeated units linked together into long chain-like molecules. Most polymers are soft and pliable (plastic) or can be made so by the application of heat (thermoplastic). In addition to compo and modern synthetic plastics, defined below, polymers include animal glue, horn, natural resins such as shellac, latex rubber, and rosin.

Compo. This thermoplastic mixture based on natural polymers—typically glue, linseed oil, and resin bulked with chalk—has been used extensively to create sculptural relief.

Modern Synthetic Plastics. Starting with cellulose nitrates such as celluloid (1840s), a vast array of man-made polymers has been created. Plastics received their popular name because, like composition, they are generally shaped while soft and pliable, but, due to cost, composition is the only polymer material to be used extensively in architectural decoration until quite recently.

Plaster and Plaster-based Materials

Plaster: This term describes two distinct calcium-based mixes. First, *lime plaster* is made by heating calcium carbonate to produce calcium oxide and slaking it with water to produce calcium hydroxide (lime putty). This material, mixed with fillers and aggregates and applied to surfaces gradually reconverts to calcium carbonate over a period of years. Second, *gypsum plaster* ("Plaster of Paris") is made by heating hydrated calcium sulfate to remove part of the chemically bound water. When water is added, it reconverts to fully hydrated calcium sulfate, setting and hardening in the process. Wet plaster was "run" in cornices; or made in piece-molds and flexible gelatin molds, then applied to interior surfaces.

Stucco: In its earliest use in Europe and America, stucco was a lime putty-based mix for fine interior ornamental plasterwork; historically, "stucco" referred to ornamental (particularly sculptural) plaster work. In the United States by the 19th century, however, stucco was primarily used to describe exterior plastering, usually done with Portland cement-based mixtures.

Fibrous Plaster: This is the term for molded architectural plasterwork which is heavily reinforced with coarse weave cloth as it is built up in the molds.

Fibrous plaster is lightweight, strong, and somewhat flexible and was used to manufacture large architectural units such as balcony fronts, columns, and pilasters.

Pate Coulante (*flowing paste*). This is a mixture mentioned in one 19th century text that consisted of gypsum plaster, whiting, glue, alum, and sometimes paper pulp. If encountered in an historic interior, it is likely to be indistinguishable from plaster.

Paper-Based Materials

Papier-mâché: This material became popular for interior decoration during the mid-18th century in England and its colonies. *Papier-mâché* was made from soaked rag paper layered into molds with small quantities of glue or starch paste as additional binders. It was usually covered with whiting and glue (gesso) and sometimes gilded. *Papier-mâché* is always hollow and can be distinguished from compo or plaster by gentle tapping.

Anaglypta: This is a trade name for a wallpaper embossed with relief decoration.

Carton-Pierre: This material was based on fully pulped paper fiber extended and hardened with substantial amounts of glue, whiting, and gypsum plaster, and sometimes alum and flour. Carton-pierre was pressed into molds as a plastic mass and allowed to harden. It is mid-way between plaster and papier-mache in weight and density.

Fibrous Slab: This was the name given to layered papier-mache panels heavily impregnated with linseed oil by inventor, C.F. Bielefeld, in the mid-19th century. The composite of paper fiber and hardened linseed oil made a thermoplastic panel that could be shaped and embossed by heating and pressing.

Lincrusta: This material, composed of fiber and dried linseed oil and press molded onto paper backing, was introduced by the linoleum manufacturer, F. Walton, in 1877 and is still made. Typical use is in continuous low-relief friezes at the top of a room.

Wood and Wood-Fiber Based Materials

Wood: Natural wood can also be press molded to a limited extent after it is made plastic by either steam or ammonia. *Pressed wood* architectural elements have been extensively marketed, but would be difficult to mistake for the deeper and sharper relief of most of the other materials described above.

Wood-fiber: Also called saw dust, this cheap and readily available product has been used as a bulking agent in moldable mixtures since before the Renaissance. Numerous recipes consisting of wood fiber and various binders were published in 19th century formulas, and some of these proprietary mixtures or *patent woods* were used to produce small architectural decorations and moldings. Modern particle boards are non-sculptural variations of the material.

Further Reading

- Adair, William. "An Investigation of Composition Ornamentation." *The Interiors Handbook for Historic Buildings II*. Washington, D.C.: Historic Preservation Education Foundation, 1993, Chapter 4, pp. 1-7.
- Adair, William. *The Frame in America, 1700-1900: A Survey of Fabrication, Techniques and Styles*. Washington, D.C.: The American Institute of Architects Foundation, 1983.
- Budden, Sophie (ed.). *Gilding and Surface Decoration*. London: United Kingdom Institute for Conservation, 1991. See: Judith Wetherall, "History and Techniques of Composition," pp. 26-29; Jonathan Thornton, "Minding the Gap: Filling Losses in Gilded and Decorated Surfaces," pp. 12-17.
- Cotton, J. Randall. "Composition Ornament." *Old-House Journal*. Vol. XXI, No. 1 (January/February 1993), pp. 28-33.
- Green, Malcolm. "Conservation and Restoration of Gilded Antiques." *The Conservator*, 3. United Kingdom for Conservation, 1979.
- Hasluck, Paul N. (ed.). *Cassell's Cyclopaedia of Mechanics*, 8 vols. London: Cassell and Co., 1904, Chapter 4, p. 164.
- _____. *Mounting and Framing Pictures*. London: Cassell and Co., 1899.
- Kunou, C.A. *Manual of Gilding and Compo Work*. Los Angeles, California: The Bruce Publishing Co., 1928. Request reprint information from the International Institute for Frame Study, 2126 "O" Street, NW, Washington, D.C. 20037.
- Loeffler, R.F. *Step by Step Compo and Mold Making*. Oroville, California: Loeffler-Valac Industries, 1992.
- Millar, William. *Plastering Plain & Decorative: A Practical Treatise on the Art & Craft of Plastering and Modelling*. London: B. T. Batsford. New York: John Lane, 1899.
- Scott-Mitchell, Frederick. *Practical Gilding*. London: The Trade Papers Publishing Company, 1905.

The Gilder's Manual. New York: Excelsior Publishing House, 1876. Reprinted by the Society of Gilders, Washington, D.C., 1990.

The Secretary of the Interior Standards for the Treatment of Historic Properties. Washington, D.C.: U.S. Department of the Interior, National Park Service, Preservation Assistance Division. Washington, D.C., 1992.

Thornton, Jonathan. "Compo: The History and Technology of 'Plastic' Compositions." *Preprints* of papers presented at the 13th annual meeting, Washington, D.C. American Institute for Conservation, 1985.

Organizations

For information on conservators, contact the following organizations:

Association for Preservation Technology
904 Princess Anne St.
Fredericksburg, VA 22404

National Institute for the Conservation
of Cultural Property
3299 K St., NW, Ste. 403
Washington, D.C. 20007

American Institute for the Conservation
of Historic & Artistic Works
1400 16th St.
Washington, D.C. 20036

Cover photograph: The process of making composition ornament has changed little over the years. In the J.P. Weaver Company, located in Glendale, California, freshly made compo is being kneaded prior to pressing it in a mold.

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