

Connick Windows

Thoughts, news and comments concerning the art and craft of Connick stained glass, published periodically by....

The Charles J. Connick Stained Glass Foundation, Ltd., Orin E. Skinner, Founder Marilyn B. Justice, President October, 2006
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How Stained-Glass Windows Are Made (Part One)

Julie L. Sloan, 2006

Stained-glass windows have been made with essentially the same techniques and materials since the Middle Ages. In essence, a stained-glass window is made up of pieces of glass, usually but not always colored. Some or all of the glass is usually painted. The pieces are held together with metal strips called **comes**, usually made of lead. A window is assembled in sections, or panels, and held in place in the frame by iron or steel bars.

Glass

All glass is made up of sand, lime, and soda, melted together. The colors of stained glass are imparted through the addition of various metallic oxides to the molten glass before it is formed into a sheet. These colors are permanent and do not alter with time, for the most part.

There are essentially three types of glass used in stained-glass windows, characterized predominantly by their method of manufacture. The first is **antique**, or hand-made glass. The term has nothing to do with the age of the glass - it refers to glass made by blowing, following medieval techniques. Antique glasses are colored and transparent with a somewhat irregular optical quality, often having bubbles or striations which enhance its sparkle. The first blown colored sheets of glass are thought to have been made in 8th or 9th centuries. It was the only type of glass available for stained-glass windows until the development of rolled glass in the 19th century. Its use never ceased in Europe in the 19th century, but in America, the fashion for opalescent windows almost eclipsed it until the early 20th century, when artists like Charles Connick returned to a Gothic-inspired style for windows.

The most common technique for making antique glass is the **muff** or **cylinder** method. A bubble of molten glass is blown with a blow-pipe and elongated into an oblong shape. The bottom of this long bubble is opened and the top is cut from the pipe, resulting in an open-ended cylinder of glass, called a **muff**. After cooling, the cylinder is cut lengthwise and the glass reheated to allow it to open out flat.

A second manufacturing method for antique glass is the **crown** method. Ordinary window glass ceased being made this way in America by the 1830s, but production has continued for decorative windows. Crown glass is made by blowing a round bubble of molten glass instead of an oblong bubble. When the bottom of the bubble is opened, the pipe to which it is attached is spun rapidly, using centrifugal force to cause the glass to open and flatten out into a plate-shaped sheet, called a **table**. Crowns rarely exceed several feet in diameter and are often much smaller. At the center, they are very thick. This center piece, the **bulls-eye**, is usually discarded, although it is not uncommon to see bulls-eyes in decorative windows.

A variety of antique glass is **flashed** glass. It is characterized by its two layers of color. The base, or thicker layer, is usually a clear or pale tint, while the thinner, or flashed, layer, is usually a deep color such as red, blue, or black. Certain paler colors, such a rich purplish-pink, known as gold pink, are also flashed. Flashed glass is made by dipping the blowpipe into the base color first, then the flashed color. When the bubble is blown, the two colors are fused together in layers. The reason for making flashed glass is either that the color is too deep to transmit light in greater thicknesses or that the colorant is a very expensive, as in gold pink, which is actually colored with gold.

The next type of glass is **cathedral**. This transparent colored glass is made by pouring molten glass on an iron tabletop and rolling it flat. Often the rollers are textured to impart a pattern to the glass. The first machine-rolled glasses were made in the eighteenth century. These were rolled on one side only. In the 1870s, the **double-rolled** process was invented in England to texture both sides of the glass by passing the glass between two rollers. Cathedral glasses are less brilliant than antique glasses, having a regular and somewhat dull surface texture.

The third type of glass is **opalescent**. This glass is characterized by a milky opacity caused by particles suspended in the glass, rather than fully melted. These particles cause diffusion of light, spreading the light throughout the piece instead of allowing it to pass straight through, as antique or cathedral glass does. A sheet usually incorporates more than one color. It is usually machine-rolled (and is therefore also a cathedral glass), but is sometimes cast and manipulated by hand to create **drapery**, **mottled** or **catspaw** glass. Opalescent glass was developed for windows in the late 1870s at the instigation of John La Farge and Louis Comfort Tiffany. Such milky glass had been used for glass vessels for several centuries, but had never before been made in sheets and used in windows.

Paint

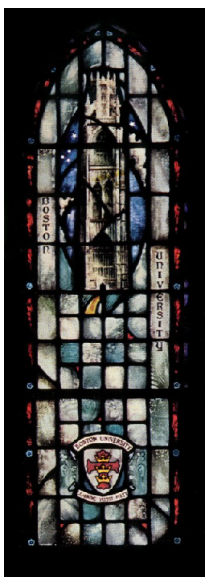
A monochromatic paint has been used to delineate details and control light transmission in stained glass since at least the tenth century. Silver stain, which imparts a transparent yellow color, was developed in the fourteenth century, and colored enamels became popular in the sixteenth century. Facial features, folds of clothing, decorative and architectural elements, and inscriptions are created in paint to make a scene legible. The control of light through glass is equally important. In general, glass paints are made of a vitreous (glass-based) powder mixed in a liquid medium, then fired in a kiln at temperatures between 800^o and 1300^o F. During firing, the paint melts and fuses with the surface of the glass, making it very durable.

Cames

After the glass is cut, painted, and fired, it is held together with I- or H-shaped metal strips called **comes**. The pieces of glass fit between the **flanges**, or parallel legs, of the came. The came is formed around the shape of the glass and joined at the ends by soldering. Care is usually taken to work the placement of the comes to complement, and even enhance, the design of the window.

This article will be continued in the February, 2007 Newsletter.

Julie L. Sloan is a stained-glass consultant in North Adams, MA. She has worked in stained glass since 1982 and is the author of *Conservation of Stained Glass* in America and many articles on stained glass history and conservation. She was adjunct professor of historic preservation at Columbia University, where she has taught stained glass restoration from 1985 until 1997. Sloan has lectured at Williams College and Rensselaer Polytechnic Institute, and given seminars around the country. Her BA in art history is from New York University, and her MS in historic preservation from Columbia University. She curated an exhibition and wrote two major books on the leaded glass of Frank Lloyd Wright, *Light Screens: The Complete Leaded-Glass Windows of Frank Lloyd Wright* and *Light Screens: The Leaded Glass of Frank Lloyd Wright* (exhibition catalog), both published by Rizzoli International (2000). Julie Sloan gave the 2001 Orin E. Skinner Annual Lecture.



Old Boston Stump
Daniel L. Marsh Chapel
Boston University

The 2006 Orin E. Skinner Annual Lecture will be held on Wednesday November 15th at 6:30 pm at the Daniel L. Marsh Chapel of Boston University, 735 Commonwealth Avenue, Boston.

Peter Cormack F.S.A. will present an illustrated lecture on the topic:

Charles J. Connick (1875-1945): America's Greatest Stained Glass Artist

Charles Connick devoted his lifetime persuading people that stained glass could be as potent a cultural and spiritual experience in 20th-century America as it had been in medieval Europe. This illustrated lecture will examine the formative impact on Connick's work of the Arts & Crafts Movement, of inter-war Modernism, and of the Modern Gothic architecture of Ralph Adams Cram and his school. Firmly committed to a regenerated handicraft tradition, Connick welcomed innovation and experimentation in design and technique among his co-workers. His Harcourt Street workshop, founded in 1912, flourished for more than seventy years, finally closing in 1986. In churches and other buildings throughout the U.S.A., Connick articulated a new and lively vocabulary of the ancient craft of stained glass, synthesizing modern expression and the best historic traditions.

PETER CORMACK is Keeper of the William Morris Gallery in London, where he has curated numerous exhibitions on Morris and the Arts & Crafts Movement. He has written and lectured extensively on 19th- and 20th-century stained glass and was for ten years Co-Editor of The Journal of Stained Glass. His 1999 book The Stained Glass Work of Christopher Whall (1849-1924) was co-published by Boston Public Library and the Connick Foundation. He is a Fellow of the Society of Antiquaries of London (and Hon. Curator of the Society's collections at Kelmscott Manor), Honorary Fellow of the British Society of Master Glass Painters and Honorary Director on the Board of the Charles J. Connick Stained Glass Foundation