ARCHITECTURE

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TOMB OF SESHEMNEFER AT GIZEH

This issue's limited edition signed print by Ladd Ehlinger is of the entry to the offering chapel of Tomb of Seshemnefer, a Queen's Mastaba tomb. This tomb is part of a complex of multiple small tombs for queens and lesser functionaries, on the riverside of the Great Pyramid of cheops in Gizeh, Egypt.

The entire complex is located on the southeast corner of the Pyramid (largest of the three Great Pyramids). The complex includes in addition to the mastaba tombs, a mortuary temple, an offering chapel, and five boat shaped pits, three on the south and two on the north.

There were three types of tombs in ancient Egypt: Mastabas, Royal Pryamids, and Rock-Hewn Tombs. This tomb is a Mastaba, a type of tomb typical of the Fourth Dynasty of Egypt (between 3200-2130 B.C.), and characterized by the low height and sloped sides of the structure. Most had flat tops. The majority of the tombs of this period were of limestone.

A VIEW OF WINDOWS

(continued)

The advent of readily available and affordable glass during the Romanesque period of Architecture was the impetus that ushered in the Gothic period. During this time, the wall was effectively deleted as an opaque element with glass being substituted where there had previously been stone. As a practical matter, this was the solution for the ongoing "search for light" that architects had been engaged in since the inception of Architecture, but the light that was sought was sought to the exclusion of the other environmental factors of rain and snow, heat and cold. Glass provided the solution of light with security.

Aesthetically, the Gothic period utilized the glass to express the infinity of space, and thereby allude to the presence of God. By coloring the glass and diffusing the light, no "ground" for the source of light was given, and hence depth was a difficult, even evanescent element of design, and simulated an endless depth. The wall structure of the building was reduced to columns of stone supporting pointed arches, vaults and roofs and braced by buttresses and flying butresses. The structure of the building became a frame of "bones", a reduction to the minimal amount of stone necessary to stand up to gravity & wind loading. Space became liberated with light by the dematerialization of the building structure.

The Renaissance period that followed the Gothic produced no aesthetic or technological breakthroughs with glass or windows. There was a reversion to the Greek and Roman periods of antiquity, and careful attention was given to the re-expression of the window in terms of those past periods.

At the end of the Renaissance period, in the late 17th through the early 19th century, other technological changes were taking place which were to very quickly have a profound effect upon windows and glass. Coal was harnessed as a cheap source of energy, energy that was used to power the steam engines driving the water evacuation pumps that were used to render the coal mines safe places to work, and the digging and transporting machines to perform the mining itself of the coal. These same steam engines enabled safe and productive iron ore mining by similar means. Coal also provided the cheap energy needed to produce at first cast iron and later carbon steel. To do this, the coal was reduced to coke (carbon) by heat, and mixed with the pig iron. Coal also provided the affordable energy to make larger sheets of glass with greater quality control. The Industrial Age was born, and it brought with it new materials with new methods of architectural expression.

The strength of cast iron was quickly utilized by the engineers and tinkerers of the day in Britain, at first for utilitarian structures such as bridges and terminals for new rail transport systems being built. Architects were slow to take advantage of the new structural and glazing technology merely repeating or mimicking historical forms with the new materials instead of searching for new forms or expression.

Greenhouses for the Victorian Age's interest in Botany were constructed of the new structural material Here the "bones" of the building were reduced to even smaller sizes than the Gothic buildings stone frames due to the new material's tensile strength property in addition to compressive strength The glass was used as the only cladding of these buildings, allowing the light needed for plant growth in the interior. These first greenhouses were designed by a gardener, Sir Joseph Paxton, in the period 1836 to 1847.

Paxton's crowning achievement was an adaptation of the greenhouse technology to an exhibition building, The Crystal Palace, completed in 1851 for The Great Exhibition of 1851 (a world's fair). The building was constructed in nine months and was designed in only seven weeks. Paxton was chosen to do the design after an international competition had been held, and none of the entries had been found to be acceptable or buildable within the short time constraints. Paxton collaborated with Sir Charles Fox, Structural Engineer, and Owen Jones for the ornament.

The Crystal Palace was a huge building, 408 feet wide by 1,848 feet long. As a spatial conception, it broke no new ground in its planning, being of a basilican plan, even with a transept. Its space was expressed in a revolutionary way through the use of cast iron and glass as the only materials comprising the walls and roof, and the fact that it was one of the first buildings to be wholly mass produced with essentially identical parts, each of which was stress tested before erection. The entire structure was destroyed by a fire in 1936.

Other seminal buildings which stretched the usage of glass were: the Galleria Vittorio Emmanuel in Milan (1865-77) where the entire roof is a glass and steel

barrel vault; The Galerie des Machines for the International Exhibition of Paris in 1889, where the end walls are entirely of glass and steel with the frames of the building separate; The Hallidie Building in San Francisco (1918) which prophicized the present day curtain wall, by having a "curtain" of glass supported by secondary glazing members utterly independent of and exterior to the main building structure from which the "curtain" is hung.

A. The Crystal Palace at completion in Hyde Park, London (1851): interior

A. The Hallidie Building, San Francisco (1918).

The curtain walls of the mid and late 20th century reverse the historical hierarchy of the building components. The historical building had walls which were punctured with windows, which walls held up the floor and roof structures. The curtain wall building has an independent frame which holds up the floor and roof structures and from which the walls of glass are hung. The window now becomes the entire building.

Advances in glass technology, such as flat large panels, opaque panels, tinted translucent panels, reflective coated panels, insulated panels (where 2 panes of glass are joined together separated by a dead air space that is hermetically sealed), and various combinations of the panel types render curtain walls a versatility and flexibility to respond to changing environmental factors and different building orientations.

Glass building bricks are another technological advance, combining the new glass methods with traditional masonry.

Architects in the 20th century were quick to develop the new glass and structural technology into a new aesthetic. The concept of expression of the unity and oneness of space through large glass exposures and subtle detailing of the solid components took shape. The notion of "bringing the outdoors in and the indoors out" by using the same flooring and/or wall/roofing materials both inside and outside and separating the interior and exterior with glass detailed to minimize the glazing enclosure was one method espoused by Frank Lloyd Wright in his prairie houses in the period 1896 through 1914. Another of Wright's techniques was to eliminate the corner of the walls and replace it with a mitered glass (no glazing frame) window. In some cases the glass was actually set in the stone or brick directly. These were exploited in Wright's Usonian House period from about 1932 through 1950.

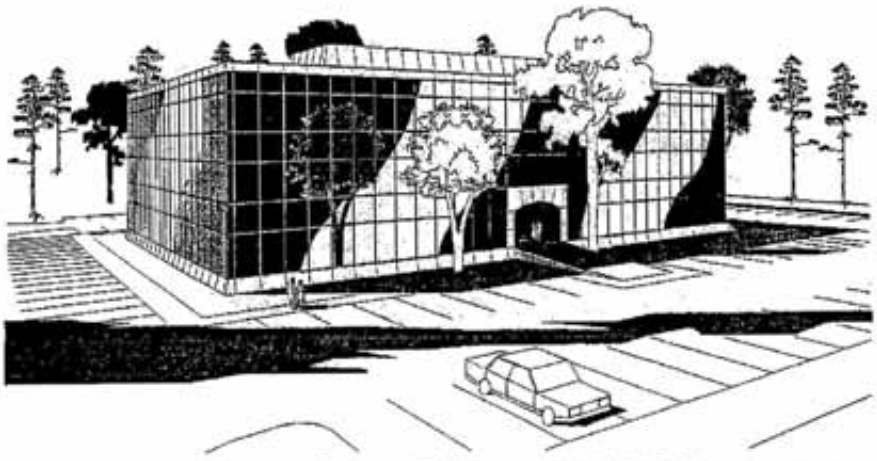
Curtain walls were developed by Wright also from the 1920's until his death in the late 50's, most notably in the Johnson's Wax Co. complex's research tower (1946-49). But the real curtain wall development took place in the work by those architects that designed in the International style. The development of stainless steel and aluminum as glazing members allowed for this work to take place, as regular carbon steel was too high a maintenance type material.

Rockefeller Center is a complex of buildings with stone and glass curtain walls which are expressive of the verticality and elevator service within. They were designed by a group of architects from 1930 onward, but most notably Raymond Hood and led by the team of Harrison and Abramovitz.

The Lever House, New York (1952), designed by Gordon Bunshaft of Skidmore, Owings & Merrill, was a pure expression of the all aluminum & glass curtain wall. The apartment buildings on Lakeshore Drive in Chicago (1949-51) by Mies Van Der Rohe, preceded Lever House and set the theory prototype. Mies later collaborated with Philip Johnson on the Seagram Building in New York (1956-58), which is considered to be one of the finest detailed curtain walls ever built.

C. Lever House, New York (1952).

D. The Johnson Wax Co. Buildings, Racine, Wisconsin (1936–49).



Curtain Wall Project by EHLINGER & ASSOCIATES