



Many New Deal construction projects were gymnasiums, like this one in the Webster County town of Harcourt (population 300). Whether arches were glued or mechanically fastened, the labor to prepare the planks and bend them into the shape of the rafters was extensive. The Harcourt gymnasium still stands.

Laminated Timber Arches Grace WPA Gymnasium

by Barbara Mitchell

Built in 1941/42 by the New Deal's Work Projects Administration, the school gymnasium in Harcourt, Iowa, was an example of a new construction method, laminated timber arches.

The graceful curve of laminated timber arch construction lends itself well to spanning large open spaces. By the late 1800s a few barns began to feature rafters with sawn curves. Bent laminated rafters, bolted or otherwise mechanically fastened, became popular

in the late 1910s. But bent laminated rafters were not as strong as the sawn curved rafters that preceded them. The solution found for this dilemma was glue.

Glued laminated timber arch construction originated in Germany. Otto Hetzer, of Weimar, received the first patent for a curved laminated beam in 1906. The "Hetzer system" included multiple layers of long wood planks, carefully bent into the proper shape, clamped, and bonded together us-



ing casein adhesive for strength. The glued lamination allowed roofs to span large open areas without the use of columns or other supports. By World War I, the use of timber arches had spread through Germany, Switzerland, and Scandinavia.

Max Hanisch, Sr., an employee of Hetzer's firm, brought the construction technique to the United States in 1923. Hanisch teamed up with the Thompson Brothers Boat Manufacturing Company in Peshtigo, Wisconsin,



to begin building laminated timber arches. The boat builders' familiarity with woodworking made them perfect partners for the business, which incorporated as Unit Structures. The first building to use the arches in North America was a Peshtigo school gymnasium, designed by Hanisch in 1934.

Unsure the glued arches were strong enough, the Wisconsin Industrial Commission required reinforcement with bolts and straps. In late 1934, however, Unit Structures and the

USDA-Forest Products Laboratory in Madison began research to prove the strength of the arches held together by glue alone. They also demonstrated that short pieces of wood could be glued together to form long arches.

In Iowa around the same time, Henry Giese worked with the Rock Island Lumber Company on similar tests at the Iowa State College in Ames. His work, in particular, improved the design of the rafters for use in Gothic-roofed barns. By the late 1930s, glued

laminated timber arches were used in gymnasiums, barns, churches, recreation halls, and auditoriums across the country. ❖

Barbara Mitchell is an architectural historian in the State Historic Preservation Office of the State Historical Society of Iowa (Des Moines).



ALL PHOTOS: SHELBORN CITY, WPA COLLECTION

Many New Deal construction projects were gymnasiums, like this one in the Webster County town of Harcourt (population 300). Whether arches were glued or mechanically fastened, the labor to prepare the planks and bend them into the shape of the rafters was extensive. The Harcourt gymnasium still stands.

Laminated Timber Arches

Grace WPA Gymnasium

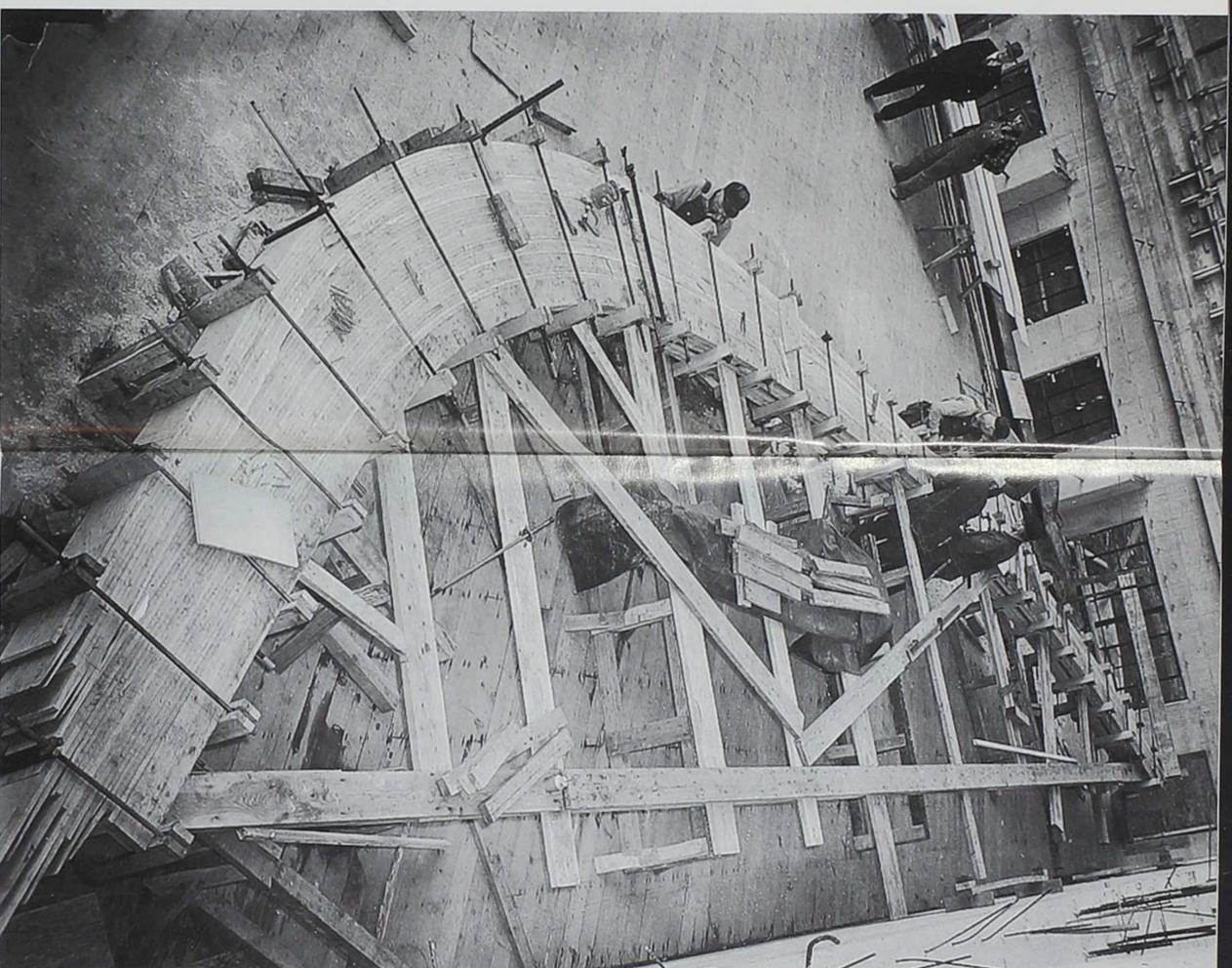
by Barbara Mitchell

Built in 1941/42 by the New Deal's Work Projects Administration, the school gymnasium in Harcourt, Iowa, was an example of a new construction method, laminated timber arches.

The graceful curve of laminated timber arch construction lends itself well to spanning large open spaces. By the late 1800s a few barns began to feature rafters with sawn curves. Bent laminated rafters, bolted or otherwise mechanically fastened, became popular

in the late 1910s. But bent laminated rafters were not as strong as the sawn curved rafters that preceded them. The solution found for this dilemma was glue.

Glued laminated timber arch construction originated in Germany; Otto Hetzer, of Weimar, received the first patent for a curved laminated beam in 1906. The "Hetzer system" included multiple layers of long wood planks, carefully bent into the proper shape, clamped, and bonded together us-



ing casein adhesive for strength. The glued lamination allowed roofs to span large open areas without the use of columns or other supports. By World War I, the use of timber arches had spread through Germany, Switzerland, and Scandinavia.

Max Hanisch, Sr., an employee of Hetzer's firm, brought the construction technique to the United States in 1923. Hanisch teamed up with the Thompson Brothers Boat Manufacturing Company in Peshtigo, Wisconsin,

to begin building laminated timber arches. The boat builders' familiarity with woodworking made them perfect partners for the business, which incorporated as Unit Structures. The first building to use the arches in North America was a Peshtigo school gymnasium, designed by Hanisch in 1934.

Unsure the glued arches were strong enough, the Wisconsin Industrial Commission required reinforcement with bolts and straps. In late 1934, however, Unit Structures and the

USDA-Forest Products Laboratory in Madison began research to prove the strength of the arches held together by glue alone. They also demonstrated that short pieces of wood could be glued together to form long arches.

In Iowa around the same time, Henry Giese worked with the Rock Island Lumber Company on similar tests at the Iowa State College in Ames. His work, in particular, improved the design of the rafters for use in Gothic-roofed barns. By the late 1930s, glued

laminated timber arches were used in gymnasiums, barns, churches, recreation halls, and auditoriums across the country. ❖

Barbara Mitchell is an architectural historian in the State Historic Preservation Office of the State Historical Society of Iowa (Des Moines).

