

MOVABLE BRIDGE ✦ HALL OF FAME

Hugo Abt

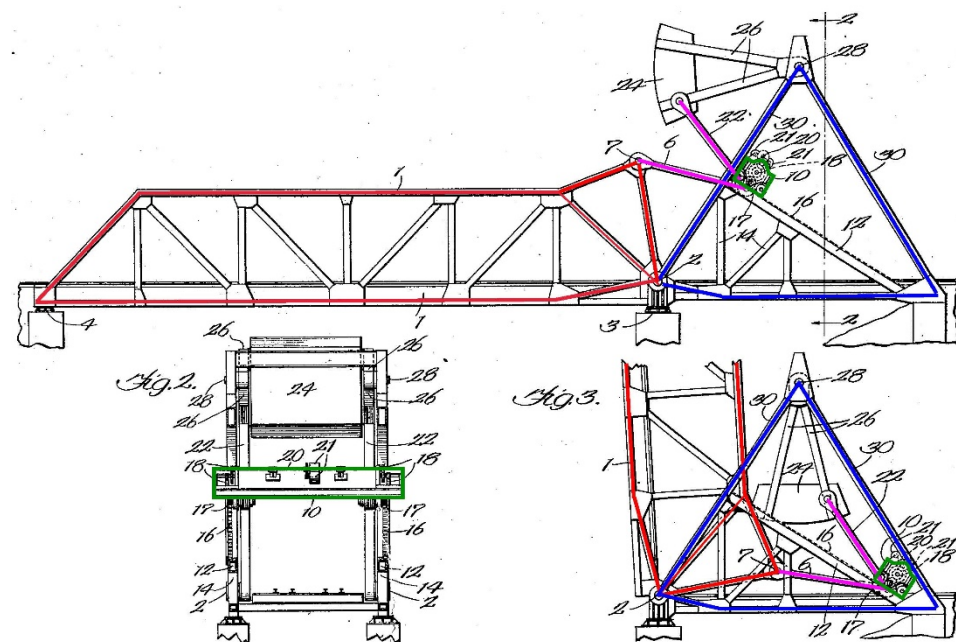
Inventor of the Abt Bascule Bridge

Dr. Hugo A. F. Abt was born in Germany in 1873. By 1913 he was working in Chicago as an independent Civil Engineer. Prior to 1920 he joined the Chicago office of American Bridge, becoming Assistant Engineer; he continued there through about 1945. Very little information has been found regarding his personal or professional life other than his patents for his unique bascule bridges. (In Bethany Cemetery in Charleston SC there is a grave marker for Adam Franz Hugo Abt, born January 2, 1873, died September 22, 1959, possibly our Abt.) Working in Chicago during the early 20th Century he was familiar with a variety of movable bridge types, the Scherzer rolling-lift and the Strauss heel-trunnion being the most prevalent. Abt believed that there was a more efficient way to construct a bascule bridge, especially for railroad service. After considerable thought, he applied for and was granted three U.S. patents, the first granted in 1921 and the basis for the bridges actually constructed. The others were granted in 1922. The second was for an alternate arrangement of the operating system; and the third was for a double-leaf bascule that acted as a 3-hinge arch for live loads.



Figure 1 - 230-ft Span at Beaumont Texas

The sketch below is from Abt's first patent. At first glance, Abt's design is similar to the Strauss heel-trunnion except that the counterweight is located on the leaf side of the A-frame (blue lines) and the operating machinery is located on a carriage that runs on inclined tracks (12) in the A-frame rather than on the bascule leaf. The bascule leaf (red lines) and the counterweight are connected to the machinery carriage (green lines) with operating links (magenta lines, 6 and 22).



The machinery has operating pinions that engage fixed racks (16) that are affixed to the inclined tracks (12). The operator houses were originally located on the machinery carriage. The counterweight revolves around a pair of trunnions (28) located at the apex of the A-frame. The bascule leaf rotates around a pair of trunnions (2) located at the forward base of the A-frame. The moments caused by the counterweight and the machinery carriage balance the moments caused by the bascule leaf.

Eight bascule bridges were built based on Abt's first patent. The first was a 162-ft thru-truss over the Rouge River in Detroit MI, completed in 1922 for the Wabash Railroad. This was

followed by a 110-ft thru-girder over the Manitowoc River in Manitowoc WI for the Minneapolis, St. Paul and Sault Ste. Marie Railroad (Soo Line) in 1926, three 110-ft thru-girder bascules for the Santa Fe Railway over the Middle River and the Old River in Orwood CA in 1928 and over the San Joaquin River in Stockton CA in 1930, a 172-ft thru-truss over the Black River in Port Huron MI for the Pere Marquette Railroad in 1931, a 230-ft thru-truss over the Neches River in Beaumont TX for the Texas and New Orleans Railroad in 1940, and a 172-ft thru-truss over the Saginaw River in Saginaw MI for the Pere Marquette Railroad in 1944. The five bridges in Detroit, Saginaw, Orwood, and Stockton are still active, providing 448 years of combined service.