In 1898, Oklahoma rancher J. A. Whittenburg filed on four sections of land in Hutchinson County. He built a small dugout near the Canadian River and claimed the acreage as his homestead. In 1901, Whittenburg donated land for the establishment of the village of Plemons. Barney Plemons filed on land there and the town was named for him. When Hutchinson County was organized in 1901, Plemons became the county seat. The courthouse was built by E. E. Akers. Mattie Sams was named the first postmaster when Plemons received its post office on May 29, 1901. The post office was closed in 1952.

In its first decade, Plemons never had more fifteen families. Billy Dixon moved to Plemons from Adobe Walls and operated a boarding house. Dixon became the first county sheriff. Dixon lived in Plemons from 1902–1906. He was awarded the Medal of Honor for gallantry in action on September 12, 1874. In 1916, Dixon's was one of nine hundred medals withdrawn as "unwarranted". The U.S. Army Board for the Correction of Records restored his medal in 1989.

The Rock Island and Gulf Railway was routed to the north and bypassed Plemons. Stinnett was developed as a shipping point for the railroad. Plemons realized modest benefit from the nearby Turkey Track and Tar Box ranches, but in 1926, the seat of county government was moved to Stinnett. Plemons began to decline after that, despite a brief spurt during the oil boom. Today Plemons is a ghost town.