

Types of Bellows

Bellows are an essential component of the traditional ironmaking process. To maintain an internal temperature hot enough to melt iron, the furnace requires a steady supply of oxygen, which is provided by the bellows. Three broad categories of bellows can be seen throughout the world: bellows made from wooden planks, bellows made from animal skin, and bellows made from piston-like tubes. Though the materials and shapes of the bellows differ, their function is generally the same: air is forced out of a confined space through a nozzle or pipe.

The earliest bellows used in open-air *tatara* from the late sixth century were made from animal skin. Deerskin bellows are mentioned in an eighth-century historical text called the *Nihon shoki* (*The Chronicles of Japan*). However, plank bellows are believed to have been adopted more widely from the eighth century onward.

There were two common types of plank bellows used in *tatara* ironmaking: hand-operated box bellows and foot-operated bellows that resembled a seesaw. In the late 1600s, ironworkers enlarged and improved the latter type to create *tenbin* (scales) bellows, so named for their resemblance to a huge set of scales. *Tenbin* bellows were more powerful and required fewer workers to operate. As this technology spread, box bellows were relegated to the smaller furnaces in *ōkajiba* forges and blacksmiths' workshops.