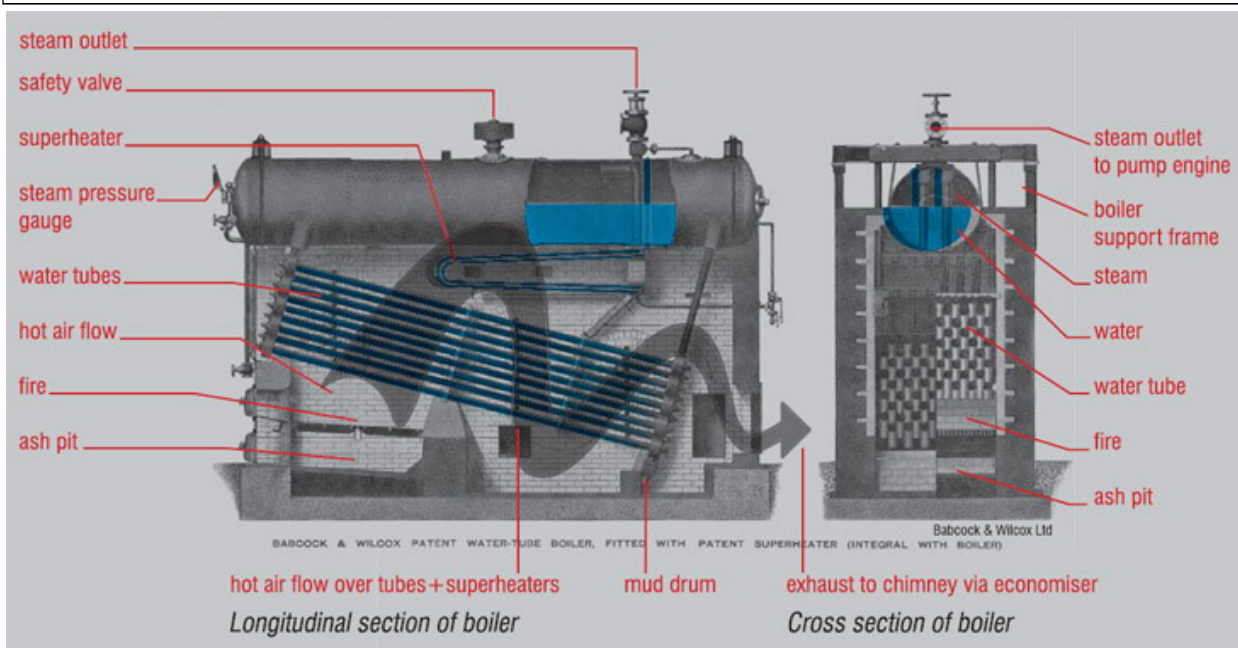


Diagram of water-tube steam boiler, 1903



Description

This is a technical drawing of two views of a Babcock and Wilcox boiler of the type used in Western Australia's Coolgardie Water Supply Scheme. The side view on the left shows a water-tube boiler with a superheater, while the drawing on the right shows a cross-section of the boiler, indicating the level of the water within. The drawing is labelled and the path of the hot gases that heat the water to generate steam is indicated. The drawing measures 26 cm x 18 cm.

Educational value

- Babcock and Wilcox boilers were an important part of the machinery used in the Coolgardie Water Supply Scheme. They were installed in the eight steam-powered pumping stations constructed as part of the project designed to pipe water 560 km from a dam near Perth to WA's arid gold fields along what was, in the early 1900s, the world's longest freshwater pipeline. A shortage of fresh water had restricted development and resulted in death and disease from insanitary conditions before the Scheme successfully solved the problem.
- Some of the latest developments in steam-driven boiler technology at the time were used in the Scheme. Water-tube boilers with superheaters were patented and manufactured by Babcock and Wilcox, leading boilermakers in Glasgow and London. Each boiler had a large drum, beneath which were 81 inclined water tubes. Circulating water between the drum and the tubes exposed a greater surface area to the furnace heat. The steam that rose to the top of the drum was collected and passed through a superheater, which heated it to dry steam, ensuring no moisture was carried over to the engines.
- Steam drives machinery because of its expansive properties. When a fire is set under a container holding water, the boiling water generates steam. This steam can be directed through an outlet to steam-driven machinery that converts the steam's thermal energy into mechanical energy. The expansion or contraction of the steam exerts a force that can be used to turn wheels or drive other machinery.



Categories: Storing and Pumping Water

- The 'Babcock and Wilcox Non-Explosive Boiler' shown here used narrow tubing to increase the surface area available for heating and to gain better water circulation and so generate higher pressures. Steam under pressure is dangerous and safety features included a gauge to measure the pressure of the steam and a safety valve to release pressure in the drum if necessary. Offset double rows of rivets were also used to close joints where steel sheets overlapped. Safety was in fact the biggest advantage of the water-tube boiler design because even if a tube blew it was extremely rare to have a boiler explosion as a result.
- These boilers were exported to many countries around the world. Their competitive advantage was that any source of fuel could be used to heat water to generate steam. In the Coolgardie Water Supply Scheme coal and then timber were used, but in some rice-producing countries, rice husk was used.
- Boilers were used to generate steam for the steam-driven equipment on which the Coolgardie Water Supply Scheme relied for the first 50 years of its operation. Electric pumps started replacing the eight steam pumping stations in the 1950s.
- A major engineering feat for its time, the Scheme was officially opened in January 1903 and is still in operation. It continues to draw water from the original dam and still uses more than half of the original pipes, although electricity has supplanted steam to drive its machinery.

Copyright Reproduced courtesy of Western Australian State Reference Library

Creator Unidentified

Identifier National Trust of Australia (Western Australia) number P12
Western Australian State Reference Library number 621.1 BAB

Source National Trust of Australia (Western Australia) <http://valuingheritage.com.au/>



Categories: Storing and Pumping Water