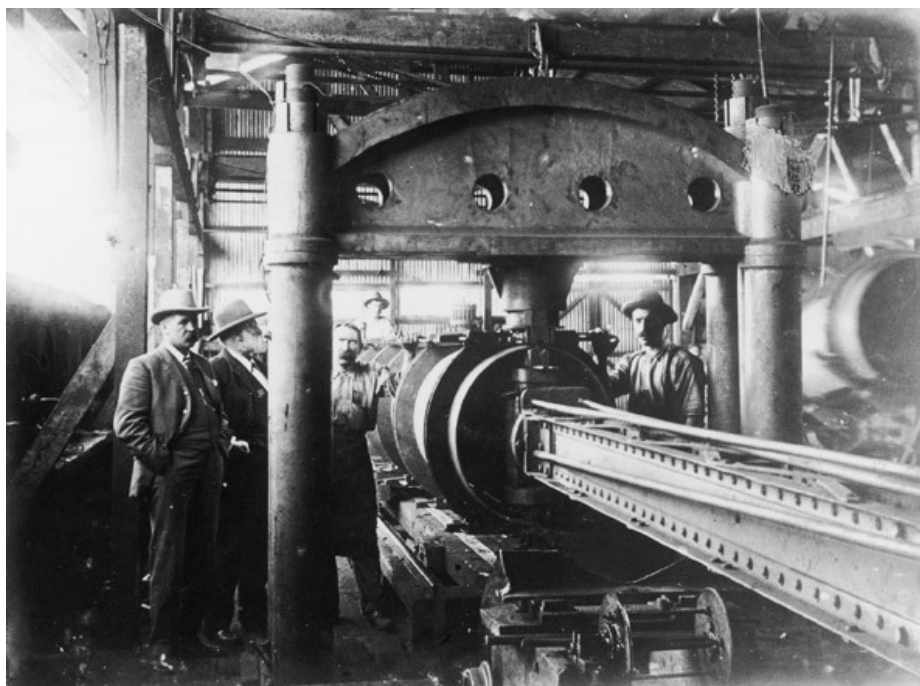


Making steel pipes, 1901



Description

This is a black-and-white photograph, taken in the Mephan Ferguson pipeworks, of a machine that joined two half cylinders of steel plate to make a length of cylindrical pipe, 8.5 m long and 76 cm in diameter, for the Coolgardie Water Supply Scheme in Western Australia. Mephan Ferguson (second from left with hat and beard), the factory owner and inventor of the special device used to lock the two halves of pipe together, is observing the closing machine. The photograph measures 21 cm x 16 cm.

Educational value

- The photograph documents a significant machine used in the construction of the pipes used in the Coolgardie Water Supply Scheme, an engineering feat that attracted worldwide attention at the time and has subsequently been declared an Australian national engineering landmark.
- The pipeline opened in 1903 and solved water-shortage problems resulting from the gold rush that began in the 1890s when prospectors rushed to Western Australia's inhospitable eastern regions following rich discoveries at the locations later known as Coolgardie and Kalgoorlie. Men literally died of thirst in the arid country, while others died of diseases that spread due to a lack of sanitation and clean water. Water was also needed for the gold-mining industry to develop, but attempts to obtain water from local underground sources and dams proved unsustainable, so finally the expensive pipeline from the coastal region was built.
- Two factories were established on the main railway line east of Perth specifically to manufacture pipes for the Coolgardie Water Supply Scheme. The interior of one of them, Mephan Ferguson's factory established in 1899, is shown in this photograph. The other was established by G and C Hoskins who held several patents for producing locking bar pipes and regularly patented improvements.
- Each of the factories made half of the 60,000 pipe lengths needed for the 560-km pipeline, with delivery of the pipes required to begin six months after the



Categories: The Pipes

contracts were signed on 24 October 1898 and to be completed within 26 months.

- This is the only known photograph of Mephan Ferguson taken at his Perth pipe-manufacturing works. Ferguson (1843-1919), the inventor of the innovative pipe used for the gold fields water supply, was born in Scotland and emigrated to Australia with his family in 1854. At age 13 he began work at an engineering works and in 1875, aged 32, established his own firm. In 1885 he won the contract for Australia's first steel main, a large-capacity pipe several km long, for Melbourne's water supply. The design of the Perth pipe-making works was the same as that in Melbourne.
- At the end of the 19th century, pipe-manufacturing work was mostly done manually or with hydraulic machines, that is, machines powered by fluid, often water, under pressure. One example can be seen in the foreground, being used in the Mephan Ferguson factory to power presses to bend and shape metal. They were also used for cranes, hoisting equipment and clamping work. A large hydraulic accumulator was used to store the water under high pressure, and supplied power for short periods of time.
- Engineers credit the locking bar pipe with the Coolgardie pipeline's success, and the closing machine in the image was central to the manufacture of the pipe. The closing machine had a hydraulic cylinder below floor level that produced a force of 12 meganewton, equivalent to a weight of 1,200 tonnes. Each time pressure was applied, the great force squeezed the locking bar closed, clamping two steel half cylinders together to make a pipe length. The machine was so efficient that very few pipes leaked. Of the 60,000 pipes made, only 50 had to be returned to the closing machine.
- The hydraulic, or Bramah, press, patented by Joseph Bramah in 1795, is still the most used and most efficient press to this day. It depends on Pascal's principle that pressure throughout a closed system is constant. In the Bramah press, pressure exerted on a small-diameter cylinder is transmitted through fluid to a large-diameter cylinder. Because the area of the larger cylinder's piston is greater than that of the smaller cylinder's piston, the force exerted by the large one is greater. Hydraulic presses are capable of great pressure and can cold form metal (shape metal without heat being applied).
- Because the engineering feat of pumping water uphill through the longest pipeline in the world was regarded as so exceptional, Ferguson's factory was inspected by the Duke of York, later King George V, when the Royal yacht called at Fremantle during the Duke's visit to Australia in 1901 to open the first Commonwealth Parliament. Ferguson was apparently injured during this works tour when the heavy cast-iron end of the testing machine fell on his foot, but he continued on, returning to the yacht for refreshments.

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