

Manufacturing joint rings, c1902



Description

This black-and-white photograph shows two men at Mephan Ferguson's pipeworks in Falkirk, a suburb of Perth now known as Maylands. The men are in the process of welding joint rings for joining pipes to be used in the Coolgardie Water Supply pipeline. One man is heating a collar of steel over an open-hearth fire while the other is manipulating a second ring. Both men are using long-handled tongs to hold the collars. The photograph measures 21 cm x 16 cm.

Educational value

- The photograph records one component of the Coolgardie Water Supply pipeline, 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 immediately 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 goldfields 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 the pipeline from the coastal region was finally built at great expense.
- The men shown are working on a connecting piece called a joint ring, or thimble, designed for joining pipe lengths to create the pipeline. To make such rings, flat steel sections supplied by steelworks in England were shaped and welded by a blacksmith and his mate, first hammering each end into a 45-degree-angle wedge before a hydraulic press shaped the steel into a ring.
- The photograph shows the ends being heated in a forge until red hot, when they became malleable, prior to being welded into a continuous ring by a steam



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hammer, shown at front left in the photograph. A 'bulge' was then created on opposite sides of the ring, using heat and pressure, to accommodate the ends of the two locking bars that ran the length of each pipe and held the pipe halves together.

- The men are using long-handled tongs but there is little other evidence of concern for occupational safety, such as gloves. The men are wearing their everyday clothes and no safety glasses or steel-capped boots. The floor is the one concession to safety, although trip hazards are evident. It has deliberately been left as dirt so that burning embers escaping from the fire will quickly be extinguished. Temperatures would have been unbearable during Perth's hot summers in a corrugated iron shed with a fire, yet there is no evidence of any form of cooling.
- The work shown in the photograph is an example of forge welding, a method of joining metals used since ancient times in which two or more pieces of metal are heated until their surfaces are molten and then hammered together. Historically, the hammering would have been done by hand but, by the time these joint rings were being made, a steam-powered hammer had been invented. Forge welds are strong because during forging (heating) the metal's structure changes, making it stronger and more ductile.
- In the days before welding was common, joining pipes in the field required innovation. In the case of the Coolgardie Water Supply pipeline, the pipes and rings were delivered to the pipeline construction sites by rail. The pipes were then laid end to end, pushed as close together as possible and a joint ring fitted around the join between two pipe ends to act as a 'cover plate'. Molten lead was packed into the 6-mm space between the ring and pipe and it solidified to make the joint waterproof. The Coolgardie Water Supply pipeline required 60,000 joint rings.
- The joint ring method of joining the pipes was superseded within a relatively short time of the pipeline's completion in 1903, as the lead joints leaked, resulting in corrosion. In many cases they needed to be cut out, shortening the pipe. After rust-hole leaks near the lead joints increased from 4,185 in 1921 to 9,704 in 1924, the pipeline was overhauled in the 1930s. Pipe lengths were refurbished or replaced (in some sections with wooden pipes) and relaid above ground, with oxywelded joints replacing the caulked joints. Very few joint rings remain, most having been earmarked for scrap metal.

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