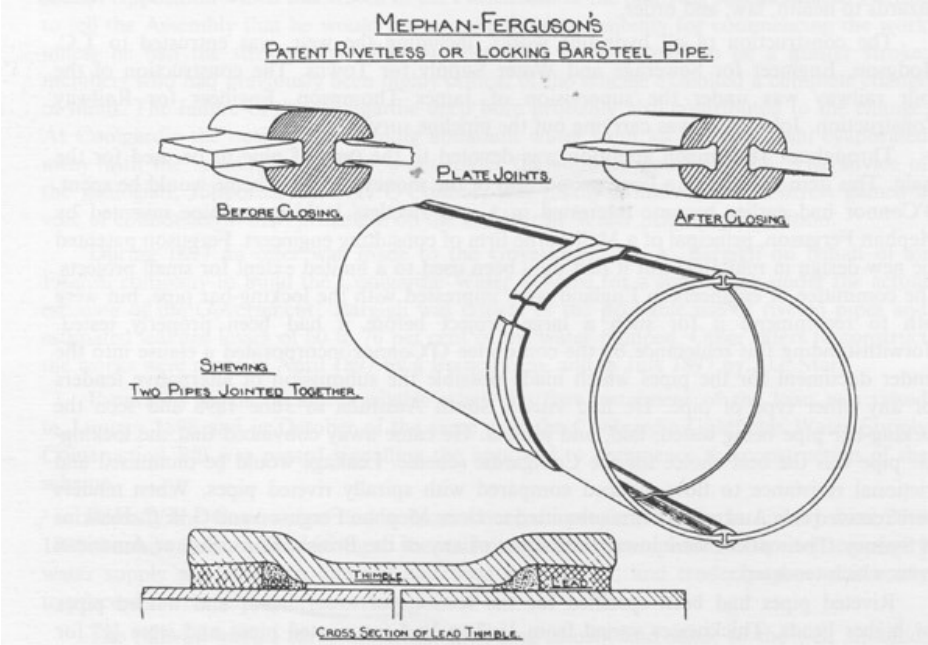
Locking bar steel pipe, 1905



Description

This is a diagram of the type of pipe used to deliver water to Western Australia's arid eastern gold fields. It consists of sketches that illustrate the design of the joint connecting two half-cylinders of steel to make a cylindrical pipe and the joint ring, or thimble, used to join pipe lengths. The text reads 'Mephan-Ferguson's Patent Rivetless or Locking Bar Steel Pipe; Plate Joints, Before Closing, After Closing; Shewing two pipes jointed together; Thimble; Cross Section of Lead Thimble.' The black-and-white image measures 15 cm x 12 cm.

Educational value

- The diagram shows the type of pipes used in the Coolgardie Water Supply Scheme that attracted worldwide attention at the time and that 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 amazingly 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. The gold-mining industry also needed water to develop, but attempts to obtain water from local underground sources and dams proved unsustainable and finally the pipeline from the coastal region was built at great expense.
- The pipes designed to supply water to WA's eastern gold fields were made without rivets, a distinct advantage because riveted pipes have holes punched or drilled for the rivets, and each rivet hole is a potential leak site. A line of rivet holes is an area of weakness that might give way under pressure, and protruding rivet heads slow down the flow of water in the pipe. One engineer calculated that if 5 per cent of the holes in a riveted pipe lost one drop of water each second, the water leaving the storage dam would all be lost before reaching Kalgoorlie, 560 km away.

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GOLD AND WATER

- 'Before' and 'after' cross-sections of the joint illustrate how a longitudinal bar locked the pipe halves together by the long edges of the semicircular half-pipes being inserted into the open 'jaws' on each side of a locking bar. Pressure was then applied to close the jaws around the edges of the plates. Water in the pipe could not force the plates out of the locking bar because the ends of the plates were dove-tailed.
- The sketches illustrate how lengths of pipe were joined by being pushed together and a joint ring, or thimble, placed around the join. The cross-section diagram of the thimble shows how it was made watertight with lead. First rope or yarn made from hemp was pushed into the space between the pipe and the joint ring, and then molten lead, which was absorbed by the rope, was poured into this space. Workers called 'caulkers' used chisel-shaped tools to pack in the lead which, when cooled and solidified, stopped the joints between the pipe lengths from leaking.
- The locking bar pipe was recommended to the WA Government for use in the water supply pipeline by C Y O'Connor, the State's engineer-in-chief 1891-1902, with his recommendation being accepted in October 1898. During that year much thought had gone into which type of pipe to use, with O'Connor favouring the untested locking-bar pipe. In the tender calling for riveted or welded pipes he inserted the clause 'or any other type of pipe'. Two Australian firms, one being Mephan Ferguson's, submitted tenders for locking bar pipes at O'Connor's request.
- The locking bar pipes were made by a revolutionary rivetless clamping mechanism that was inspired by a carpentry joint at a time when welding was in its infancy and rivets were widely used to join seams. The story of the locking bar is told in a biography of its inventor, Mephan Ferguson. The Melbourne engineer was apparently sitting at his desk one night in 1896 when he opened a drawer and saw the dove-tail joints attaching the bottom to the sides. This was said to have inspired him to make a dove-tail joint in steel the next morning. Ferguson patented the joint and started mass production of such pipes.
- Locking bar pipes proved to be very successful both in Australia and overseas, and were manufactured for about 40 years and installed by many water authorities. The inventor, Mephan Ferguson, won tenders for contracts in New Zealand at the same time as the Coolgardie Water Scheme. The machinery for pipemaking was made in Ferguson's Footscray works and shipped to the sites. Once a contract was completed the machinery was shipped elsewhere. Locking bar pipes were also made in India and England.
- From its inception, the ambitious plan to pump water from the coast to WA's eastern gold fields caught the attention of professionals and the interest of the public. Throughout the planning and construction phases, articles and letters appeared regularly in local, national and international newspapers. This diagram appeared in a booklet published in London in 1905, two years after the pipeline's opening.

Creator James Simpson and Co, publisher, 1905

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