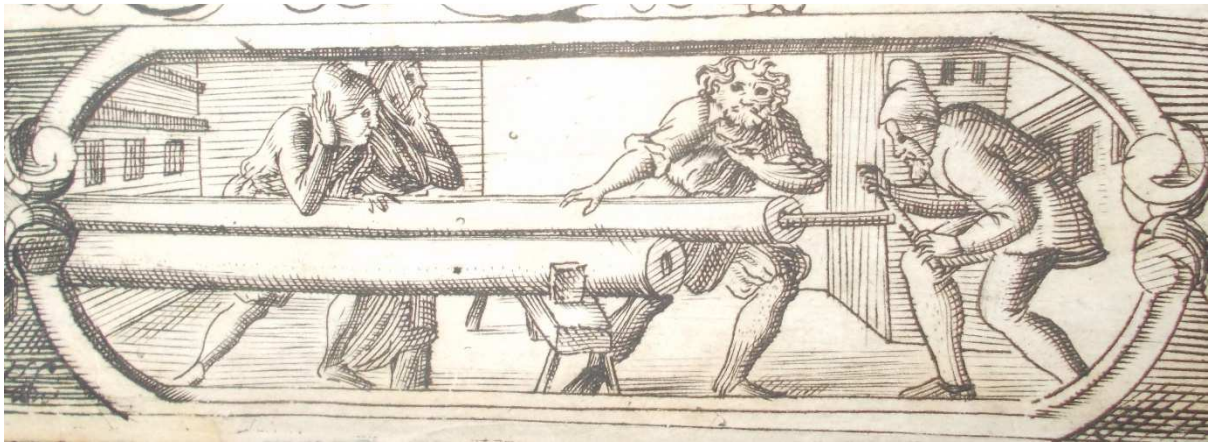
**Discussion on the History of Edinburgh Wooden Water Pipes at Edinburgh College of Art Sculpture Court on 26th January 2019.**

**Contribution by Prof Roland Paxton FRSE**

**Civil Engineer and Engineering Historian**

From at least Roman times until the early 20th century wooden pipes for distributing water were made by boring dressed tree trunks, often Elm, either manually or, in quantity, by water-powered machinery. The use of wooden pipes is referred to by Vitruvius in his *De Architectura*.

An early 17th century illustration of manual pipe boring from Theil's *Theatri Machinarum* is shown below, a method still in use in rural parts of the UK three centuries later [see H.L. Edlin's *Woodland Crafts in Britain.* 1949]



Manual pipe boring from Ander Theil's *Theatri Machinarum*. 1610

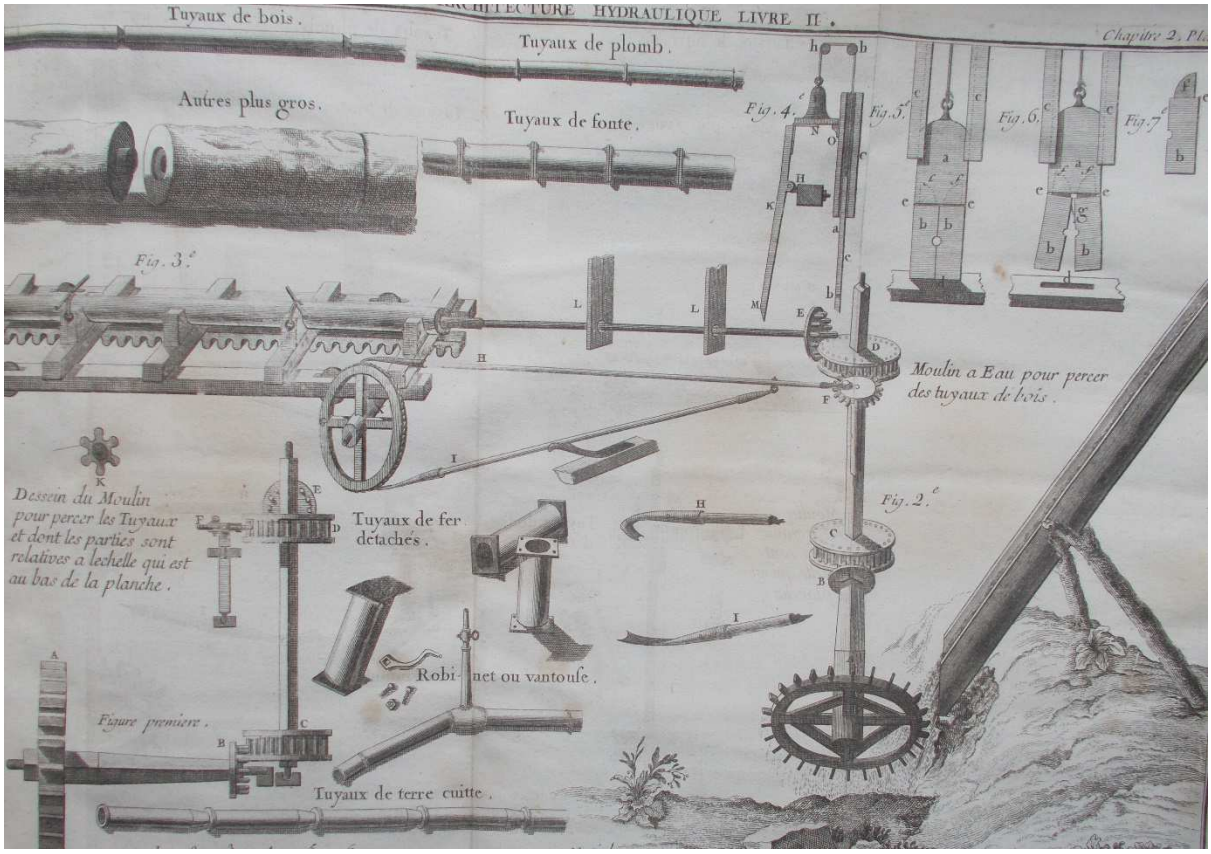

Belidor's portrait in *Architecture Hydraulique*

Belidor's *Architecture Hydraulique* 1737

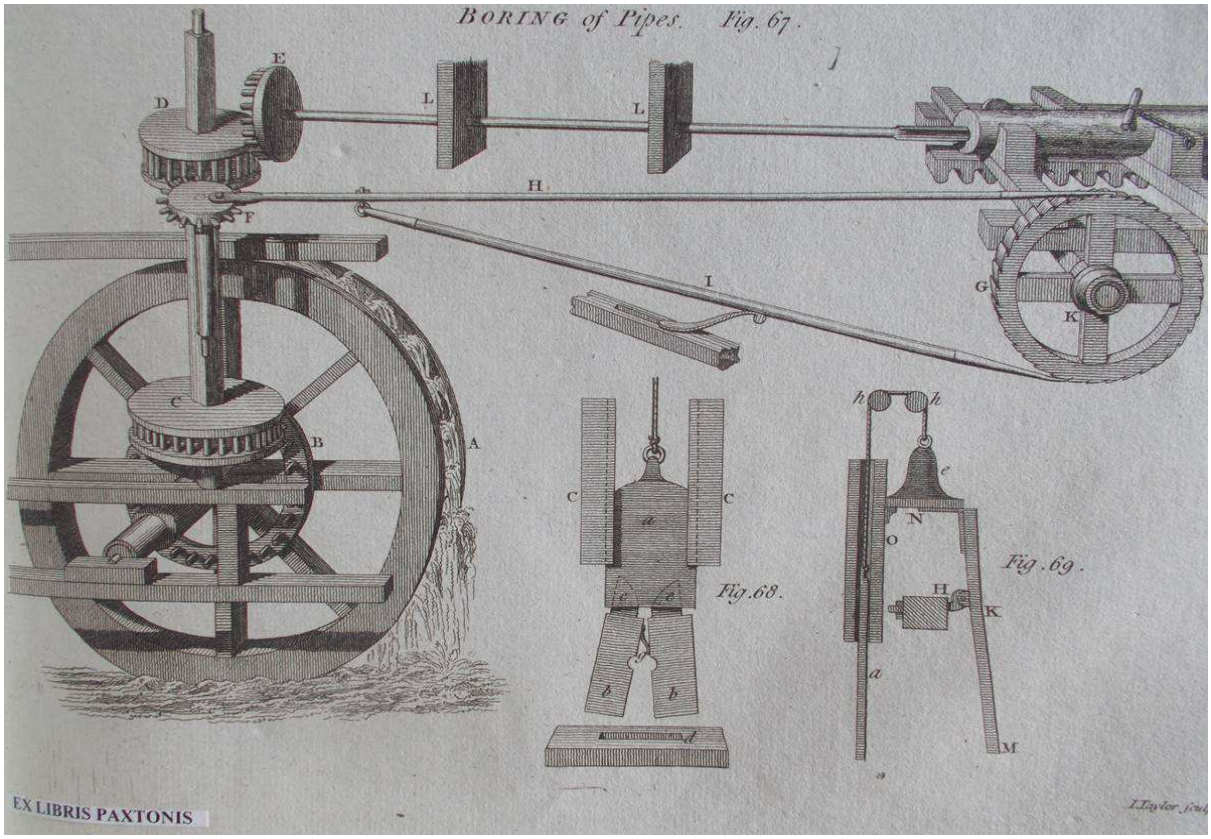
An important 18th century illustrated description of the water-powered mode of pipe boring was provided by leading French engineer, Bernard Belidor, in his engineering classic *Architecture Hydraulique* published from 1737. His book was influential internationally for about a century and in Britain copies found their way to architects, engineers, and other hydraulic practitioners.

Belidor's illustrations shown here are taken from a copy of his work acquired in c.1820 by leading Scottish Civil Engineer Robert Stevenson of Bell Rock Lighthouse fame, founder of the Stevenson dynasty of engineers. The book remained in the firm's library until 1952, where it may have been read in 1868-70 by his famous writer grandson Robert Louis Stevenson when a trainee.

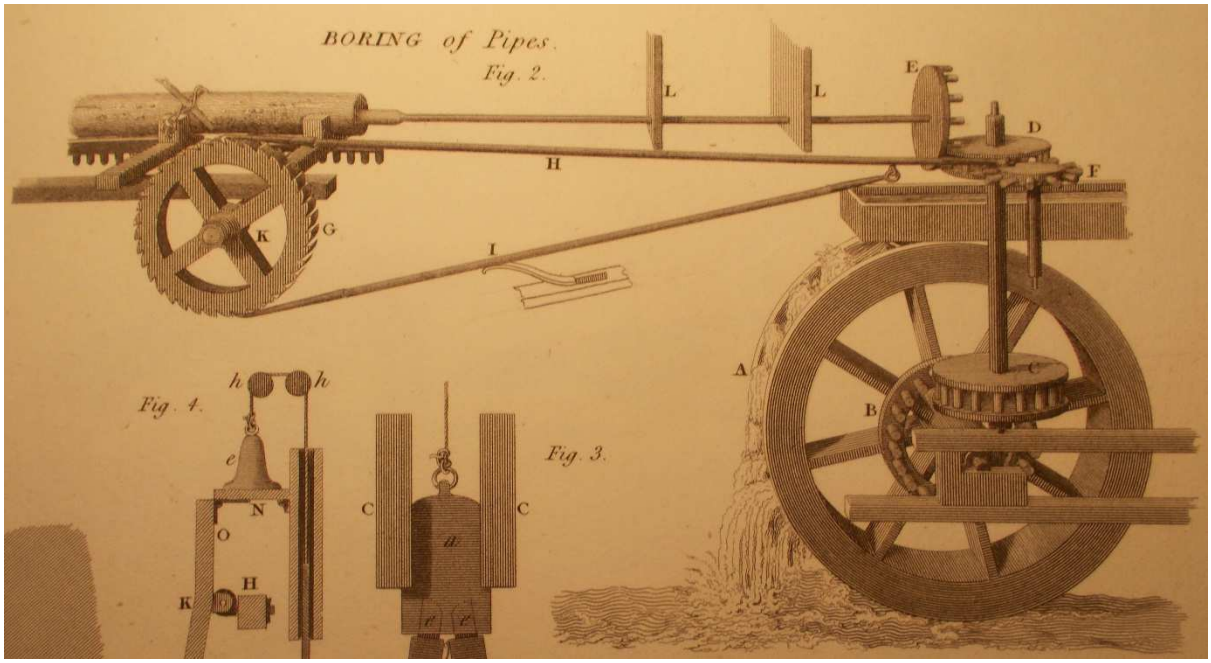
Belidor's pipe boring illustration and, as re-drawn with minor variations in key English encyclopaedias including Chambers' and Rees', covered the years from 1737 to about 1830, including the time when wooden water pipes were used in Edinburgh. The content of these illustrations can be readily understood and compared in the figures below. A minor difference is that Belidor's water-wheel is shown to have a 'breast-fed' water intake and Rees' [and Chambers'] an 'over-shot' intake which would have had greater power for a wheel of the same diameter and width.




Pipe boring from Belidor's *Architecture Hydraulique.* 1737 [vol.1, chap. 2]




Pipe boring from Chambers' *Encyclopaedia* 1789 [Vol V. Mechanics]



Pipe boring from Rees' *Cyclopaedia.* 1819. [Plates Vol 3. Mechanics pl.2]

The pipes recently retrieved from the north side George Square are basically of traditional design, with the possibly innovative use of an iron ring to make each joint more watertight. Wooden water pipes had drawbacks in terms of not being completely impervious, decay, and having joints susceptible to leakage when under pressure, in contrast to the cast iron mains that superseded them. Nevertheless, wooden pipes made a significant contribution to Edinburgh's Water supply for decades and the **Institution of Civil Engineers' Scotland Museum** is delighted to find a home for the specimens below which are being slowly dried out before being displayed to present and future generations.


George Square pipe, iron ring in joint ©Sandra Purves

Wooden pipes from George Square drying out in EGIS Workshop at Heriot Watt University. [L to R] Tom Stenhouse *Technician*, Tom Ferguson *Technical Services Manager* & Roland Paxton ©S.Purves

Professor Roland A Paxton
Institute for Infrastructure and Environment
School of Energy, Geoscience, Infrastructure and Society
Heriot-Watt University Edinburgh EH14 4AS
R.A.Paxton@hw.ac.uk
3rd February 2019