# Rare Astronomical Clock, showing High Tide at London Bridge.

A most rare tidal clock devised by James Ferguson (1710-1776), a driven astronomer and one of the most highly regarded and successful popularisers of natural science in the 18th century. The mechanics are described and illustrated in Ferguson's 1773 compendium *Select Mechanical Exercises: Shewing how to construct different Clocks, Orreries and Sundials.* where he notes it requires "…only two Wheels and a Pinion added to the common Movement". The detail is now available to read online in Encyclopaedia Londinensis for 1811 – see page 332.

This clock is unsigned and dates from the third quarter of the 19th century, but adopts Ferguson's principles.

Bonhams New York last year had an original Ferguson clock (in collaboration with William Dutton) pass through their auction house – click here for details. They give an excellent bibliography of James Ferguson's life and achievements.

Movement

The 8-day timepiece fusee movement has four turned and ringed pillars, and in addition to the usual timepiece gearing structure, has an extra wheel for the moon's aging (see note 1).

Dial

The main dial is a 24-hour time dial.  Nested above this dial is a plate consisting of two disks. The inner disk carries the sun hand, and hence rotates once every 24 hours. This disk is painted with two rings of numerals – the inner ring with 1 to 29½; the age of the moon in days from new moon to new moon again. The outer ring carries the numerals I to XII twice; the sun hand is positioned at the XII for noon.

The upper disk rotates with the daily period of the Moon, 24 hours 50 ½ minutes (note 1). The aperture in the upper dial reveals the numerals on the disk below – setting the pointer of the moon hand to the age of the moon allows a reading of the time of high water at London Bridge on the Roman dial by a separate pointer.

There is a further circular aperture showing the age of the moon age graphically.

Note 1:

There is a systemic inaccuracy inherent in the gearing of the clock. The sun hand (for time) is affixed to a wheel of 57 teeth set on a pinion of 19 teeth which rotates once in 8 hours, so three times every 24 hours. It meshes with a wheel of 59 teeth (also on a pinion of 19 teeth). Therefore the 59 tooth wheel goes around in (8 x 59)/19=24.842105 Hours.

This equates to 24hrs 50.5263mins which is in excess of that required by 0.0263mins/day , or 16 hours per 100 years.

According to tide / moon tables, the reading given today is out by 25½ hours; this cumulative error suggests (very crudely) that the clock dates from c.1860.

The clock is currently undergoing overhaul through our workshops, and is photographed here prior to restoration.