

The earliest known depiction of a double pan beam balance is in the Egyptian Book of the Dead, (Fig. 2),² written on papyrus c.3300BCE, showing the Judges of the Dead weighing a soul. Jackal-headed Anubis weighs the heart of the deceased against a feather, symbol of Maat, the goddess of truth and justice, while Amemait, the hybrid monster lion/hippo/crocodile, waits to devour the heart of the guilty. The deceased was judged guilty if the heart (representing a measure of the soul's truthfulness) was heavier than Maat's feather. This depiction was included in a recent exhibition from the Louvre in The National Gallery in Canberra.

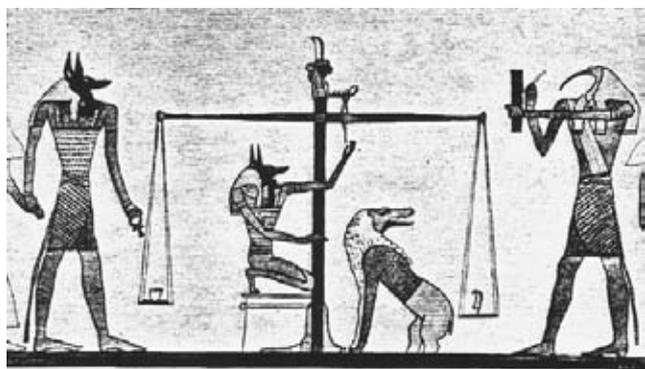


Fig. 2. Detail from the Egyptian 'Book of the Dead'

Also in Egypt, in the 1920s, the British archaeologist Flinders Petrie bought a primitive red limestone balance, (Fig. 3)³ dated to about the same period as the Book of the Dead. Three suspension holes have been drilled, probably with a primitive bow drill and flint point, but there is no pointer of any kind, so equality could only be estimated by checking if the beam appeared level to the eye. Overall, it would not have been very sensitive.

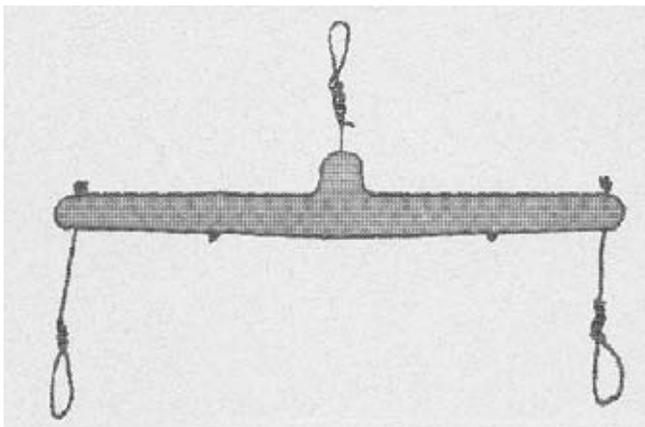


Fig. 3. Sketch of the Egyptian red limestone balance

It is thought that weighing of gold and precious stones encouraged the development of the balance. Gold wasn't used as a medium of exchange before c.1450BCE, though jewellers and goldsmiths would have had to weigh it. A few hundred years after that, it was discovered that natural gold was of variable composition, and could be purified by the use of fire, charcoal and common salt. The fineness, or purity, of the gold could be calculated roughly, but for accurate values and to catch counterfeiters, accurate weighing was required.

The important features of an assay balance, in fact of most beam balances, can be seen in the model 9 Oertling (Fig. 1). Polished mahogany is usual for the cabinets, brass for beam and columns, and, in this model, the tiny pans are silver, though they can be brass, aluminium, even copper coated with platinum, or gold in some of the very old balances. Pan suspension may be of brass, (rod, chain, or links); cord, (hemp, cotton, or silk); German silver; or even platinum chain. The double rider carrier above the beam on the model 9 is used to transfer a tiny extra weight (rider), usually 1mg, along the beam without opening the case, thus preventing the ingress of air currents, and possible changes of temperature, which would upset the equilibrium of the balance.

There is usually important information marked under the drawers. In this case, on the base of the left drawer, in pencil, are 20772 and L3; while on the base of the right drawer are 'S' and 25/11/96. The serial number 6108 is on the left side of the base of the pillar column. The '3' means that this was the third model 9 cabinet made in this batch, (a batch was usually less than six), and the 'S' the initial of the cabinet maker, whose identity is not known at the time of writing. However, from the Oertling archives which are held at the Avery Museum, in Birmingham, we also learn that balance #6108 was made by the balance mechanician Hodges, on 16.11. [18]96, and the works number 20772 is for late 1896, so all the data fits together. The beam on this balance, 20cm/8", is very light and delicate, as will be discussed later. The pans are suspended by agate knife-edges on agate planes, and the central bearing is also agate. There is a long thin pointer in front of the scale, and a knob at the front for release and arrestment of the pans.