Early History of the Inclination Balance Part 1

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The inclination balance is one of the most successful devices in the history of scales, and is classified in the great group of lever balances. It is known by various names, including pendulum balance, quadrant scale, angle scale, bent-lever balance or pointer scale. Even today, when the use of the 'electronic balance' (based on weight compensation determined by electro-magnetic forces) is growing more and more, the use of the inclination balance is as widely used as ever - for example in the commonly used letter scale, Fig 1.

FIG 1.

The most noticeable component of the inclination balance is the swinging graduated arc, on which the result of weighing is indicated by a pointer when it comes to rest, Fig 2. Alternatively, the result of weighing may be determined by the 'deflection method'†, as on very sensitive balances of the equal-arm type, such as the classical un-damped model of the precision or analytical type. On this type of balance a long pointer sweeps across a fixed arc. In principle, it is the same, whether the arc is fixed and the pointer moves, or if the arc is a moving component of the scale, and the pointer is fixed.

The equalisation of the inclination balance is achieved by raising a mass attached to the other lever arm, until the torques* are compensated, or balanced. Thus, the beam of the inclination balance rotates through an angle, the value of which is a measure of the acting force of weight. From this angle, the mass is determined (Ref.1). This is contrary to the 'balance with separate weights', which uses the torque of the weights to equalise the torque of the load placed on the pan of the other lever arm.

* Torque = rotating force. †See page 589.

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Abstract

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