

Fig. 10. The 1935 Sartorius

The model 9 uses an external rider control to position the 1mg rider at any desired position along the beam, but the case still had to be opened to add large weights, thus running the risk of air currents and temperature differences affecting equilibrium. It is not certain who invented the rider, but at the Great Exhibition of 1851, L. Oertling received a Council Award, the highest award, for his balance ‘with graduated beam and sliding apparatus’.

A clever mechanism to avoid opening the case to add weights was a feature of the ‘Chain-o-matic’ balance, the design patented by the American Christopher Becker in about 1915, although the initial invention was by a Frenchman, Serrin, in 1890¹⁰. An example of a Chain-o-Matic is the 1951 model 101 Oertling shown in Figure 11, which belongs to Warren Hewertson, a member of this Association. This balance does use a rider, but it also uses a fine chain for addition of mg weights. One end of the chain is attached to the beam, the other to a vernier carriage (which means readings to 0.1mg are possible), travelling on a vertical graduated column, operated from outside the case. The turning force of the weight of the chain increases as the carriage is lowered, so the scale is numbered from top to bottom.

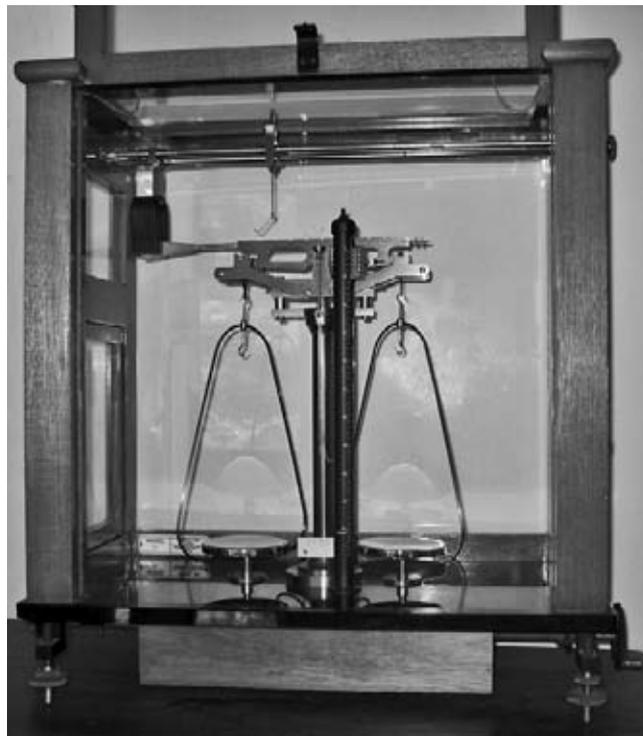


Fig. 11. The 1951 Oertling model 101 Chain-o-Matic

The problem of shortening the waiting time till the balance beam stopped swinging was tackled in various ways, one being to attach a piston with cylinder pot to each end of the beam – these are the damping cylinders seen on the Sartorius in Figure 10. Another method was to use magnetic damping, seen in the model 101 (Fig. 11).

Additions and refinements to beam balances continued to be made for some hundreds of years, culminating in superbly accurate instruments which were also beautiful examples of the craftsman’s art. Then, heralding the end of beam balances as laboratory instruments, came the single pan balances as laboratory instruments, similar to the one shown in Figure 12.

These were first seen in Melbourne in about 1946, and arrived in the second year chemistry laboratory at Melbourne University in 1959, just when I’d spent £20 on my own set of weights from Selby’s. (These weights are now part of the Monash Collection.) After the advent of single pan balances, weighing became faster and easier, but in undergraduate laboratories at least, probably no more accurate. 🏠