Last updated on March 11, 2017

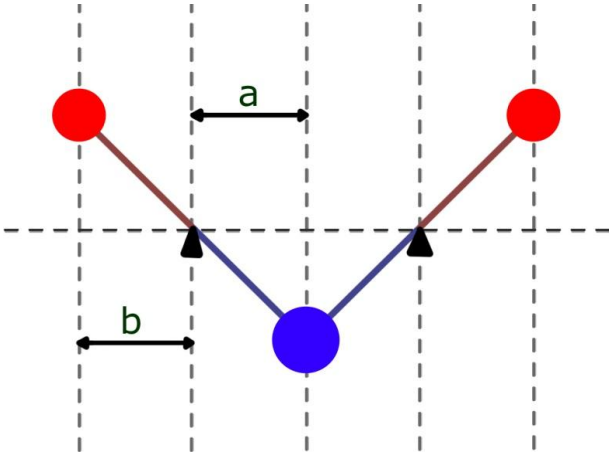
Design described below is different from the actual prototype shown on www.sentally.com and photo, it is harder to produce but much more efficient.

Compound Leverage

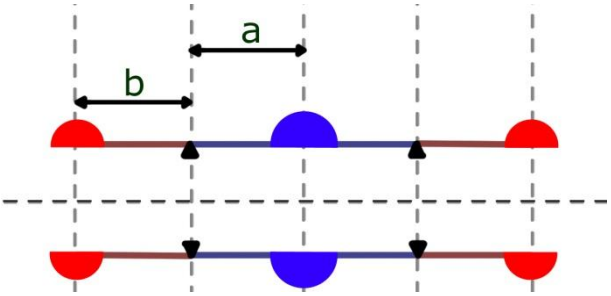
Compound Leverage is lifting middle parts also; leverage ratio is changing during its upward move. Let's look at the sketches. Here you can see blue circle representing the balance red circles represent counterbalances. We assume that weight of one blue circle is equal to two red ones. Black triangles stand for fulcrums.

Length of the blue leverage is equal to the length of brown leverage or **a = b**. Hence the system is in equilibrium and not moving at all.

Front View

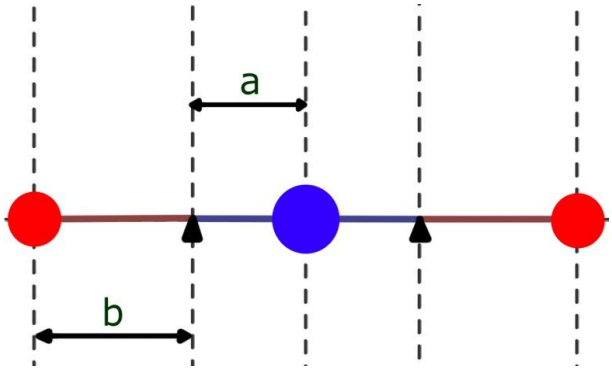


Top View

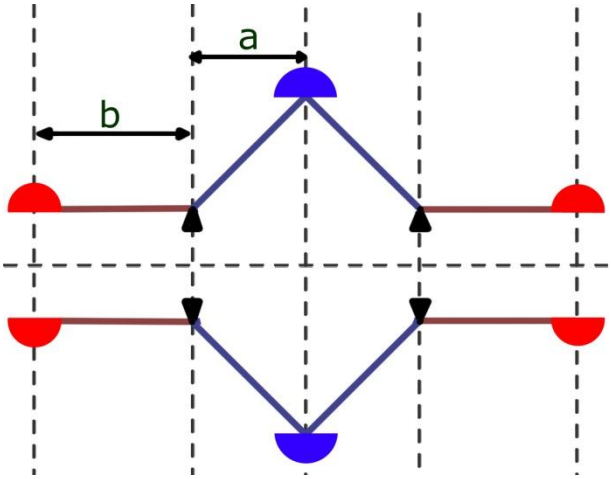


Some mysterious force (explained below) pushed the balance upwards the system lost its equilibrium and as you can see on the sketches below **a < b** resulting the balance moving farther upwards until the system reached its equilibrium.

Front View

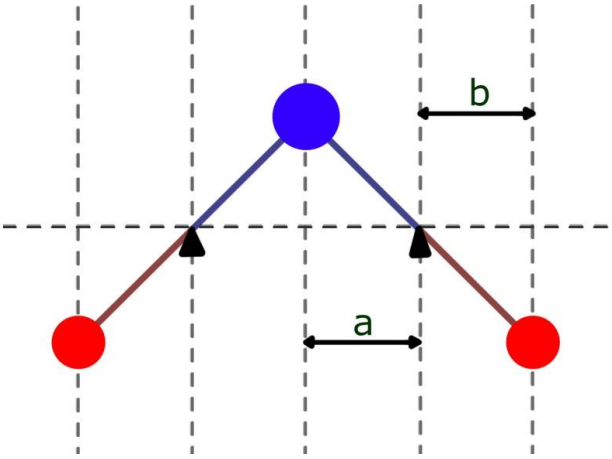


Top View

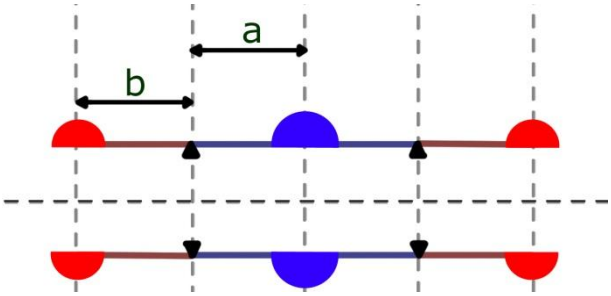


The balance ascends until its uppermost position, **a = b** again.

Front View



Top View



To repeat the move we need to flip the system so balance comes to its low position. Doing this does not require considerable work because the system in its equilibrium relative to horizontal (rotation) axis.

Modifications made to the middle piece or balance (picture below)

The balance is made in form of two bars with misplaced COM, lightest end of each bar attached to the frame; the heaviest side is sliding on leverage, represented by black crosses. When the bars in their horizontal positions the maximal weight applied on the leverage, when the bars are close to vertical upward or vertical downward position the weight placed on leverage approaches nil. This is one way to cause already mentioned “mysterious force” allowing the balance to move upwards from its equilibrium.

This modification of the balance makes possible to shift system COM upwards from its rotational axis. You already know what happens as a result - the system flips as soon as balance reaches its uppermost point.

Side View of the Compound Leverage