

The system
may be
turned about
it.

44. If this point—the centre of parallel forces—in a given system be rigidly connected with the system and supported or fixed, the system will be kept at rest, and will remain so when the forces are turned about their points of action into any other direction. It will also still be at rest if it be turned about this point into any other position, the forces acting always at the same points of the system and being always parallel to each other, though their directions may be varied at pleasure.

The pressure supported by this fixed centre is evidently the algebraic sum of the forces, and the algebraic sum of their moments about any line through this point vanishes.

45. *The Centre of Gravity.*

Centre of
Gravity.

When the only forces acting on a system are the weights of the several particles of that system, if we suppose the vertically-downward directions in which these weights act to be parallel to each other, and the weight of any particle to be independent of its position; then, since the forces all act in the same direction, they have a single Resultant which is equal to their sum, that is, to the weight of the whole system, and acts vertically downwards through the *centre of parallel forces*, which is in this case called the *centre of gravity*.

Whole
weight may
be collected
at:

46. The statical effect, therefore, of any rigid system will not be altered by supposing it to be without weight, and the whole weight to be collected at its centre of gravity and there to act—this point, however, being rigidly connected with the system.

We may also, without alteration of the statical effect, conceive the system to be geometrically divided into any number of systems, and the weight of each of these to be collected at its own centre of gravity and there act, these partial centres of gravity being rigidly connected with each other and the system.