concluded that they do not actually touch, but are kept asunder at determinate distances from each other, by the constant action of the two forces of attraction and repulsion, which are supposed to balance and counteract each other at the ordinary distances of the particles, but to prevail, the one or the other, according as they are forcibly urged together or pulled asunder.

(242.) In solids, however, the case is very different. The mutual free motion of their parts *inter se* is powerfully impeded, and in some almost destroyed. In some a slow and gradual change of figure may be produced to a great extent, by pressure or blows, as, for instance, in the metals, clay, butter, &c.; in others, fracture is the consequence of any attempt to change the figure by violence beyond a certain very small limit. In solids, then, it is evident, that the consideration of their intimate structure has a very great influence in modifying the general results of the action of such attractive and repulsive forces as may be assumed to account for the phenomena they present; yet the general facts that their parts *cohere* with a certain energy, and that they resist displacement or intrusion on the part of other bodies, are sufficient to demonstrate at least the existence of such forces, whatever obscurity may subsist as to their mode of action.

(243.) This division of bodies into airs, liquids, and solids, gives rise, then, to three distinct branches of mechanical science, in each of which the general principles of equilibrium and motion have their peculiar mode of application; viz. pneumatics, hydrostatics, and what might, without impropriety, be termed stereostatics.

Pneumatics.

(244.) Pneumatics relates to the equilibrium or movements of aërial fluids under all circumstances of pressure, density, and elasticity. The weight of the air, and its pressure on all the bodies on the earth's surface, were quite unknown to the ancients, and only first perceived by Galileo, on the occasion of a sucking-pump refusing