

CHAPTER IV.

DISCOVERY OF THE MECHANICAL PRINCIPLES OF FLUIDS.

Sect. 1.—Rediscovery of the Laws of Equilibrium of Fluids.

WE have already said, that the true laws of the equilibrium of fluids were discovered by Archimedes, and rediscovered by Galileo and Stevinus; the intermediate time having been occupied by a vagueness and confusion of thought on physical subjects, which made it impossible for men to retain such clear views as Archimedes had disclosed. Stevinus must be considered as the earliest of the authors of this rediscovery; for his work (*Principles of Statik and Hydrostatik*) was published in Dutch about 1585; and in this, his views are perfectly distinct and correct. He restates the doctrines of Archimedes, and shows that, as a consequence of them, it follows that the pressure of a fluid on the bottom of a vessel may be much greater than the weight of the fluid itself: this he proves, by imagining some of the upper portions of the vessel to be filled with fixed solid bodies, which take the place of the fluid, and yet do not alter the pressure on the base. He also shows what will be the pressure on any portion of a base in an oblique position; and hence, by certain mathematical artifices which make an approach to the Infinitesimal Calculus, he finds the whole pressure on the base in such cases. This mode of treating the subject would take in a large portion of our elementary Hydrostatics as the science now stands. Galileo saw the properties of fluids no less clearly, and explained them very distinctly, in 1612, in his *Discourse on Floating Bodies*. It had been maintained by the Aristotelians, that *form* was the cause of bodies floating; and collaterally, that ice was *condensed* water; apparently from a confusion of thought between *rigidity* and *density*. Galileo asserted, on the contrary, that ice is *rarefied* water, as appears by its floating: and in support of this, he proved, by various experiments, that the floating of bodies does not depend on their form. The happy genius of Galileo is the more remarkable in this case, as the controversy was a good deal perplexed by the mixture of phenomena of another kind, due to what is usually called *capillary* or *molecular attraction*. Thus it is a fact, that a *ball*