

ADDITIONS TO THE THIRD EDITION.

BOOK VIII.

ACOUSTICS.

CHAPTER III.

SOUND.

The Velocity of Sound in Water.

THE Science of which the history is narrated in this Book has for its objects, the minute Vibrations of the parts of bodies such as those by which Sounds are produced, and the properties of Sounds. The Vibrations of bodies are the result of a certain tension of their structure which we term *Elasticity*. The Elasticity determines the rate of Vibration : the rate of Vibration determines the audible note : the Elasticity determines also the velocity with which the vibration travels through the substance. These points of the subject, Elasticity, Rate of Vibration, Velocity of Propagation, Audible Note, are connected in each substance, and are different in different substances.

In the history of this Science, considered as tending to a satisfactory general theory, the Problems which have obviously offered themselves were, to explain the properties of Sounds by the relations of their constituent vibrations ; and to explain the existence of vibrations by the elasticity of the substances in which they occurred : as in Optics, philosophers have explained the phenomenon of light and colors by the Undulatory Theory, and are still engaged in explaining the requisite modulations by means of the elasticity of the Ether. But the *Undulatory Theory of Sound* was seen to be true at an early period of the Science : and the explanation, in a general way at least, of all kinds of such undulations by means of the elasticity of the vibrating substances has been performed by a series of mathematicians of whom I have given an account in this Book. Hence the points of the subject already mentioned (Elasticity, Vibrations and their Propagations,