

rian curve; so that, for the ends of physical philosophy, the solution was not very incomplete.

John Bernoulli, a few years afterwards,⁷ solved the problem of vibrating chords on nearly the same principles and suppositions as Taylor; but a little later (in 1747), the next generation of great mathematicians, D'Alembert, Euler, and Daniel Bernoulli, applied the increased powers of analysis to give generality to the mode of treating this question; and especially the calculus of partial differentials, invented for this purpose. But at this epoch, the discussion, so far as it bore on physics, belonged rather to the history of another problem, which comes under our notice hereafter, that of the composition of vibrations; we shall, therefore, defer the further history of the problem of vibrating strings, till we have to consider it in connexion with new experimental facts.

CHAPTER III.

PROBLEM OF THE PROPAGATION OF SOUND.

WE have seen that the ancient philosophers, for the most part, held that sound was transmitted, as well as produced, by some motion of the air, without defining what kind of motion this was; that some writers, however, applied to it a very happy similitude, the expansive motion of the circular waves produced by throwing a stone into still water; but that notwithstanding, some rejected this mode of conception, as, for instance, Bacon, who ascribed the transmission of sound to certain "spiritual species."

Though it was an obvious thought to ascribe the motion of sound to some motion of air; to conceive what kind of motion could and did produce this effect, must have been a matter of grave perplexity at the time of which we are speaking; and is far from easy to most persons even now. We may judge of the difficulty of forming this conception, when we recollect that John Bernoulli the younger¹ declared, that he could not understand Newton's proposition on this subject. The difficulty consists in this; that the movement of the parts of air, in which sound consists, travels along, but that the parts

⁷ *Op. iii.* p. 207.

¹ *Prize Dis. on Light*, 1736.