CHAPTER III.

Earliest Stages of Harmonics.

AMONG the ancients, the science of Music was an application of Arithmetic, as Optics and Mechanics were of Geometry. The story which is told concerning the origin of their arithmetical music, is the following, as it stands in the Arithmetical Treatise of Nicomachus.

Pythagoras, walking one day, meditating on the means of measuring musical notes, happened to pass near a blacksmith's shop, and had his attention arrested by hearing the hammers, as they struck the anvil, produce the sounds which had a musical relation to each other. On listening further, he found that the intervals were a Fourth, a Fifth, and an Octave; and on weighing the hammers, it appeared that the one which gave the Octave was *one-half* the heaviest, the one which gave the Fifth was *two-thirds*, and the one which gave the Fourth was *three-quarters*. He returned home, reflected upon this phenomenon, made trials, and finally discovered, that if he stretched musical strings of equal lengths, by weights which have the proportion of one-half, two-thirds, and three-fourths, they produced intervals which were an Octave, a Fifth, and a Fourth. This observation gave an arithmetical measure of the principal Musical Intervals, and made Music an arithmetical subject of speculation.

This story, if not entirely a philosophical fable, is undoubtedly inaccurate; for the musical intervals thus spoken of would not be produced by striking with hammers of the weights there stated. But it is true that the notes of strings have a definite relation to the forces which stretch them; and this truth is still the groundwork of the theory of musical concords and discords.

Nicomachus says that Pythagoras found the weights to be, as I have mentioned, in the proportion of 12, 6, 8, 9; and the intervals, an Octave, corresponding to the proportion 12 to 6, or 2 to 1; a Fifth, corresponding to the proportion 12 to 8, or 3 to 2; and a Fourth, corresponding to the proportion 12 to 9, or 4 to 3. There is no doubt that this statement of the ancient writer is inexact as to the physical fact, for the rate of vibration of a string, on which its note depends, is,