

BOOK VI.

MECHANICS.

CHAPTER III.

PRINCIPLES AND PROBLEMS.

Significance of Analytical Mechanics.

IN the text, page 372, I have stated that Lagrange, near the end of his life, expressed his sorrow that the methods of approximation employed in Physical Astronomy rested on arbitrary processes, and not on any insight into the results of mechanical action. From the recent biography of Gauss, the greatest physical mathematician of modern times, we learn that he congratulated himself on having escaped this error. He remarked¹ that many of the most celebrated mathematicians, Euler very often, Lagrange sometimes, had trusted too much to the symbolical calculation of their problems, and would not have been able to give an account of the meaning of each successive step of their investigation. He said that he himself, on the other hand, could assert that at every step which he took, he always had the aim and purpose of his operations before his eyes without ever turning aside from the way. The same, he remarked, might be said of Newton.

Engineering Mechanics.

The principles of the science of Mechanics were discovered by observations made upon bodies within the reach of men; as we have seen in speaking of the discoveries of Stevinus, Galileo, and others, up to the time of Newton. And when there arose the controversy about *vis viva* (Chap. v. Sect. 2 of this Book);—namely, whether the “living force” of a body is measured by the product of the weight into the

¹ Gauss, *Zum Gedächtniss, von W. Sartorius v. Waltershausen*, p. 80.