

CHAPTER II.

INDUCTIVE EPOCH OF GALILEO.—DISCOVERY OF THE LAWS OF MOTION IN SIMPLE CASES.

Sect. 1.—Establishment of the First Law of Motion.

AFTER mathematicians had begun to doubt or reject the authority of Aristotle, they were still some time in coming to the conclusion, that the distinction of Natural and Violent Motions was altogether untenable;—that the velocity of a body in motion increased or diminished in consequence of the action of extrinsic causes, not of any property of the motion itself;—and that the apparently universal fact, of bodies growing slower and slower, as if by their own disposition, till they finally stopped, from which Motions had been called Violent, arose from the action of external obstacles not immediately obvious, as the friction and the resistance of the air when a ball runs on the ground, and the action of gravity, when it is thrown upwards. But the truth to which they were at last led, was, that such causes would account for *all* the diminution of velocity which bodies experience when apparently left to themselves; and that without such causes, the motion of all bodies would go on forever, in a straight line and with a uniform velocity.

Who first announced this Law in a general form, it may be difficult to point out; its exact or approximate truth was necessarily taken for granted in all complete investigations on the subject of the laws of motion of falling bodies, and of bodies projected so as to describe curves. In Galileo's first attempt to solve the problem of falling bodies, he did not carry his analysis back to the notion of force, and therefore this law does not appear. In 1604 he had an erroneous opinion on this subject; and we do not know when he was led to the true doctrine which he published in his *Discorso*, in 1638. In his third Dialogue he gives the instance of water in a vessel, for the purpose of showing that circular motion has a tendency to continue. And in his first Dialogue on the Copernican System¹ (published in 1630), he asserts

¹ Dial. 1. p. 40.