The Law of Velocity was hitherto, as we have seen, treated as a law of phenomena, without reference to the Causes of the law. "The cause of the acceleration of the motions of falling bodies is not," Galileo observes, "a necessary part of the investigation. Opinions are different. Some refer it to the approach to the centre; others say that there is a certain extension of the centrical medium, which, closing behind the body, pushes it forwards. For the present, it is enough for us to demonstrate certain properties of Accelerated Motion, the acceleration being according to the very simple Law, that the Velocity is proportional to the Time. And if we find that the properties of such motion are verified by the motions of bodies descending freely, we may suppose that the assumption agrees with the laws of bodies falling freely by the action of gravity."[8]

It was, however, an easy step to conceive this acceleration as caused by the continual action of Gravity. This account had already been given by Benedetti, as we have seen. When it was once adopted, Gravity was considered as a *constant* or *uniform* force; on this point, indeed, the adherents of the law of Galileo and of that of Casræus were agreed; but the question was, what *is* a Uniform Force? The answer which Galileo was led to give was obviously this;—*that* is a Uniform Force which generates equal velocities in equal successive times; and this principle leads at once to the doctrine, that Forces are to be compared by comparing the Velocities generated by them in equal times.

Though, however, this was a consequence of the rule by which Gravity is represented as a Uniform Force, the subject presents some difficulty at first sight. It is not immediately obvious that we may thus measure forces by the Velocity *added* in a given time, without taking into account the velocity they have already. If we communicate velocity to a body by the hand or by a spring, the effect we produce in a second of time is lessened, when the body has already a velocity which withdraws it from the pressure of the agent. But it appears that this is not so in the case of gravity; the velocity added in one second is the same, whatever downward motion the body already possesses. A body falling from rest acquires a velocity, in one second, of thirty-two feet; and if a cannon-ball were shot downwards with a velocity of 1000 feet a second, it would equally, at the end of one second, have received an accession of 32 feet to its velocity.

This conception of Gravity as a Uniform Force,—as constantly and

[8] Gal. *Op.* iii. 91, 92.