Weights and Powers hypothetical motions, arising from some other cause; and then, by the construction of the machine, the velocities of the Weights and Powers must have certain definite ratios. These velocities, being thus hypothetically supposed and not actually produced, are called *Virtual* Velocities. And the general law of equilibrium is, that in any machine, the Weights which balance each other, are reciprocally to each other as their Virtual Velocities. This is called the *Principle of Virtual Velocities.*

This Principle (which was afterwards still further generalized) is, by some of the admirers of Galileo, dwelt upon as one of his great services to Mechanics. But if we examine it more nearly, we shall see that it has not much importance in our history. It is a generalization, but a generalization established rather by enumeration of cases, than by any induction proceeding upon one distinct Idea, like those generalizations of Facts by which Laws are primarily established. It rather serves verbally to conjoin Laws previously known, than to exhibit a connection in them: it is rather a help for the memory than a proof for the reason.

The Principle of Virtual Velocities is so far from implying any clear possession of mechanical ideas, that any one who knows the property of the Lever, whether he is capable of seeing the reason for it or not, can see that the greater weight moves slower in the exact proportion of its greater magnitude. Accordingly, Aristotle, whose entire want of sound mechanical views we have shown, has yet noticed this truth. When Galileo treats of it, instead of offering any reasons which could independently establish this principle, he gives his readers a number of analogies and illustrations, many of them very loose ones. Thus the raising a great weight by a small force, he illustrates by supposing the weight broken into many small parts, and conceiving those parts raised one by one. By other persons, the analogy, already intimated, of gain and loss is referred to as an argument for the principle in question. Such images may please the fancy, but they cannot be accepted as mechanical reasons.

Since Galileo neither first enunciated this rule, nor ever proved it as an independent principle of Mechanics, we cannot consider the discovery of it as one of his mechanical achievements. Still less can we compare his reference to this principle with Stevinus's proof of the Inclined Plane; which, as we have seen, was rigorously inferred from the sound axiom, that a body cannot put itself in motion. If we were to assent to the really self-evident axioms of Stevinus, only in virtue