the use of the crank, as has been proved above, conclusively. We hope to be able to ascertain the amount of loss arising from other causes, particularly from the reaction of the waste steam, and may at some future period offer formulas which will very nearly agree with practice.

It remains yet to account for the loss of useful effect attending the use of the crank, or the change from a straight to a rotary motion, generally.

It appears that the law of virtual velocities is only applicable to analagous motions, with respect to actual and useful effect. Rotary motions and straight motions differ in their nature totally; they cannot be compared directly by that law.

The philosophical principle—*what matter is in existence cannot be lost, nor destroyed, but can only be changed in form and space*,—appears to be a grand universal law, rendering the existence of the Universe itself, permanent, and independent of time.

This principle, the truth of which will force itself upon the mind, by a concatenation of rigid deductions, must hold out in all cases, and therefore also in the case before us, where matter is brought into action to produce a mechanical effect. The laws of mechanics cannot be in contradiction to an universal law.

If therefore we cannot account for the loss of power in any way, we have strong reasons to doubt the accuracy of a demonstration which is to prove that loss of power.

On the other hand, no law has been established yet, to prove that the whole amount of power applied, can be made available for all purposes for which we want it, leaving of course friction out of view, and other circumstantial causes of loss.

In the case before us, let us suppose the tangential pressure *k i*, (see diagram,) is applied to the crank. If the impulse which the point *i* receives in consequence of that pressure, was allowed to be developed for any *actual extent* of space, in the line of the tangent, which is the direction of the impulse, we would be authorised to compare the quadrant to a succession of inclined planes, and we could prove *no loss* of power. But the impulse which is ready to act in the point *i*, is not allowed to develope itself in the direction of its natural tendency for any actual extent of space, *without being checked.* And since an inclined plane coincides with a straight line, and a straight line is the result of a point moving through an *actual extent* of space, in a straight course, it follows, conclusively, that we cannot compare the circumference of the quadrant with a succession of inclined planes.

We have made these remarks, in order to object to any demonstration which treats the circumference of the quadrant as a succession of inclined planes.

The impulse of the crank, with relation to the centre, can therefore only be considered for single mathematical points in the circumference, as *k i*, without even allowing an initial extent for the display of the tangential forces.