is also difficult to assign the rate even of this general uniform motion. We may, however, say, that it will not be greater than if it were uniform throughout. Were it entirely free from friction, it would be exactly the same as if uniform; because the accelerations during the advantageous situations of the impelling power would compensate the retardations. But friction diminishes the accelerations, without diminishing the retardations.

We may conclude this article with some observations tending to the general improvement of machines.

109. Nothing contributes more to the perfection of a machine, especially such as is massive and ponderous, than great uniformity of motion. Every irregularity of motion wastes some of the impelling power; and it is only the greatest of the varying velocities which is equal to that which the machine would acquire if moving uniformly throughout; for, while the motion accelerates, the impelling force is greater than what balances the resistance then actually opposed to it, and the velocity is less than what the machine would acquire if moving uniformly; and when the machine attains its greatest velocity, it attains it because the power is then not acting against the whole resistance. In both of these situations, therefore, the performance of the machine is less than if the power and resistance were exactly balanced; in which case it would move uniformly.

110. Every attention should, therefore, be given to this, and we should endeavour to remove all cause of irregularity. The communications of motion should be so contrived, that if the impelled point be moving uniformly, by the uniform pressure of the power, the working-point shall also be moving uniformly. Then we may generally be certain, that the massy parts of the machine will be moving uniformly. When this is not done through the whole machine, there are continual returns of strains and jolts; the inertia of the different parts acting in opposite directions. Although the