

wheel with that velocity with which the wheel is really moving. And as we cannot give the direction of a tangent to the wheel, the velocity with which it is delivered on the wheel must be so much greater than the intended velocity of the rim, that it shall be precisely equal to it when it is estimated in the direction of the tangent. Three or four inches of fall are sufficient for this purpose; and it should never be neglected, for it has a very sensible influence on the performance. But it is highly improper to give it more than this, with the view of impelling the wheel by its stroke. For even although it were proper to employ part of the fall in this way (which we shall presently see to be very improper), we cannot procure this impulse; because the water falls among other water, or it strikes the boards of the wheel with such obliquity that it cannot produce any sensible effect.

It is a much-debated question among mill-wrights, Whether the diameter of the wheel should be such as that the water will be delivered at the top of the wheel; or larger, so that the water is received at some distance from the top, where it will act more perpendicularly to the arm? We apprehend that the observations formerly made will decide in favour of the first practice. The space below, where the water is discharged from the wheel, being proportional to the diameter of the wheel, there is an undoubted loss of fall attending a large wheel; and this is not compensated by delivering the water at a greater distance from the perpendicular. We should therefore recommend the use of the whole descending side, and make the diameter of the wheel no greater than the fall, till it is so much reduced that the centrifugal force begins to produce a sensible effect. Since the rim can hardly have a smaller velocity than three feet *per second*, it is evident that a small wheel must revolve more rapidly. This made it proper to insert the determination that we have given, of the loss of power produced by the centrifugal force. But even with this in view, we should