pended; that is, that three cubic feet of water descending from any height, will raise two to the same height.

It is not very easy to compare these deductions with observations on large works; because there are few cases where we have good measures of the resistances opposed by the work performed by the machine. Mills employed for pumping water afford the best opportunities. But the inertia of their working gear diminishes their useful performance very sensibly; because their great beams, pump-rods, &c. have a reciprocating motion, which must be destroyed, and produced anew in every stroke. We have examined some machines of this kind which are esteemed good ones; and we find few of them whose performance exceeds one-half of the power expended.

By comparing other mills with these, we get the best information of their resistances. The comparison with mills worked by Watt and Boulton's steam-engines is perhaps a better measure of the resistances opposed by different kinds of work, because their power is very distinctly known. We have been informed by one of the most eminent engineers, that a ton and half of water *per* minute falling one foot will grind and dress one bushel of wheat *per* hour. This is equivalent to 9 tons falling 10 feet.

If an overshot wheel opposed no resistance, and only one bucket were filled, the wheel would acquire the velocity due to a fall through the whole height. But when it is in this state of accelerated motion, if another bucket of water is delivered into it, its motion must be checked at the first, by the necessity of dragging forward this water. If the buckets fill in succession as they pass the spout, the velocity acquired by an unresisting wheel is but half of that which one bucket would give. In all cases, therefore, the velocity is diminished by the inertia of the entering water when it is simply laid into the upper buckets. The performance will therefore be improved by delivering the water on the