

Water-wheels are of two kinds, distinguished by the manner in which water is made an impelling power, viz. by its weight, or by its impulse. This requires a very different form and manner of adaptation; and this forms an ostensible distinction, sufficiently obvious to give a name to each class. When water is made to act by its weight, it is delivered from the spout as high on the wheel as possible, that it may continue long to press it down: but when it is made to strike the wheel, it is delivered as low as possible, that it may have previously acquired a great velocity. And thus the wheels are said to be *OVERSHOT* or *UNDERSHOT*.

Of Overshot Wheels.

THIS is nothing but a frame of open buckets, so disposed round the rim of a wheel as to receive the water delivered from a spout; so that one side of the wheel is loaded with water, while the other is empty. The consequence must be, that the loaded side must descend. By this motion the water runs out of the lower buckets, while the empty buckets of the rising side of the wheel come under the spout in their turn, and are filled with water.

If it were possible to construct the buckets in such a manner as to remain completely filled with water till they come to the very bottom of the wheel, the pressure with which the water urges the wheel round its axis would be the same as if the extremity of the horizontal radius were continually loaded with a quantity of water sufficient to fill a square pipe, whose section is equal to that of the bucket, and whose length is the diameter of the wheel. For let the buckets *BD* and *EF* (Fig. 5.) be compared together, the arches *DB* and *EF* are equal. The mechanical energy of the water contained in the bucket *EF*, or the pressure with which its weight urges the wheel, is the same as if all this water were hung on that point *T* of the horizontal arm *CF*, where it is cut by the vertical or plumb-line *BT*. This is plain from the most elementary principles of mechanics.