periments to reach 0.68. It is better to take it at 0.6 in estimating the power of the wheel, so as to allow some margin.

158. The Reaction Wheel; Barker's Mill.— Fig. 85 shows a simple reaction wheel. ACB is a tube, capable of revolving about its axis, which is vertical, and having a horizontal tube DBE connected with it. Water is supplied at C, which descends through the vertical tube, and issues through the orifices D and E at the extremities of the horizontal tube, so placed that the direction of motion of the water is tangential to the circle described by the orifices. The efflux is in opposite directions from the two orifices; as the water flows through BD, the pressures on the sides balance each other except at D, where there is an uncompensated pressure on the side opposite the orifice; the effect of this pressure or reaction is to cause motion in a direction opposite to that of the jet. The same effect is produced by the water issuing at E, and a continued rotation of the machine is thus produced by the reaction of the jet in each arm.

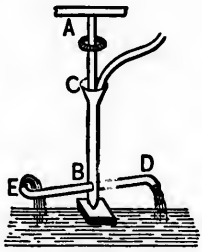

Fig. 85

Let h be the available fall, measured from the level of the water in the vertical pipe to the centres of the orifices, v the velocity of discharge through the jets, and V the velocity of the orifices in their circular path. When the machine is at rest, the water issues from the orifices with the velocity $\sqrt{2gh}$ (neglecting friction). But when the machine rotates, we have for the velocity of discharge through the orifices, from (1) of Art. 89,

$$v = \sqrt{V^2 + 2gh}. \qquad (1)$$

While the water passes through the orifices with the velocity v, the orifices themselves are moving in the opposite