Fig. 11

It will be noticed that the deficit of the actual from the calculated efficiency increases steadily as the speed is increased. It is suggested that this may be attributed to two causes.

(1) The best effect of the impact occurs when the sharp edge of the wedge is perpendicular to the line of the impinging jet. This condition only occurs at one point in the arc of action. At all other points the position of the edge of the wedge departs more or less from the perpendicular position, as in fig. 11, and the deflection does not take place in the manner assumed with the consequence that the efficiency of the impact is more or less impaired. The higher the speed of the wheel the greater is the arc of action, and consequently the greater will be the departure of the cutting edge of the wedge from perpendicularity to the line of the jet. This would mean that the loss of efficiency of the impact is less when the arc of action is smaller, or the speed small, and that the loss of efficiency increases as the arc of action increases or as the speed is increased.

(2) It was pointed out how the action of the outer lip or scoop at the beginning of the arc of action tended to impair the efficiency of the wheel. It will be seen that if the arc of action is large enough the same effect will take place at the end of the arc of action, as well as at the beginning. If, therefore, the speed is increased to such an extent as to allow this to occur, there will be a further cause of loss of efficiency at high speeds.

It is estimated that the efficiency would not suffer diminution from this latter cause until the velocity reaches a value of 800 revolutions per minute with the 175 foot head or a value of 900 revolutions per minute with the 235 ft. head. It will be noticed on reference to table IV that the discrepancy between the theoretical and actual efficiencies shows a marked increase for those respective speeds.

In addition to the trials quoted and compared with the theoretical results, trials were also made with the small $\frac{1}{2}$ inch nozzle. Complete tables of all the results obtained are given.

I.—NOZZLE .5277″ DIAMETER.

(*a*) Pressure 50 lbs. per sq. inch.
Equivalent head = 115 feet.
Discharge = 45 galls. per second.

Speed.	Horse Power.	Efficiency.
252	.79	50.7
322	.76	48.5
398	.93	59.1
400	.86	57.0
407	.84	53.5
438	.87	56.7
450	.94	59.9
497	.96	62.8
506	.94	60.4
545	.95	60.6
551	.95	61.0
565	.84	55.7
585	.76	47.3
588	.83	52.6
625	.91	55.7
638	.91	58.3
665	.83	52.2