

through the nozzle, C, but on this nozzle, C, an upward or lifting brass spindle valve, H, was attached having a piece of 2 inch pipe, I, of about 2 feet high, covering it. This pipe, I, was closed at the top, but had a lateral branch pipe, J, of one inch bore inserted into it above and near the valve, H. The pipe, J, formed the rising main through which the water to be raised had to ascend. The upper space in the pipe, I, acted as an air-chamber or air cushion. In large machines, a vacuum valve is inserted in the end of this air-chamber, to supply any deficiency of air, but in this experimental machine it was omitted.

The upright pipe, J, was 80 feet high, measured from the ram, or 73 feet above the level of the water in the supply cask. It was furnished with 3 outlet cocks at various heights. The object of these cocks was merely to ascertain the difference in the volume of water, which would be thrown up by the ram at different heights.

The action of the machine, as detailed in Mr. Latrobe's letter, may appear complicated to our readers, but, with the help of the diagram, we think it can be easily understood.

Having filled the water cask, F, the water runs down the pipe, E, and by the time it reaches the valve, B, it has acquired a momentum, which closes the valve, and the only escape is by the valve, C. Through this valve it rushes up into the air-chamber, I, and into the pipe, J. The momentum having been expended, the valve, B, falls, and a quantity of the water rushes out, through the open valve. The water again acquires a fresh momentum, closes the valve, B, and part of it again forces open the valve, C, increasing the column in the pipe, J. The fall and closing of the valves is like a smart blow of a hammer, and they close and open with great precision. In the machine we saw, the strokes were 70 each minute, and plainly heard at the distance of 150 feet. In the course of two or three minutes, the pipe, J, became full, and ran over at the top. On measuring the quantity of water, which was thus thrown up in 312 minutes, 73 feet above the level in the water cask, it was found to be 4 gallons; and as during the 12 minutes, 96 gallons of water had passed from the water cask, into the ram, it appears, that it required 23 gallons of water to raise one gallon to 10½ times its own height.

The experiment was continued, and the same quantity of water, 4 gallons, was thrown up 66

feet high, in 11 minutes, 53 feet high in 7 minutes, and 42 feet high in 4 minutes. Thus, in the last trial, the machine required 28 gallons of water to throw up 4 gallons to 6 times the height of the fall. It would have been easy to have made the head of water 10, 20, or 30 feet high and a series of interesting experiments might be made, to ascertain experimentally the relative differences in the momentum of the water descending from a greater or less distance, the fall of 7 feet, however, was preferred, in order to give the machine the ability to throw up water to more than ten times the height of the fall, a difference which would not often occur. Whether a fall of 70 feet instead of 7 would have thrown up the same relative quantity of water 420 feet, is a question we confess we are not able to solve.

The pipe, E, it is found, must be 30 or 40 feet long, or the valve, G, will not work, almost all the water ran out of it, when the water cask was put directly over the ram. The valve made 50 strokes in a minute. It is not necessary to have the pipe E a perfectly straight one, but it may be bent to suit the inequalities of the ground, and may even be bent at right angles, as shown in the sketch at K.—*Am. Ag.*

THE HOUSEWIFE'S DEPARTMENT.

RECIPES FOR MAKING CAKES.

Composition Cake.—One pound of flour, one of sugar, half a pound of butter, seven eggs, half a pint of cream.

Tea Cake.—Three cups of sugar, three eggs, one cup of milk, two cups of flour, a small lump of pearl ash, and make it not quite as stiff as pound cake.

Loaf Cake.—Five pounds of flour, one of sugar, three-quarters of a pound of lard, and the same quantity of butter, one pint of yeast, eight eggs, one quart of milk; roll the sugar into the flour, and the raisins and spice after the first rising.

Soft Gingerbread.—Six tea cups of flour, three of molasses, one of cream, one of butter, one table spoonful of ginger, one glass of wine, and a nutmeg.

Jumbles.—Three pounds of flour, two of sugar, one of butter, eight eggs, with a little caraway seed, and a little milk, if the eggs are not sufficient.

Soft Cakes in little pans.—One and a half pounds of butter rubbed into two pounds of flour;