Suppose, now, that we plug up both orifices in the bottom of the tank, and substitute an orifice or outlet at the surface, and, for simplicity of calculation, call it a rectangular notch extending upward to the top of the tank. Let the other conditions of the problem remain the same, viz., a constant influx and efflux of three cubic feet per second.

Assuming the notch to be two feet in width, what will be its depth from the surface of the water to the sill to discharge 3 cubic feet per second?

Let b = the width, while the rest of the notation remains the same as above.

By Rankine's Formula, the discharge

$$D = 8\cdot025\, c \times \tfrac{2}{3}\, b\, h_1^{\frac{3}{2}}$$
$$= 5\cdot35 \times \cdot5 \times 2\, h_1^{\frac{3}{2}}$$
$$= 5\cdot35\, h_1^{\frac{3}{2}}$$
$$\therefore\ h_1^{\frac{3}{2}} = \frac{D}{5\cdot35}$$
$$= \frac{3}{5\cdot35} = \cdot56.$$

Squaring both sides.

$$h_1^3 = \cdot56^2$$
$$h_1 = \cdot56^{\frac{2}{3}}$$
$$\log.\ \cdot56 = \bar{1}\cdot7481880 \times \tfrac{2}{3}$$
$$\cdot68 = \bar{1}\cdot8221353.$$
$$\cdot68 \text{ feet} = 8\cdot16 \text{ inches}.$$

Again, suppose that a second rectangular notch is made in the tank capable of discharging ·2 cubic feet per second, with the sill of both orifices or notches at the same elevation; what will be the width, b_1, of the second orifice?

Using the same notation and formula—

$$D = 8\cdot025\, c \times \tfrac{2}{3}\, b_1 h_1^{\frac{3}{2}}$$
$$= 5\cdot35 \times \cdot5 \times \cdot56\, b_1$$
$$= 1\cdot498\, b_1$$
$$\therefore\ b_1 = \frac{D}{1\cdot498} = \frac{\cdot2}{1\cdot498}$$
$$= \cdot1335 \text{ feet} = 1\cdot6 \text{ inches}.$$

Next to find the height of the surface of the water in the tank above the sill of the notch, when the two orifices or notches will discharge 3 cubic feet per second, that is to say, when the equilibrium between influx and efflux is again restored?

Let x be the difference of elevation between the original depth of water on the sill when the one notch is discharging 3 cubic feet per second, and that when the two notches are discharging 3·2 cubic feet per second.

Then $h_1 - x$ will be the depth of water on the sill when equilibrium is again established between inflow and outflow.

Call b_1 = combined width of both notches, the other notation remaining the same. Then

$$D = 8\cdot025\, c \times \tfrac{2}{3}\, b_1 h_1^{\frac{3}{2}}$$
$$= 5\cdot35 \times \cdot5 \times 2\cdot1335\, h_1^{\frac{3}{2}}$$
$$= 5\cdot707\, h_1^{\frac{3}{2}}$$
$$\therefore\ h_1^{\frac{3}{2}} = \frac{D}{5\cdot707}$$
$$= \frac{3}{5\cdot707}$$
$$= \cdot52567$$