(therefore $\frac{1}{T_2^2} = \frac{1}{(T^1)^2} = \frac{1}{(2\,T_0^1)^2} - \frac{1}{(T^1)^2}$ is positive)

which shows that we should use the third form of the general integral which is

$$y = \left(R_1\, e^{+\frac{t}{T_2}} + R_2\, e^{-\frac{t}{T_2}}\right) e^{-\frac{t}{2\,T_0^1}}$$

Further, $m = \dfrac{-E}{\dfrac{A\,T_0}{k\,T^2} + 1} = -.354$ feet

$T_0^1 = 14.3$ sec. $T^1 = 51$ sec. $T_2 = 34.6$ sec., so that

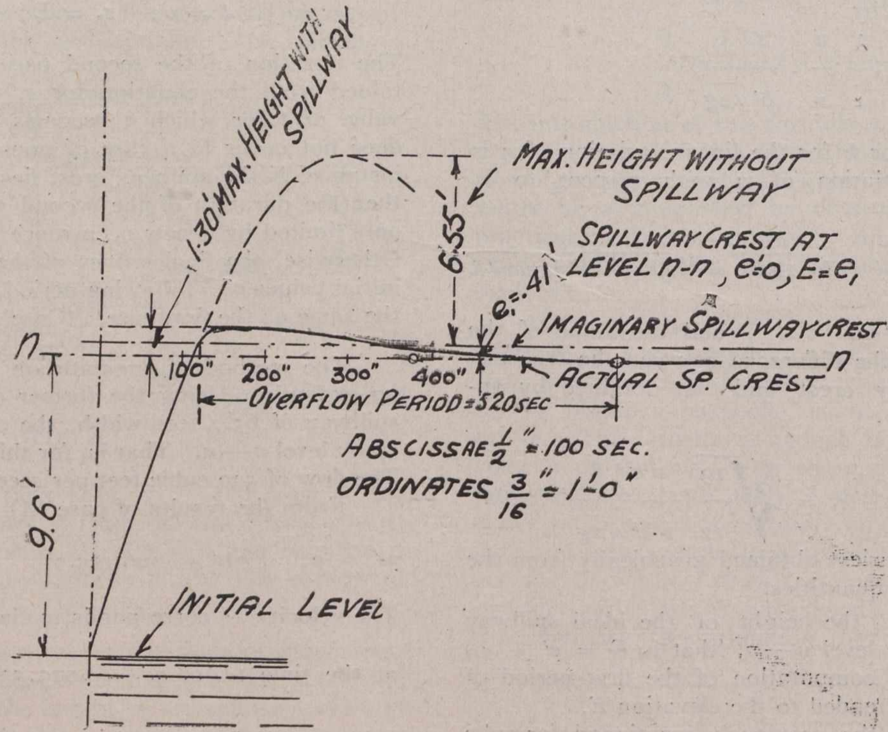

Fig. 9.

$$z = +.354 + \left[R_1\, e^{+\frac{t}{34.6}} + R_2\, e^{-\frac{t}{34.6}}\right] e^{-\frac{t}{28.6}}$$

$$= +.354 + R_1\, e^{-\frac{t}{165}} + R_2\, e^{-\frac{t}{15.65}}$$

$$s = \frac{dz}{dt} = -\frac{R_1}{165}\, e^{-\frac{t}{165}} - \frac{R_2}{15.65}\, e^{-\frac{t}{15.65}}$$ and for $t = o$

$$+.410 = +.354 + R_1 + R_2;\quad .073 = -\frac{R_1}{165} - \frac{R_2}{15.65};$$

therefore, $R_1 = 1.33$ feet and $R_2 = -1.27$ feet

$$z = +.354 + 1.33\, e^{-\frac{t}{165}} - 1.27\, e^{-\frac{t}{15.65}}$$

$$s = -.00805\, e^{-\frac{t}{165}} + .0810\, e^{-\frac{t}{15.65}}$$ which values give the following table:

Seconds $t=$	o	50	100	150	200
feet $z=$	+.41	+1.282	+1.079	+.881	+.746
feet per sec. $s=$	+.073	—.00261	—.0044	—.0032	—.0024

The time of the highest elevation is determined with $s = o$ from equation $o = -.00805\, e^{-\frac{t_1}{165}} + .0810\, e^{-\frac{t_1}{15.65}}$ to $t_1 = 40$ seconds and z max. follows:

$$z\ \text{max} = +.354 + 1.33\, e^{-\frac{40}{165}} - 1.27\, e^{-\frac{40}{15.65}} = 1.30 \text{ ft.}$$

This water level corresponds to an overflow quantity of 300 cubic feet per second. For the determination of the ideal overflow height and the factor of proportionality, we used the maximum overflow quantity of 282 cubic feet per second. It is therefore shown that the assumption made that $u = 0.7$ is correct. The duration of the overflow period follows from

$$.41 = +.354 + 1.33\, e^{-\frac{t}{165}} - 1.27\, e^{-\frac{t}{15.65}}$$

and is $t_x = 520$ seconds.