instead of $-Px'$. The formulas used for vertical loading can be applied to horizontal loading by changing x' to y''. Then,

$$\left.\begin{aligned} H_L &= P\,\frac{-\int_A^R y''\,y\,d\,w}{\int_L^R y^2\,d\,w} = P\,\frac{-\sum_A^R y''\,y\,\Delta\,w}{\sum_L^R y^2\,\Delta\,w} \\ V_L &= P\,\frac{\int_A^R y''\,x\,d\,w}{\int_L^R x^2\,d\,w} = P\,\frac{\sum_A^R y''\,x\,\Delta\,w}{\sum_L^R x^2\,\Delta\,w} \\ M' &= P\,\frac{\int_A^R y''\,d\,w}{\int_L^R d\,w} = P\,\frac{\sum_A^R y''\,\Delta\,w}{\sum_L^R \Delta\,w} \end{aligned}\right\} \cdots\cdots(29)$$

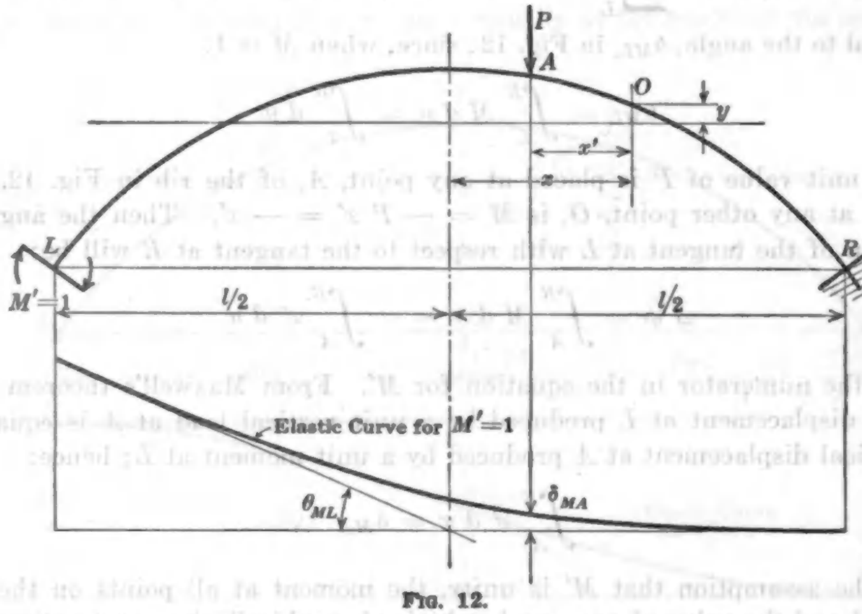

FIG. 12.

***Graphical Determination of H for Horizontal Loads.*—**

$$H_L = P\,\frac{\sum_A^R y''\,y\,\Delta\,w}{\sum_L^R y^2\,\Delta\,w}$$

The denominator in this equation is the same as that for vertical loads and is found in the same way; it is δ_{HL}.

The numerator is also found as previously. When $P = 1$, the moment at any point, O, is $M = -P\,y'' = -y''$. The horizontal displacement of L' due to $P = 1$ is:

$$\Delta\,x = \int_A^R M\,y\,d\,w = -\int_A^R y''\,y\,d\,w$$