Art. 6. Methods of Calculation. — Our three equations of equilibrium, Art. 5, furnish us with two methods of calculation: *the method by resolution of forces*, and *the method of moments*. The principle of the first method is embraced in the first two equations of equilibrium; the principle of the second method is embraced in the third equation of equilibrium.

Either of these methods may be used in the solution of any given case; but in general there will be one, the employment of which in any special case will be found easier and simpler than the other. Sometimes a combination of both methods furnishes a readier solution.

Remark. — A section may be passed through a truss in any direction, separating it into any two portions. Thus, in Fig. 5, a section may be passed around *h*, cutting *hc*, *hk*, and *ha*. Then the internal stresses s_4, s_5, s_3, and the apex load of 10,000 lbs. at *h* form a system of forces in equilibrium, to which our equations are applicable.

A judicious selection of directions for the resolution of the forces often simplifies the determination of the stresses. Thus, to find s_5 in Fig. 5, if we resolve the forces into a direction perpendicular to the rafter *ac*, we shall obtain an equation free from the forces s_3 and s_4; whereas if the directions are taken at random, all of the forces will enter the equation. This principle is a very useful one.

Thus, we have at once in Fig. 5, calling θ the angle between the load and the rafter,

$$10000 \sin\theta + s_5 = 0. \quad \therefore\ s_5 = -10000 \cos cad = -7895 \text{ lbs.}$$

as before.

Similarly, if a section be passed around *d* in Fig. 5, cutting *dk*, *dc*, and *db*, and the vertical components be taken, the stress in *dc* is found at once to be zero.

In solving by the second method, the center of moments