the point of contact, its horizontal thrust equals the weight sustained, multiplied by the horizontal, and divided by the vertical reach of the brace. But the horizontal and vertical reaches are respectively as the sine and cosine of the angle made by the tangent with the vertical; that is, as \( ab \) and \( bd \), Fig. 17, while the weight is also as the sine \( ab \), of the angle \( adb \). Hence, the weight by the horizontal reach, is as \( ab^2 \), or as the square of the sine of \( adb \); and the constant horizontal thrust of the arch at all points, is as \( \frac{ab^2}{bd} \); or, as \( \frac{ab^2}{\frac{1}{2}bd} \).

Now this condition is answered by the parabola, in which \( bc = cd = \frac{1}{2} bd \), and \( \frac{ab^2}{bd} = \frac{1}{2} \frac{ab}{cd} = \text{constant} C \), whence \( ab^2 = cb \times \text{constant} 2C \), which is the equation of the parabola.

This quality of the arch truss, allowing nearly all of the compressive action to be concentrated upon almost the least possible length, and consequently, enabling the thrust material to work at better advantage than in plans where this action is more distributed, and acts upon a greater number and length of thrust members, enables it to maintain a more successful competition with other plans than we might be led to expect, in view of the greater amount of action upon materials in the arch truss, than what is shown in trusses with parallel chords. Hence, we should not too hastily come to a conclusion unfavorable to the arch truss, on account of the apparent disadvantage it labors under, as to amount of action upon material. These apparent disadvantages are frequently overbalanced by advan-