already mentioned, and which lie nearly on the same meridian (say 4° 30′ W.)* The difference of their latitudes would have been their distance measured on the celestial vault, if all three had had the same longitude; but as their condition was not fulfilled, it became necessary, by a process of arpentage, to find the absolute difference which corresponded to the difference of the latitudes of these three towns.

This procedure is called *Triangulation*. We furnish a few explanations of the manner in which it is carried out.

To perform an experiment in *triangulation*, we must first procure a *base*, by measuring, as accurately as possible, the length of a line traced upon the ground; then we observe the angles made by the base, at its two extremities, with two visual rays which abut on one and the same distant point. We have thus secured the figure of a triangle, whose three sides are formed by the base and two visual rays; we may trace it upon paper, and read, by a simple proportion, the distance of the apex from the two extremities of the base (Fig. 32). Suppose, for example, that the base measures 1000 yards; if, in the tracing of the triangle, one of these sides should be found equal to double the base, we conclude that the true distance of the summit from either extremity of the base is 2000 yards. On one of the two sides we afterwards construct a second triangle, having for its apex another distant view-point, as a church-spire, or a pyramid raised for the purpose; and continuing in this way, we eventually form an uninterrupted chain of triangles extending in the direction of the meridian.

We have now nothing more to do than to note the points where the meridian encounters the sides of those triangles whose length has been calculated, and by a very simple process we obtain the length of a portion of the meridian itself. Having, at the same time, determined astronomically the latitude of some of the trigonometrical stations (as A, B, C), we deduce the distance in latitude of the two extremities of the meridian measured on the ground, and this distance, expressed in degrees, and compared with the corresponding number of yards or miles, gives us the value of a degree of the meridian. Suppose, for example, that the extreme latitudes of the meridian be 48° 10′ and 51° 25′, and that the distance between these points be measured at 3° 15′, or about 393,500 yards, we conclude that the degree will equal about 121,300 yards.

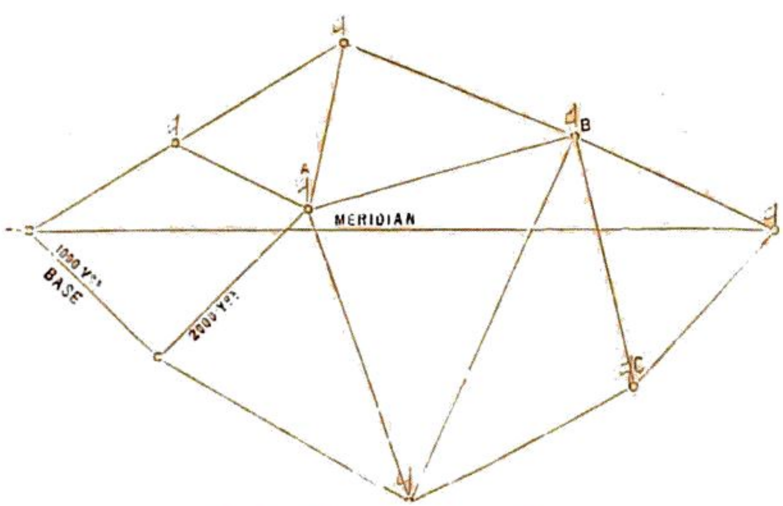

FIG. 32.—TRIGONOMETRICAL SURVEY.

It was by the employment of these trigonometrical processes that

* [Alkmaar, long. 4° 43′ W.; Bergen-op-Zoom, 4° 17′ W.; Leyden, 4° 29′ E.]