

the continuance of the vibrations the image is highly illuminated in the analyser and becomes darkened when the vibrations cease. This method was developed much further by Kundt in 1864 and by Mach in 1873.

A third optical method was devised by Töpler and Boltzmann in 1870 for the purpose of exhibiting the changes which take place at a nodal point of a vibrating column of air. This method consists in producing interference bands by means of two rays of intermittent light from the same source, one of which passes through the air in its normal state, and the other through a nodal point of the vibrating air column. A vibratory movement of the interference bands results, a movement which can be made as slow as we please, thus rendering it possible to deduce by stroboscopic methods exact measurements as to the movement of the air at the nodal point.

*Method of Manometric Flames.*—The object of the method of manometric flames, invented by Rudolph Kœnig in 1862, is to furnish an ocular proof of the variations in density at a point of the air traversed by waves originating in another body or in the air itself. A short description of the first apparatus based on this method appeared in Poggendorff's "Annalen" in 1864. Between that year and 1872 the method was applied to a series of instruments, the experiments being described in the same Journal in a long memoir entitled "Les Flammes manométriques". Although this method is extremely sensitive and capable of furnishing very accurate results, it has been prevented for a long time from rendering more efficient service on account of two causes: first, the want of sufficient brightness in the reflected images of the jumping flames, and second, the difficulty of observing the details of these images owing to their momentary appearance in the mirror. The former of these difficulties has now been overcome by the employment of acetylene and other gases, which at the same time allow admirable photographs of the flames to be taken, thus obviating the second difficulty also. We owe an important paper on this subject to Professors E. L. Nichols and Ernest Merritt, published in 1898 in the "Physical Review".

*Kundt's Method.*—In 1865 Kundt published his method of using light powders for the purpose of exhibiting the vibratory character of stationary air waves in columns and plates of air. During the existence of these vibrations the light powders arrange themselves in transversal striæ which collect around the loops, and are wanting at the nodes. As in the case of the nodal lines on Chladni's plates, a satisfactory explanation of these striæ was for a long time wanting. In 1890 Professor Walter Kœnig showed from hydrodynamical considera-