

stone, raising the liquid behind it in a circle; and so on; the result being the case of sound, however, the waves of air do not form rings, but the succession of concentric circles with which we are all familiar. In concentric globes; hence as a consequence of the geometrical proof that the surface of spheres varies as the square of their radii, we have the principle; *The intensity of sound waves varies inversely as the square of the distance from its source.*

We have stated that it was not our intention of treating this subject from a purely scientific standpoint, but rather from that of the interest ed observer, so, having dealt with the main principles of sound, we will now consider its chief qualities, namely, pitch, timbre, intensity, reflection and refraction. In considering pitch and timbre, we will take up that part of physics devoted to the physical theory of music.

To determine the pitch of any sound the number of vibrations must be calculated, and, consequently, the pitch of a musical note is determined by the number of vibrations per second yielded by the body producing the note. The more rapid the vibrations, the higher the pitch and hence this quality of sound is responsible for our difference in tones. These differences have given rise to scales commonly known as the harmonic, the diatonic, and the chromatic scales. The harmonic scale, the first scale used by ancient peoples, is a series of octaves, each tone of which is double its predecessor as regards vibratory value. The diatonic is the scale generally used to-day, and the notes comprising it are known by the names *do, re, mi, fa, sol, la, si, do*. The chromatic scale is really a semi-tone scale, as it consists in lowering or raising the notes a half tone. Regarding the production of different notes we can but mention the syren, which, by a succession of puffs of air gives us the simplest method of measuring pitch. To Savart are we indebted for our knowledge of perceptible sound. He found that with seven or eight vibrations a second, the ear perceived a distinct but deep sound, while acute sounds were audible up to those corresponding to 38,000 vibrations a second. But considered musically those sounds which are available range from about 40 to 4,000 vibrations per second.