

ble sound, although its parts are visibly thrown into the usual vibratory motions. In proportion as air is admitted into the receiver, the sound becomes more and more distinct; and if, on the other hand, the air be condensed, the sound is louder than when the bell is surrounded by air of the ordinary density.\*

The impulses given by the sounding body to the contiguous particles of the elastic medium, are propagated in every direction, from particle to particle, each, in its turn, striking against the next, and communicating to it the whole of its own motion, which is destroyed by the reaction of the particle against which it strikes. Hence, after moving a certain definite distance, a distance, indeed, which is incalculably small, each particle returns back to its former situation, and is again ready to receive a second impulse. Each particle, being elastic within a certain range,† suffers a momentary compression, and immediately afterwards resumes its former shape: the next particle is, in the mean time, impelled, and undergoes the same succession of changes; and so on, throughout the whole series of particles. Thus, the sonorous undulations have an analogy to waves, which spread in circles on the surface of water, around any body, which, by its motion, ruffles that surface; only that, instead of merely extending in a horizontal plane, as waves do, the sonorous undulations spread out in all directions, forming, not circles in one plane, but spherical shells; and, whatever be the intensity of the sounds, the velocity with which the undulations advance is uniform, as long as they continue in a medium of uniform density. This velocity in air, is, on an average, about 1100 feet in a second, or twelve and a half

\* These facts were first ascertained by Dr. Hawksbee. See Philosophical Transactions for 1705, vol. xxiv. p. 1902, 1904.

† The particles of water are as elastic, within a limited distance, as those of the most solid body, although, in consequence of their imperfect cohesion, or, rather, their perfect mobility in all directions, this property cannot be so easily recognised in the masses of fluids, as in solids.