

Energy of Motion and of Position. 19

In the whole process there has been no change in the amount of energy; it has simply gone through a series of transmutations. First it was energy of position held in the powder by the force of chemical affinity. When this was released by igniting the powder, a portion of its energy was transferred to the ball, which robbed the gases of a portion of the heat and passed from molecular into mechanical energy, which in its flight upward has been gradually converted into energy of position; in its fall downward it is gradually reconverted into mechanical energy, and finally, when it strikes the earth, there is another transmutation into that of molecular, and a new production of heat. (Friction against air is not here considered.)

Another instance of energy of position may be found in a body of water having a level higher than that of the ocean's surface. If this body of water is released it will flow down to the lower level, and during its progress it is able to do work, such as grinding grain, sawing wood, or driving the machinery of a factory. When it has reached its lowest level it no longer possesses the power to do work. In order to restore to it the same power that it had at the higher level we should have to expend the same amount of energy in pumping it back that it gave up when it ran down. As a matter of fact we should have to expend a