

enough to absorb the reaction, so that the recoil will not be too great.

If we should plant a cannon in a perpendicular position, with the breech resting firmly upon the earth, and fire it, the earth itself would recoil, and the law of action and reaction would hold in this instance as truly as in the first one cited, where two balls were fired from the same gun-barrel. The recoil of the earth, however, would be so infinitesimally small, because of the great weight compared with that of the cannon-ball, that it can be practically ignored. The energy of recoil is really almost entirely represented by heat. Theoretically, however, we must admit that the earth does recoil. The converse of this is true when a cannon-ball has reached its most elevated position. There is a moment when all of its energy of motion has been converted into that of position (except that which has passed into heat by the friction against the atmosphere), and then the ball and the earth attract each other by the force of gravitation and they move toward each other. The weight of the ball is so infinitesimal as compared with that of the earth that the movement of the latter would be an almost immeasurable quantity. However, the law holds good both in the flight of the ball upward and in descent. If this same cannon-ball could be caught by some power and held