A rejoinder to the Problem Editor's comment on the solution to Problem 63 by W.A. O'N. Waugh.

In the solution we consider an impact between perfectly elastic balls of equal mass. Writing u, w for their velocities before impact and u', w' for their velocities after impact we make use of the relation

$$u - w = -(u' - w') \tag{1}$$

which the Solver attributed to an experimental law due to Newton. The Editor described this as misleading in that (1) is a consequence of the conservation of momentum and of energy.

Reference to Newton's "Principia" (Motte's Translation, revised by Cajori, University of California Press, 1934) will show that Newton performed a series of experiments on "percussion and reflection" of suspended spherical bodies with a view to testing his third Law of Motion. He describes the experiments in the Scholium to the Laws of Motion in terms that indicate that he is primarily interested in perfectly elastic bodies. He then admits that this would require that such bodies be available, "whereas no such bodies are to be found in Nature", and he proceeds to a discussion of changing the materials of the spheres (compressed wool, steel, cork, glass). He arrives (loc. cit. page 25) at conclusions which in present day notation would be written

$$u - w = -e(u' - w') \quad \text{where} \quad 0 < e < 1 . \tag{2}$$

This part of his discussion, and in particular his final remark "And thus the third Law, so far as it regards percussions and reflections, is proved by a theory exactly agreeing with experience", clearly indicates that he regards the ideal or limiting case (where $e = 1$) as a direct consequence of his experiments. This is of course our relation (1). The fact that energy would be conserved in such an ideal case is then in turn a consequence of (1).

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